

**Social Equity and Payments for Ecosystem Services:
From Macro to Micro**

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In memory of Blanca Elisa Cuastumal Pastás.

Your kindness and generosity will always be remembered.

En memoria de Blanca Elisa Cuastumal Pastás.

Su amabilidad y generosidad siempre serán recordadas.

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Summary

As attested by the recently published IPBES' Global Assessment on Biodiversity and Ecosystem Services, which provides a state of the art review of the collective knowledge regarding ecosystems around the world, nature is being degraded at an alarming rate in almost every corner of the planet. This fact is contributing to rising concerns that irreversible degradation will take a significant toll on human wellbeing. This is particularly the case in the Global South where many of the world's most vulnerable stakeholders live and closely rely on the nature's contributions to people, including ecosystem services (ES).

Attempts by policy makers to reverse this trend have included a multitude of different environmental management approaches. Over the last two decades one such approach that has garnered widespread interest is based on the use of payments for ecosystem services (PES). PES consist of voluntary programs in which land users receive positive incentives (payments, rewards or in-kind compensation) in exchange for carrying out actions that (are expected to) provide socially valuable but undersupplied ES. Examples include implementing more environmentally friendly farming practices or conserving forested land that are associated with the conservation of regulating ES. From the perspective of a social planner, PES offer a promising way to distribute the limited funds available for environmental conservation in a cost-effective way to internalize environmental externalities and in this way to seek to enhance social welfare. This is because PES funds can, through careful targeting, cost-effectively prioritize areas where costs of conservation are relatively low while the environmental benefits are relatively high.

Perhaps the most characteristic difference between PES and other types of environmental policy tools such as protected areas or environmental taxes is that PES follows a 'steward-rewarded' design. This makes PES particularly well suited for contexts where the people tasked with changing their land use practices have low incomes, as using 'polluter-pays' approaches may raise both ethical and practical issues where the polluter cannot afford a fine or tax. As a consequence, PES has received much interest as a promising approach that under

the right circumstances may be capable of conserving nature while also tackling development goals. This has contributed to the use of PES growing rapidly in the Global South, especially in Latin America, where issues of justice and equity are very salient given that in these contexts many stakeholders are particularly vulnerable for a variety of reasons (e.g. low income and education, marginality, poor governance, high dependence on natural resources for their livelihoods). However, this also raises issues related to the robust governance of PES under weak formal institutional settings.

Nonetheless, the academic literature is divided regarding the degree to which PES should also focus on non-environmental objectives, such as developmental ones, due to the potential risk of jeopardizing conservation outcomes in the process. However, there is growing evidence that PES that ignore social equity concerns may be perceived as politically and socially illegitimate and thus face opposition or weak buy-in. This is particularly visible in the case of indigenous communities, which have a mixed track record with PES and in some occasions have opposed these programs for being incompatibly framed with their worldviews about nature and their own wellbeing. The objective of this dissertation is, therefore, to shed some light on the debate regarding the degree to which social equity concerns should be present during PES design. Rather than examining this debate from an ethical or normative perspective, the overarching goal is to pursue this question from a practical and instrumental point of view: does making PES more equitable increase the likelihood that they will be successful, and if that is the case, how do we make them so?

This thesis includes three empirical chapters based on corresponding scientific articles, covering the following content:

- (1) The first article is called *The impact of social equity on the outcomes of payments for ecosystem services: Practitioners' perceptions in Latin America*, and was co-authored by Unai Pascual and Stefanie Engel. The goal of this paper is to explore the interlinkages, synergies and tradeoffs between considering equity in PES design and their social and environmental outcomes. This article presents the results of a survey targeted at 61 PES practitioners engaged in 45 different PES programs across 12 Latin American countries to investigate the relationship between different dimensions of equity in PES design and implementation, and the environmental and social outcomes

of these programs. The survey gathers information from PES practitioners who have first-hand experience with programs that target various ecosystem services at different scales, from local to national. A major contribution of this study is that it considers equity in a multidimensional way, not only including distributive concerns but also elements of recognition and procedure, which are reflected in 15 indicators. The results suggest that PES that are perceived by practitioners to be more equitable in their design and implementation are associated with a greater degree of success in achieving their intended environmental *and* social goals. The implications are that PES practitioners might not only concern themselves with equity for ethical reasons (“because it is the right thing to do”), but also for instrumental reasons (“because it will contribute to PES success”).

- (2) The second article is called *Deliberative Monetary Valuation as a Transdisciplinary Approach: Increasing the Credibility and Salience of Valuation in the Global South*, and was co-authored by Petr Mariel, Unai Pascual and Stefanie Engel. The goal of this paper was to explore whether deliberative monetary valuation (DMV) approaches can be effectively used in contexts of the Global South to elicit stakeholder preferences regarding PES design in a procedurally equitable way, and if so, to see what are the advantages of using this type of approach. This paper analyses this topic through the application of a deliberative choice experiment in a rural community in Colombia. Results suggest that at least in some contexts, DMV is superior to conventional stated preference approaches in terms of its capacity to elicit more considered and informed preferences. This study finds that the DMV approach offers multiple learning opportunities for participants, the benefits of which are greater for those for whom valuation exercises may seem cognitively complex, including older and less educated participants. The study controls for the possibility of participants with a higher social status exercising a dominant role during the deliberative process and does not find conclusive evidence in this regard. Findings suggest that one of the main potential advantages of the DMV approach applied in the Global South is that it allows participants to express a more diverse set of instrumental, relational and intrinsic values, providing much richer information than that usually obtained from conventional

valuation approaches. This article concludes that DMV approaches can be a useful way to aid decision making in complex social-ecological contexts.

- (3) The third article is called *Payments for ecosystem services or collective stewardship of Mother Earth? Applying deliberative valuation in an indigenous community in Colombia*, and was co-authored by Unai Pascual, Stefanie Engel and Petr Mariel. The objective of this article is to explore how PES can be adapted to indigenous communities—which have unique ways of relating to the environment—in ways that guarantee that they are equitable and do not lead to unintended negative outcomes. This paper is motivated by the fact that the literature on PES applied in regions where indigenous peoples are key social actors has not yet cast much light on their preferences as regards the framing and design features of economic incentives for conservation. Thus, in this study the preferences of an indigenous community in Colombia are analyzed using the results of the deliberative choice experiment described in the previous article. Whereas that article focuses on the deliberative methodology, this one follows a more ethnographic approach. It provides insights into why PES programs in which indigenous people are the key actors must meaningfully engage them in their co-design to be effective, as well as adapt any framing associated with PES to match their social representation of nature. A methodologically relevant finding is that deliberative valuation had a homogenizing effect on the preferences and views of the indigenous participants towards PES schemes.

As mentioned earlier, the overarching question that this thesis intends to shed some light on is whether making PES more equitable increases the likelihood that they will be successful. The findings of the three empirical chapters suggest that policy-makers would do well to keep equity consideration in mind when designing PES. This is because, contrary to other types of environmental policy tools, participation in PES is voluntary. As such, making them more socially equitable tends to increase the perceptions about how just such PES are and thus is likely to increase their legitimacy and uptake on the ground, further increasing participants' engagement and motivating the desired land use changes.

Zusammenfassung

In seinem letzten Bericht über den aktuellen Zustand der weltweiten Ökosysteme warnt der Weltbiodiversitätsrat (Zwischenstaatliche Plattform für Biodiversität und Ökosystemleistungen, IPBES) vor der Degradierung der Natur, die in alarmierender Geschwindigkeit in nahezu jedem Teil der Welt fortschreitet. Diese Tatsache trägt zu der wachsenden Besorgnis bei, dass die irreversible Degradierung der Natur das Wohlbefinden der Menschen erheblich verschlechtern wird. Dies gilt insbesondere für den Globalen Süden, wo zahlreiche Landnutzer am stärksten betroffen sind, weil sie von den Beiträgen der Natur, einschließlich der Ökosystemleistungen (ES), abhängig sind.

Die Versuche der Entscheidungsträger, diesen Trend umzukehren, haben zu vielfältigen Ansätzen im Umweltmanagement geführt. Einer dieser Ansätze, der auf Zahlungen für Ökosystemleistungen (PES) basiert, ist in den letzten zwei Jahrzehnten auf reges Interesse gestoßen. PES bestehen aus freiwilligen Programmen, die Landnutzern positive Anreize bieten (Bezahlungen, Belohnungen oder Sachleistungen), wenn sie Maßnahmen ergreifen, die (voraussichtlich) zu sozial wertvollen, jedoch unterversorgten Ökosystemleistungen führen. Beispiele sind die Einführung von umweltfreundlichen Anbaumethoden oder der Schutz von Waldflächen. Aus der Sicht eines Sozialplaners bieten PES eine vielversprechende Möglichkeit, die beschränkten Geldmittel, die für die Erhaltung der Umwelt zur Verfügung stehen, auf kostengünstige Art zu verteilen und so die externen Effekte der Umweltbelastung zu verinnerlichen und die soziale Wohlfahrt zu verbessern. Das erklärt sich daraus, dass die Geldmittel für PES in richtiger Dosierung solche Gebiete vorrangig behandeln, in denen die Kosten für den Umweltschutz relativ niedrig, die Vorteile für die Umwelt jedoch relativ groß sind.

Ein wesentlicher Unterschied zwischen PES und anderen umweltpolitischen Maßnahmen, wie Schutzgebiete oder Umweltsteuern, besteht darin, dass mit PES der Landnutzer belohnt wird. Daher sind PES besonders dann gut geeignet, wenn eine Änderung der Landnutzung erwünscht ist, das Einkommen der Menschen dazu jedoch nicht ausreicht.

Ansätze, die den Verursacher bezahlen lassen, können nämlich zu ethischen und praktischen Problemen führen, wenn der Verursacher ein Bußgeld oder eine Steuer nicht bezahlen kann. Daher wurde den PES große Beachtung geschenkt, weil sie einen vielversprechenden Ansatz bilden, um unter den richtigen Bedingungen die Natur zu schützen und gleichzeitig auch die Entwicklungsziele zu erreichen. Dies trug auch zum Aufschwung von PES im Globalen Süden, insbesondere in Lateinamerika, bei, wo Fragen rund um Gerechtigkeit und Gleichheit im Vordergrund stehen, weil viele Akteure aus verschiedenen Gründen besonders gefährdet sind (z. B. niedriges Einkommen und geringe Schulbildung, Ausgrenzung, schlechte Verwaltung, große Abhängigkeit von natürlichen Ressourcen für den Lebensunterhalt). Dies wirft jedoch auch Fragen im Zusammenhang mit der soliden Governance von PES unter institutionellen Rahmenbedingungen, die formal schwach sind, auf.

Ungeachtet dessen ist sich die akademische Literatur darüber uneinig, bis zu welchem Ausmaß PES sich auch auf nicht-umweltspezifische, beispielsweise entwicklungspolitische, Ziele erstrecken sollten, weil das potenzielle Risiko besteht, dass die Ergebnisse des Naturschutzes im Prozess gefährdet werden. Es gibt jedoch immer mehr Hinweise dafür, dass PES, die Aspekte der sozialen Gerechtigkeit ignorieren, als politisch und sozial illegitim betrachtet werden und daher zu Widerstand oder geringer Akzeptanz führen. Das zeigt sich insbesondere in indigenen Gemeinschaften, in denen PES-Programme nicht immer gut aufgenommen werden. Auch widersetzen sich diese Gruppen oft diesen Programmen, weil sie mit ihrem Verständnis von Natur und dem eigenen Wohlbefinden nicht vereinbar sind. Daher ist es das Ziel dieser Dissertation, in die Debatte, inwieweit soziale Gerechtigkeit beim PES-Design berücksichtigt werden sollte, etwas Licht zu bringen. Der Schwerpunkt liegt dabei nicht auf der ethischen oder normativen Perspektive, vielmehr ist das übergreifende Ziel, diese Frage von einem praktischen und instrumentellen Standpunkt aus zu untersuchen: Erhöht sich die Wahrscheinlichkeit, dass PES erfolgreich sind, wenn sie die soziale Gerechtigkeit besser berücksichtigen, und wenn dies der Fall ist, wie können wir erreichen, dass PES erfolgreich werden?

Die vorliegende Dissertation enthält drei empirische Kapitel, die auf wissenschaftlichen Studien mit folgendem Inhalt basieren:

- (1) Der erste Artikel, *The impact of social equity on the outcomes of payments for ecosystem services: Practitioners' perceptions in Latin America*, wurde von Unai Pascual und Stefanie Engel verfasst. Diese Studie untersucht die Verbindungen, Synergien und Trade-offs zwischen einem PES-Design, das die soziale Gerechtigkeit und deren soziale und ökologische Ergebnisse berücksichtigt. Anhand von 61 Personen, die an 45 verschiedenen PES-Programmen in 12 lateinamerikanischen Ländern teilnehmen, wird die Beziehung zwischen den verschiedenen Dimensionen der Gerechtigkeit im PES-Design und der Implementierung sowie den ökologischen und sozialen Ergebnissen dieser Programme beleuchtet. Die Studie sammelt Informationen von PES-Praktikern, die mit Programmen für diverse Ökosystemleistungen auf verschiedenen Ebenen von lokal bis national, aus erster Hand Erfahrung hatten. Ein wichtiger Beitrag dieser Studie ist, dass sie Gerechtigkeit multidimensional betrachtet, indem sie nicht nur Verteilungsfragen, sondern auch Elemente der Anerkennung und des Vorgehens behandelt, die sich in 15 Indikatoren widerspiegeln. Die Ergebnisse lassen darauf schließen, dass die PES, deren Design und Implementierung von den Praktikern als gerecht erfahren wurde, für die Realisierung der beabsichtigten ökologischen *und* sozialen Zielsetzungen erfolgreicher waren. Daraus folgt, dass PES-Praktiker nicht nur aus ethischen Erwägungen („weil es richtig ist, das zu tun“), sondern auch aus instrumentellen Gründen („weil es zum Erfolg der PES beiträgt“) sich mit PES auseinandersetzen könnten.
- (2) Die Autoren der zweiten Studie, *Deliberative Monetary Valuation as a Transdisciplinary Approach: Increasing the Credibility and Salience of Valuation in the Global South*, Petr Mariel, Unai Pascual und Stefanie Engel, untersuchen, ob Ansätze der deliberativen monetären Bewertung (DMV) in Kontexten des Globalen Südens effektiv genutzt werden können, um die Präferenzen der Interessensgruppen für ein PES-Design in einem prozedural gerechten Vorgehen sowie die Vorteile dieser Ansatzes zu eruieren. Insbesondere beschreibt diese Studie einen Versuch der deliberativen Wahl in einer ländlichen Gemeinschaft in Kolumbien. Die Ergebnisse weisen darauf hin, dass, zumindest in einigen Kontexten, die deliberative monetäre Bewertung den konventionell erstellten Präferenzansätzen überlegen ist, weil sie besser überlegte und informierte Präferenzen ermöglicht. Laut dieser Studie bietet die

deliberative monetäre Bewertung den Teilnehmern zahlreiche Lernmöglichkeiten, von denen besonders ältere und Teilnehmer mit geringer Ausbildung, für die Bewertungsübungen kognitiv komplex sein könnten, profitieren. Die Studie prüft auch die Möglichkeit für sozial höher gestellte Teilnehmer, die eine dominante Rolle während des deliberativen Prozesses spielen, gelangt jedoch zu keinen schlüssigen Beweisen. Die Ergebnisse der Untersuchung weisen darauf hin, dass einer der möglichen Hauptvorteile des DMV-Ansatzes im Globalen Süden sein könnte, dass er den Teilnehmern erlaubt, eine breitere Palette von instrumentalen, relationalen und intrinsischen Werten zu formulieren und auf diese Weise mehr Information bereitzustellen als konventionelle Bewertungsansätze für gewöhnlich bieten. Laut dieser Studie sind die Ansätze der deliberativen monetären Bewertung bei der Entscheidungsfindung in komplexen sozial-ökologischen Zusammenhängen sinnvoll.

- (3) In dem dritten Artikel, *Payments for ecosystem services or collective stewardship of Mother Earth? Applying deliberative valuation in an indigenous community in Colombia*, untersuchen die Autoren Unai Pascual, Stefanie Engel und Petr Mariel, wie PES für indigene Gemeinschaften angepasst werden können. Diese Gemeinschaften haben einen besonderen Zugang zur Umwelt, der garantiert, dass er gerecht ist und nicht zu unbeabsichtigten negativen Ergebnissen führt. Die Studie basiert auf der Tatsache, dass die Literatur über die Anwendung von PES in Gebieten, in denen indigene Gruppen die sozialen Hauptakteure sind, deren Präferenzen für die Rahmung und die Designmerkmale der ökonomischen Anreize für den Umweltschutz noch nicht ausreichend beleuchtet hat. Daher werden die Präferenzen einer indigenen Gemeinschaft in Kolumbien unter Zuhilfenahme der Ergebnisse aus dem Versuch der deliberativen Wahl, wie es im vorhergehenden Artikel beschrieben wurde, analysiert. Während letztere sich auf die deliberative Methodologie konzentriert, folgt diese Studie einem anthropologischen Ansatz. Sie behandelt die Frage, weshalb PES-Programme, in denen indigene Gruppen die Hauptakteure sind, diese Gruppen sinnvoll in die Mitgestaltung dieser Programme einbinden sowie jede Rahmung im Zusammenhang mit PES ihrer gesellschaftlichen Repräsentation der Natur anpassen müssen, um effektiv zu werden. Methodisch relevant ist die Erkenntnis, dass die deliberative

Bewertung einen homogenisierenden Effekt auf die Präferenzen und Ansichten der indigenen Teilnehmer gegenüber PES ausübte.

Wie bereits erwähnt, ist die alles übergreifende Frage, die diese Dissertation näher beleuchten will, ob gerechtere Zahlungen für Ökosystemleistungen die Wahrscheinlichkeit ihres Erfolges erhöhen. Die Ergebnisse dieser drei empirischen Kapitel weisen darauf hin, dass Entscheidungsträger gut daran täten, Aspekte der Gerechtigkeit beim PES-Design zu berücksichtigen. Dies erklärt sich daraus, dass die Teilnahme an PES im Gegensatz zu anderen ökologischen Politikinstrumenten freiwillig ist. Es ist anzunehmen, dass die gerechtere Gestaltung der PES dazu beiträgt, sie als richtig anzuerkennen und somit ihre Legitimität und Akzeptanz vor Ort zu erhöhen, sodass die Teilnehmer sich mehr für sie einsetzen und motiviert werden, ihre Landnutzung den Anforderungen entsprechend zu ändern.

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*“The most dangerous worldviews are the worldviews
of those who have never viewed the world.”*

- (Popularly attributed to) Alexander von Humboldt

Chapter 1 Introduction

1.1 Introduction and overview of the thesis

As attested by the recently published IPBES' (2019) Global Assessment on Biodiversity and Ecosystem Services, which provides a state of the art review of our collective knowledge regarding ecosystems around the world, nature is being degraded at an alarming rate in almost every corner of the planet. This fact is contributing to rising concerns that irreversible degradation will take a significant toll on human wellbeing. This is particularly the case in the Global South where many of the world's most vulnerable stakeholders live and closely rely on the nature's contributions to people (Pascual et al., 2017; Diaz et al., 2018), including ecosystem services (ES).

Attempts by policy makers to reverse this trend have included a multitude of different approaches. These range from providing education and raising awareness about the values of nature, to the use of economic incentives, to command-and-control measures such as creating protected areas and imposing fines for environmentally harmful practices. Economic incentives represent the preferred approach by many economists for their potential to provide conservation in the most cost-effective way possible (Wunder, 2005). Within this category we can find environmental taxes and subsidies, as well as payments for ecosystem (or environmental¹) services (PES).

Within the academic literature there has been much debate about what exactly constitutes PES (Wunder, 2005, 2015; Van Noordwijk et al., 2007; Porras et al., 2008;

¹ The term PES is often used indistinctly to refer to payments for both ecosystem or environmental services. When purposefully used to refer to separate things the difference generally lies in whether the service being paid for is an individual environmental service (e.g. carbon storage of a forest) or a broad range of services provided by an entire ecosystem (e.g. the capacity of wetlands to provide a habitat for animals, for flood prevention, for water purification, for carbon storage, etc.) (Wunder 2005). For the purposes of this thesis I use the terms indistinctly.

Muradian et al., 2010; Tacconi, 2012). In this dissertation I use the definition provided by Engel (2016:133), which describes PES as “positive economic incentives where environmental service (ES) providers can voluntarily apply for a payment that is conditional either on ES provision or on an activity clearly linked to ES provision”. The idea behind PES is to align the incentives of land users with those of society as a whole by internalizing environmental externalities (Pagiola et al., 2005). PES programs can be financed by those who benefit directly from the ES including individual actors (e.g. companies) and groups of people (e.g. towns), or more indirectly by intermediaries (e.g. governments and NGOs) who recognize the public good nature of many ES. PES contracts can be signed with individuals or groups of ES providers, and can offer cash or in-kind compensation in exchange for the provision of ES (Figure 1).

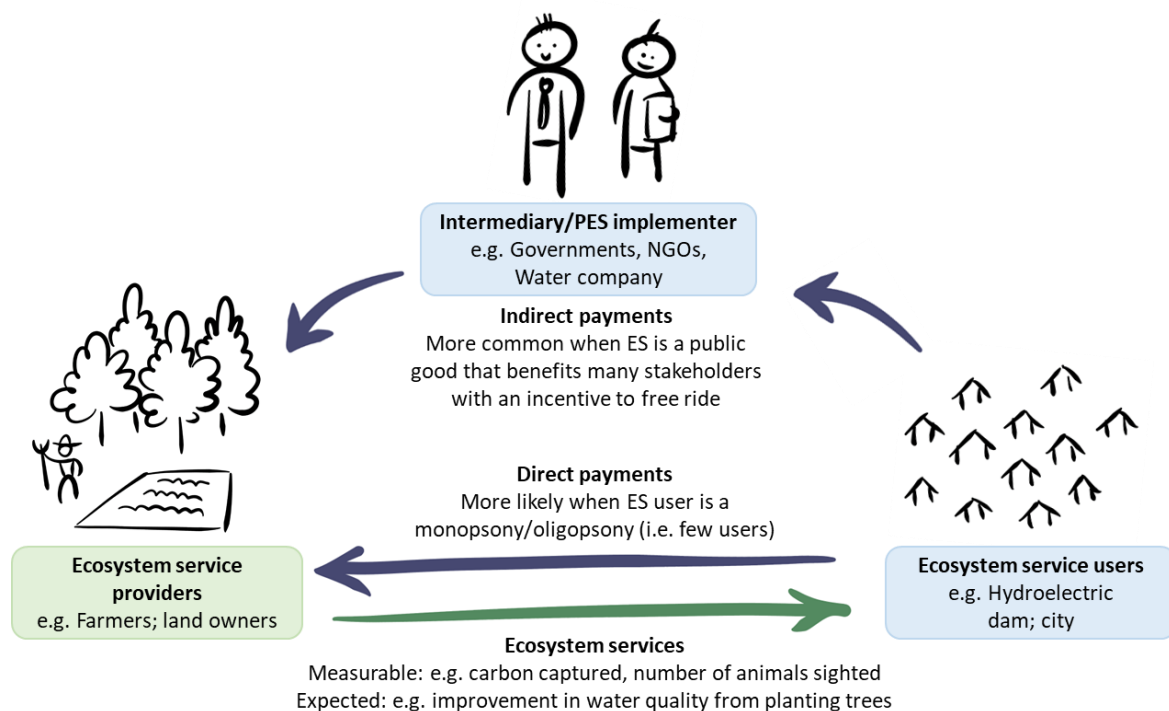


Figure 1 The functioning of a PES program (Source: author's own work)

From the perspective of a social planner, PES offer a promising way to distribute the limited funds available for environmental conservation in a cost-effective way (Wunder, 2005). This is because making payments conditional on conservation activities or outcomes is thought to provide stronger incentives to landholders than unconditional policies (Ferraro and Kiss, 2002). Moreover, PES can be designed to prioritize areas where costs of conservation are

relatively low while the environmental benefits are relatively high (Pagiola et al., 2005). This stands in opposition to the use of command-and-control mechanisms, which despite the spatial heterogeneity of the costs and benefits of conservation, are not easily capable of discriminating within their zone of influence. Their use often leads to the inefficient conservation of areas that may offer very little environmental benefits compared to non-environmental benefits provided under alternative land uses. Moreover, it has been argued that the voluntary character of PES is likely to guarantee an increase in the social surplus by benefitting both parties involved, as otherwise the agreement would not be likely to take place to begin with or at the very least would not be sustained in time (Pagiola et al., 2005; Engel et al., 2008).

Perhaps the most characteristic difference between PES and other types of environmental policy tools such as protected areas or environmental taxes is that PES follows a ‘steward rewarded’ approach (Engel et al., 2008). This makes PES particularly well suited for contexts where the people tasked with changing their land use practices have low incomes, as using ‘polluter-pays’ approaches in such settings may raise both ethical and practical issues where the polluter cannot afford a fine or tax. This fact has meant that the use of PES has grown most rapidly in the Global South (Schomers and Matzdorf, 2013), where issues of justice and equity are most salient given that in these contexts many stakeholders are particularly vulnerable for a variety of reasons (e.g. low income and education, marginality, poor governance, high dependence on natural resources for their livelihoods).

However, it would be counterproductive to think of PES as a silver bullet capable of effectively tackling environmental degradation in every situation (Engel et al., 2008). Certain preconditions have been described that are necessary for PES programs to be sustainable, including well defined property rights and the potential for effective monitoring of compliance (Engel, 2016). Even in cases where all of these preconditions are met, PES use may still be suboptimal. For example, if it seems likely that the environmental degradation may simply be shifted to areas that are not covered by the PES (‘leakage’) (Wunder, 2005). There is also growing evidence that, under some circumstances, paying for conservation may risk ‘crowding out’ peoples’ intrinsic motivations for protecting the environment (Frey and Oberholzer-Gee, 1997; Rode et al., 2015a; Moros et al., 2017; Ezzine-de-Blas et al., 2019). In this regard, insights from the field of behavioral economics are increasingly shedding light on the ways in

which the success of PES programs may be affected by behavioral responses not previously considered within a more neoclassical conceptualization of PES. A growing field of research along these lines is on the way that PES may interact with participants' social preferences, including concerns about equity and fairness (Fehr and Fischbacher, 2002; Miller et al., 2012a). This thesis contributes to this strand of literature, by questioning the conventional economic assumption that efficiency/effectiveness and equity considerations in the design of environmental policy can be separated.

Specifically, in this thesis I explore, over the course of three empirical chapters, the role that equity considerations play in the design of PES. In Chapter 2, I do this by exploring the interlinkages, synergies and tradeoffs between considering different dimensions of equity in PES design and their social and environmental outcomes. In Chapter 3, I examine the potential of deliberative approaches to elicit the preferences of communities towards different PES design characteristics impacting equity. Finally, in Chapter 4, I analyze the case study of an indigenous community where a government-led PES will likely soon be implemented, and analyze the types of equity considerations that are necessary to ensure the success of such a program.

This first introductory chapter serves as an overview of the thesis. In Section 1.2, I present a broad literature review of equity and PES. In Section 1.3, I lay out the research questions that guide the remainder of the dissertation. Section 1.4 proceeds by describing the stages of research that I carried out over the course of the PhD as well as the methods that I used to collect data. In Section 1.5, I summarize some of the most relevant findings from the three main chapters. Section 1.6 offers some concluding remarks, points to limitations of the three studies presented and proposes directions for further research.

1.2 Background, literature review and motivation

Section 1.2.1 begins by outlining the relationship between environmental management and social equity. Then, I describe the difficulty in pinning down a single definition of equity and lay out the framework used for this purpose throughout the thesis. Section 1.2.2 gives an overview of the evolution of the PES literature with an emphasis on the way that equity has

been dealt with. Section 1.2.3 outlines the specific types of concerns regarding the use of PES in indigenous communities of the Global South, and the importance of recognition and procedural equity in these contexts. Section 1.2.4 describes the underlying assumptions and main goals of this dissertation. Section 1.2.5 then lays out the gaps in the literature that this dissertation addresses.

1.2.1 Equity and environmental justice

Environmental decision-making is unavoidably value-laden and political. This is because any decision with the power to influence the way that people are able to relate to and interact with nature does so under certain assumptions, with specific goals in mind, prioritizing some ends over others (Schneider et al., 2019). Therefore, if equity considerations are not made explicit, it is likely that the implicit values underlying environmental decisions will end up serving the interests of powerful actors at the expense of those who are most vulnerable and disenfranchised (McDermott et al., 2013). In many cases this power imbalance stems from a lack of democratic processes in environmental policy-making, a fact that started receiving attention with the development of the environmental justice paradigm (EJP) in the 1980s.

Although the EJP debate was born in response to the dumping of hazardous waste near poor, minority communities in the United States, it has since expanded to cover a broad range of justice issues associated with the environment all over the world (Agyeman et al., 2016). Environmental injustices have many roots – economic, social, political and racial – but their consequences are usually the same: the perpetuation or exacerbation of inequity between the powerful and the powerless (Timmons Roberts et al., 2018). Over the course of the last three decades, this realization has increasingly led to a shift in political and academic discourses concerning environmental management and policymaking, mainstreaming issues of fairness, justice, equity and rights in discussions about human-nature relationships around the world (Taylor, 2000), from climate change mitigation negotiations, to international initiatives like the United Nations Reducing Emissions from Deforestation and forest Degradation (REDD+).

The definitions of justice and equity are hard to pin down, particularly due to their context dependence, which has led to differing and often conflicting philosophical traditions.

The Ancient Greeks focused on virtue, harmony and order (Aristotle, 2006; Grube and Reeve, 1974). Hobbes and Hume defended a consequentialist view of justice, focusing on the goodness of outcomes (Hobbes, 1991; Hume, 1994). Kant, on the other hand, furthered a deontological ethical theory which regarded justice in absolute terms (Kant, 1993). Bentham and Mill developed the idea of utilitarianism, concerning themselves with maximizing the happiness of the greatest number of people (Bentham, 1907; Mill, 2016). Rawls advanced his notion of the ‘veil of ignorance’, behind which decision makers would be able to shed their prejudices and biases in search of just outcomes (Rawls, 1971). The list goes on and on, demonstrating the intractability of pinning down a single definition of what is just and equitable that could be applied in every context (Martin et al., 2014b).

In his book “The Idea of Justice,” Sen (2009) uses a thought experiment that elegantly illustrates this point. A flute is found and three children want to claim it for themselves. The first child is the best player of the group, and therefore, from a utilitarian point of view, giving her the flute would increase the happiness of the community the most by producing beautiful music that everyone could enjoy. The second child is the poorest and has no other toys, so from a pro-poor perspective he is the most deserving of the flute as he has nothing else to play with. However, the third child claims to have made the flute, and therefore those concerned with protecting property rights would give the flute to her as it is the fruit of her own labor. Although simplistic, this parable illustrates ethical pluralism by showing how contradictory, yet valid, ethical positions can be defended by different individuals facing the same situation. In fact, even the same person may take different ethical positions depending on the context, for example by favoring an egalitarian distribution of voting rights, a meritocratic distribution of wages, or a need-based distribution of medical aid (Sikor, 2013).

In this dissertation I make no explicit distinction between equity and justice in my analysis of PES. Despite often being used interchangeably in common speech, in the academic literature justice is more frequently used in the context of guaranteeing that people's rights are respected, with a focus on the individual. On the other hand, equity is more often comparative and looks at the relationships between people and their circumstances (Grasso, 2007; McDermott et al., 2013). Equity, therefore, is usually associated with equality of ‘something’

among people: good quality of life, utility, income, opportunities, rights or liberties (Sen, 1992).

It is important to realize, however, that striving for equity among any one dimension may require trading off equity in another. For example, ensuring equal opportunities may lead to unequal distribution of income. Therefore, to avoid taking a prescriptive approach in defining what is an equitable PES, I use a framework that considers three context-dependent dimensions of equity: recognition, procedure, and distribution (Pascual et al., 2014). Despite being interrelated and not easy to discretize in practice, I define these dimensions as follows. Recognition can be seen as the cultural dimension of equity (Martin et al., 2016). It takes into account the “uneven playing field” (Larson and Ribot, 2007:1) and looks at pre-existent power relations and whether the interest of all individuals are considered, such that no one is dominated or perceived as “inferior, excluded, wholly other, or simply invisible” (Fraser, 2000:113). As such, it recognizes and respects the equal worth of “distinct identities, histories, values and interests” (Friedman et al., 2018:2). Procedural equity is the political dimension of equity and covers participation and engagement of stakeholders in the decision-making process of PES design and implementation. As Richards et al. (2004:11) put it, it can help achieve “compliance without coercion.” Finally, distributional equity can be seen as the economic dimension of equity. It considers how costs, benefits, and risks are distributed among stakeholders as an outcome of the PES (McDermott et al., 2013).

Although the content of this thesis focuses primarily on ES providers, it is important to acknowledge that equity concerns exist for other types of stakeholders: not only ES users (who are paying for an ES whose actual provision may at times be uncertain), but also for actors that do not directly participate in the PES but which may nevertheless be impacted by these programs (such as landless workers who may become unemployed as a consequence of ‘use-restricting’ PES) (Pagiola et al., 2005; Wunder, 2005).

1.2.2 The evolution of the PES literature

The literature surrounding PES has several thematic currents that have been evolving over time. In the 2000s, when PES started generating academic interest, many of the most

seminal works were developed by environmental economists (Landell-Mills and Porras, 2002; Pagiola et al., 2005; Wunder, 2005; Engel et al., 2008). Particularly at first, there was a focus on the technical aspects and defining characteristics of PES designs (e.g. conditionality, voluntariness), with an emphasis on how to guarantee that the limited funds that were being destined for conservation were used in the most cost-effective way possible. At the time, influential authors like Wunder (2005:1) expressed “doubts about the extent to which it makes sense to forcibly link the conservation and poverty-alleviation agendas”. This was because past experiences with Integrated Conservation and Development (ICDP) approaches had yielded dubious results when trying to achieve win-win environmental and economic outcomes (Engel et al., 2008; Ferraro and Kiss, 2002).

However the pro-poor potential of PES raised significant attention, not least because it was seen as a way to increase the public’s interest in these initiatives and facilitate raising additional conservation funds (Landell-Mills and Porras, 2002). PES offered a promising approach to reduce poverty for multiple reasons. First, because many marginalized groups are located in rural areas in close proximity to natural resources; second, because payments were likely to target economically unproductive land that was often owned by poorer farmers; and third, because those financing PES would generally be wealthier than those receiving payments (Landell-Mills and Porras, 2002; Pagiola et al., 2005). This was argued on the basis that downstream users were generally better off than upstream service providers, but also because PES was being used as a vehicle to transfer funds from the Global North to the Global South.

However, from the very beginning some equity concerns were salient in the literature, particularly those to do with distributional issues. For instance, the fact that some PES required upfront investments or that transaction costs were generally fixed per contract (rather than per unit of land) could favor the participation of larger and wealthier landowners unless special care was taken to abate this (Landell-Mills and Porras, 2002; Pagiola et al., 2005; Wunder, 2008). Similarly, it was recognized that both for environmental and equity reasons, effective PES design would have to tackle factors that limited the access of the poor to benefit from PES, including hurdles to their ‘eligibility’, ‘desire’, and ‘ability’ to participate (Grieg-Gran et al., 2005; Pagiola et al., 2005; Zbinden and Lee, 2005).

Other than a few early and notable reproaches concerning global movements towards the marketization of nature (McAfee, 1999), the literature critical of what had until then been the mainstream PES discourse did not start gaining traction until the late 2000s and early 2010s. Increasingly, the focus was being placed on identifying where and why PES practice might not always be aligning itself with the theory (Muradian et al., 2010). Attention began to shift from the more technical and apolitical aspects of PES design, to a more contextualized and social examination. PES thus started more frequently being scrutinized through a power-sensitive, political, and institutional lens (Muradian et al., 2010; Pascual et al., 2010; Van Hecken and Bastiaensen, 2010; Cote and Nightingale, 2012). Some outright condemned PES (Büscher, 2012; Kosoy and Corbera, 2010) on the grounds that it “implicitly accepts neoliberal capitalism as both the problem and the solution to the ecological crisis” (Fletcher and Büscher, 2017:224). Many others rejected these criticisms for ‘shooting a strawman,’ as they oversimplified the reality that, in practice, PES were rarely implemented devoid of social concerns (Muradian and Gómez-Baggethun, 2013; Van Hecken et al., 2018). In fact, alternative theoretical frameworks that do not adhere to neoliberal convictions have been able to coexist alongside more traditional market framings of PES (Bétrisey et al., 2018; Dempsey and Robertson, 2012; Muradian et al., 2010; Singh, 2015; Van Hecken et al., 2018). This can be seen on the ground, where, for example, anti-capitalist social movements have been able to hybridize PES designs by utilizing them as discourse tools to ‘revalue the rural’ (Shapiro-Garza, 2013).

In this way, a steadily growing literature demonstrated that PES interacted with local contexts and practices, and that these programs were thus habitually co-produced and negotiated with stakeholders and institutions on the ground (Van Hecken et al., 2015b). This led to the dominant academic PES discourse increasingly advocating for a more cautious and deliberate design of these policy instruments, with numerous case studies showing how not doing so could reinforce preexisting inequalities (Sikor, 2013). As such, issues of legitimacy and stakeholder perceptions of PES gained salience (Corbera et al., 2007; Gross-Camp et al., 2012; Reed, 2011), and over time the importance of equity concerns became a central consideration in PES design and analysis (Martin et al., 2014b; McDermott et al., 2013; Pascual et al., 2014).

This fueled the debate regarding the degree to which PES design should focus on equity concerns. Some authors have made compelling arguments that PES were initially designed as an alternative to ICDPs and Community-Based Natural Resource Management precisely because despite the billions of dollars invested in these types of programs, a concern for non-environmental side-objectives was compromising environmental outcomes (Ferraro and Kiss, 2002). This is supported by some recent work that shows evidence of trade-offs between equity and environmental effectiveness (Pfaff et al., 2008; Halpern et al., 2013; Jindal et al., 2013; Martin Persson and Alpizar, 2013). Many of these analyses show that prioritizing social concerns when deciding what areas PES should target significantly decreases the cost-effectiveness of these programs. Voices from this camp have argued that: “PES schemes need to strike some balance between short-run efficiency and fairness, the latter influencing long-run viability. However, what seems certain is that neither the ‘ecologically noble savage’ who fully safeguards his or her environment, nor the impoverished farmer too poor to do significant ecological damage, will emerge on the scene as major ES sellers. They simply do not constitute a credible threat, so paying them creates zero additionality — it makes no difference. Is that unfair?” (Wunder, 2005:12).

Many have argued in response to the open question posed by Wunder that whether any PES design is fair or not should not be answered by a small group of technocrats, but by incorporating participatory processes in the design of PES such that a broader spectrum of stakeholders can have their voices heard (Gebara, 2013). As Paavola (2004:68) asserts, “procedural justice is important because it can assure those whose interests are not endorsed by a particular environmental decision that their interests can count in other decisions. Procedural justice also enables the adversely affected parties to express their dissent or consent with environmental decisions and to maintain their dignity, whether or not their interests are realised.” In this regard, perceived injustice has been found to delegitimize conservation initiatives in the past, thus hampering their uptake and raising the question of whether a greater concern for equity may be necessary to guarantee their long-term success (Corbera et al., 2007; Miller et al., 2012a; Pascual et al., 2014). Whether PES should actively pursue objectives other than cost-effectiveness remains a hotly debated topic in the PES literature (Kinzig et al., 2011; Corbera and Pascual, 2012).

Recent efforts have started revisiting PES theory by incorporating the accumulated insights and knowledge from practice over the past decade. For example, in Wunder et al. (2018), authors that had previously treated PES through different conceptual lenses came together to reexamine the characteristics that were necessary to ensure that PES could deliver both efficient and equitable outcomes. Additionally, the academic literature has progressively started to focus on behavioral aspects of PES, moving away from characterizing participants as *homo oeconomicus* towards a more behaviorally nuanced framing (Engel, 2016). For instance, the way in which PES can interact with local norms, practices and motivations for engaging in conservation has been gaining more attention (Martin et al., 2014a; Rode et al., 2015a; Kerr et al., 2017; Moros et al., 2017; Ezzine-de-Blas et al., 2019).

Relevant to this debate is the fact that behavioral and experimental economists have long shown that people exhibit ‘social preferences’ towards fairness and equity (Rabin, 1993; Fehr and Schmidt, 1999, 2006; Fehr and Fischbacher, 2002). Here social preferences can be understood as preferences that go beyond self-interest, and can explain, for example, people’s willingness to redistribute what they consider to be unfair outcomes (Akbaş et al., 2019). In this sense, social preferences have been found to have explanatory power for predicting people’s behavior (Blanco et al., 2011). However, it remains to be tested whether these findings hold outside of a laboratory setting, although there is some evidence that it may be the case (Miller et al., 2012a; Pascual et al., 2014).

1.2.3 Indigenous communities and PES

There is also a growing interest in the ways in which people relate to nature (Muradian and Pascual, 2018), and how PES programs may interact with participants’ relational values (Bremer et al., 2018). Greater emphasis is starting to be placed on empirical and experimental measures of equity perceptions (Benra and Nahuelhual, 2019; Loft et al., 2018) and how these may encourage or dissuade participation in conservation initiatives. For example, a recent examination of the “Acuerdos Recíprocos por Agua (ARA)” PES in Bolivia identified feelings of recognition as the main driver determining whether participants joined the program or not (Bétrisey et al., 2018).

Despite the fact that it has been more than two decades since emblematic PES such as Costa Rica's National "Pagos por Servicios Ambientales" or Mexico's "Pagos por Servicios Ambientales Hidrológicos" programs were rolled out, so far the overall environmental effectiveness of PES programs has not been made clear (Adhikari and Agrawal, 2013; Börner et al., 2017; Brouwer et al., 2011; Pattanayak et al., 2010). In large part this is attributed to the fact that despite their widespread use, the scientific rigor underpinning most PES schemes has been inadequate (Naeem et al., 2015; Engel, 2016; Wunder et al., 2018). However, another potentially significant factor impacting the effectiveness of PES is the as-of-yet unexpected way in which the designs of these programs interact with local contexts, norms, values and institutions.

For example, the traditional framing used to describe PES has relied heavily on a neoclassical market-logic that conceives of nature's contributions to people (Diaz et al., 2018) as positive externalities, and payments as financial vehicles to align the incentives of ES providers with those of ES users. This way of understanding PES mirrors environmental economic theory, making it convenient to dissect and analyze from an academic standpoint, but has occasionally led to problems on the ground when communities reject this way of relating to their surroundings (Muradian and Pascual, 2018). This is particularly visible in the case of indigenous communities, which have a mixed track record with PES and in some occasions have opposed these programs for being incompatibly framed with their worldviews (Reed, 2011). Indigenous peoples often live in close proximity to nature and thus their identity is closely linked with their territory. Ensuring that PES can be adapted to work in these settings is critical given the fact that indigenous peoples control more than a quarter of the world's land and 40% of protected areas (Garnett et al., 2018). However, the requirements for designing PES for indigenous communities has been under-researched from an equity perspective so far.

The often antagonistic dynamic between indigenous peoples and national governments is the product of a rocky history. This is because in the past, indigenous communities around the world have been repeatedly silenced and been victims of multiple forms of systemic repression (Laurent, 2016). The main source of conflict in the past has been over land and control of natural resources, where both because of extractive purposes (e.g. though land grabs for mines or dams) as well as for environmental reasons (e.g. through the creation of protected

areas), indigenous peoples' territorial sovereignty has been violated (Denham, 2017). This pattern has only recently started to be meaningfully addressed, and then again only in some places. For instance, in the Latin American context, positive steps can be seen with the rewriting of the constitutions of Colombia (1992), Ecuador (2008) and Bolivia (2009), which for the first time in their history explicitly address the rights of indigenous groups in the country. For comparison, the previous constitution of Colombia (from 1886) did not contain a single mention of indigenous people, and laws that did address indigenous communities treated them as second-class citizens. As an example, until 1996 the law that regulated the rights of indigenous communities in Colombia was Law 89 of 1890, titled “[The law] in which we determine the means by which the savages must be governed to reduce them to civilized life.”

Unsurprisingly, in some cases indigenous communities have been hesitant to receive PES—a policy perceived to dictate what they can or cannot do with their land—with open arms. This is because a central government (or other PES implementing agency) that is unacquainted with the particular culture and customs of indigenous peoples can hardly design environmental policy that will be well-adapted without previously meaningfully engaging stakeholders with participatory processes. A regrettable example that illustrates this is the “Batwa Trail” program in the Mgahinga National Park in Uganda (Sikor, 2013). In an effort to share the benefits of the protected area, locals were trained as guides for tourists and allowed to continue entering the park so long as they were leading visitors. Nonetheless, this led to a situation where community members could only visit their own cultural sites when they were providing touristic services to outsiders.

In conclusion, over the last two decades we have seen a gradual evolution in the emphasis of the PES literature. The earlier focus on the technical design characteristics of PES needed to maximize efficiency and on the distributive impacts of these programs was superseded by increasing attention being paid to the trade-offs between short-run cost-effectiveness and other equally important considerations that have been found or at least argued to impact the long-run success of PES programs. This shift turned what had previously been a largely apolitical understanding of PES into a much more political one, where issues of justice, power, and legitimacy became central. Recently, more emphasis is being placed on the human

factor, such as the ways in which PES may interact with the way people relate to nature and their motivations to conserve it.

1.2.4 Underlying assumptions and main goal of the thesis

Engel (2016) uses Figure 2 to describe the logic of PES in a stylized way. This figure shows how, theoretically, PES should be able to effectively encourage participation so long as the loss of profits incurred by ES providers for adopting the environmentally friendly activity is exceeded by the payment offered by the program. However, in reality there is evidence of some PES programs that are able to function without seemingly being able to cover opportunity costs (Bennett, 2008; Bétrisey et al., 2018; Kosoy et al., 2007; Namirembe et al., 2014), and conversely, of PES that are rejected outright for reasons unrelated to their payment level (Pascual et al., 2014; Reed, 2011).

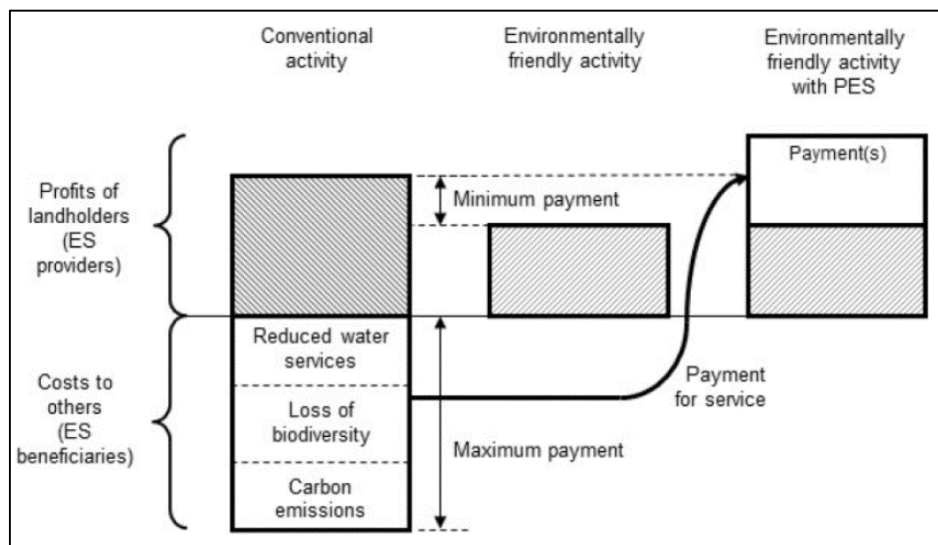


Figure 2 The logic of PES (Source: Engel 2016).

I hypothesize that this paradox is explained by the types of social and behavioral issues that are starting to receive increased attention in the literature, some of which I explore in this dissertation. Figure 2 represents this idea by showing how distilling the motivation to participate in PES to a simple cost-benefit calculation is not sufficient to fully account for the motivations of stakeholders participating (or not) in these programs. In reality, a myriad of context-dependent factors may determine whether PES are able to motivate a change in the use

of natural resources, such as whether participants feel that the way the program is framed reflects their relational values (Bremer et al., 2018). This is reflected in Figure 3 (left) where a PES that is not fully capable of covering opportunity costs is nevertheless able to compel participation as ES providers have a sufficiently positive perception of the program and its objectives to want to join the conservation efforts. Figure 3 (right) shows the opposite scenario, in which a PES that would result in a net financial gain for participants is nevertheless rejected due to a poor social perception that decreases participants' utility from participating.

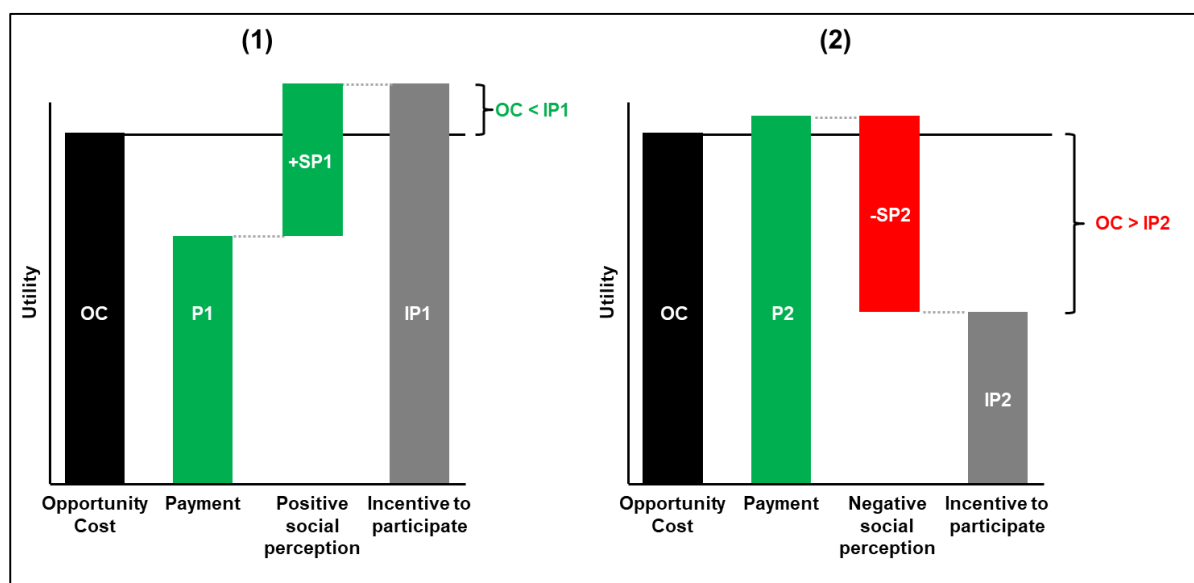


Figure 3 Waterfall chart showing the effect of social perception on participation in PES. In (1), because $OC < (P1 + SP1 = IP1)$, there is a net incentive to participate in the PES. In (2), because $OC > (P2 - SP2 = IP2)$ there is a net incentive not to participate in the PES.

In this thesis I posit that equity concerns are key factors that will affect the way that participants relate to PES. In this sense, rather than examining if PES should strive to be as equitable as possible from an ethical or normative perspective, the overarching goal and contribution of this thesis is to pursue this question from a more practical and instrumental point of view: **does making PES more equitable increase the likelihood that they will be successful, and if that is the case, how do we make them so?**

This avenue of investigation picks up the call made by Pascual et al. (2014) asking for further research into the relationships and tradeoffs between equity and environmental outcomes. This is of interest because, despite the fact that the relationship between PES and

equity has been well developed from a theoretical perspective by now (McDermott et al., 2013), given the difficulty of measuring equity it has not been unpacked much from an empirical standpoint. The empirical analyses that have been conducted up to now have relied on narrow interpretations of equity, focusing almost entirely on distributive concerns (Friedman et al., 2018; Pascual et al., 2010). However, the main limitation of analyzing only distributive impacts is that this understanding of equity is exclusively consequentialist in nature, and therefore unable to scrutinize (and thus gather knowledge about) the fairness of the process that led to that outcome.

I follow Schlosberg (2007, 2004) and Pascual et al. (2014) by rejecting the unidimensional view of equity that has dominated the literature and which collapses a broad range of equity and justice concerns into a single measure. Instead, I attempt to inspect and address the social processes that, if left unchanged, are apt to reproduce the same inequitable outcomes. The relevance of this line of enquiry is evidenced by the recent attention it has been receiving regarding other environmental policy instruments such as protected areas (Zafra-Calvo et al., 2019, 2017).

1.2.5 Identifying the gaps in the literature

The literature on PES and equity has been rapidly evolving and expanding over the last two decades. However, some relevant knowledge gaps still remain which I attempt to remedy throughout this dissertation. First, as described above, despite the ongoing debate regarding the degree to which PES should focus on (non)environmental concerns (Kinzig et al., 2011; Corbera and Pascual, 2012), little empirical evidence exists that tests whether PES that focus exclusively on maximizing environmental outcomes actually perform better than those who include concerns for social equity. This gap is of importance given that in practice, PES are often implemented with multiple objectives (Wunder, 2008). Depending on the types of tradeoffs that focusing on more than just maximizing environmental outcomes requires, policymakers may have to carefully consider if PES is the right policy tool for a given situation.

Second, the environmental justice literature has highlighted that environmental injustices often stem from a lack of democratic decision-making, which frequently leads to

decisions being made that favor powerful agents at the expense of more vulnerable individuals (Agyeman et al., 2016). However, while the end solution is clear—to democratize decision-making by involving a wider range of stakeholders—the roadmap for how to get there is not always obvious (Schilling-Vacaflor and Eichler, 2017). Promising new valuation methodologies are being developed to inform policy that include more stakeholders and a wider diversity of values (Jacobs et al., 2016a, 2018), however, up to now, most of this work has been carried out in contexts of the Global North. Therefore, much work remains to be done to test if these approaches will work effectively in different Global South contexts where participants and cultures may have significantly different from those in the Global North.

Third, despite all the work that has been done analyzing PES in the Global South, and the proximity of indigenous communities to preserved natural resources (Garnett et al., 2018), there has been limited engagement in the literature with what impacts PES may have on these groups, and what exactly PES tailored to indigenous communities would look like. For example, relatively little attention has been paid to issues of sovereignty and the differential worldviews of indigenous peoples, and how PES programs may interact with these (Denham, 2017). If PES is to effectively address environmental degradation it is therefore imperative to explore whether PES is suited to these contexts, and if so, the types of considerations that are necessary to help them succeed in the long run.

In this dissertation I attempt to address these gaps over the course of the three empirical chapters that follow this one. In Section 1.3, I present the three research questions arising from these gaps, and in Section 1.6.1 I return to them and describe how this dissertation contributes to filling them.

1.3 Research questions of the thesis

This dissertation offers a unique contribution to the literature by analyzing empirically just how the different dimensions of social equity—recognition, procedure and distribution—interact with the outcomes of PES programs, both at a macro-scale (looking across many PES) as well as at a micro-scale (exploring the specific context and realities of a case study site)

(Figure 3). Below I synthesize the gaps (G) identified in the previous section and the consequent research questions (R) that I address in this dissertation:

G1: Despite the significant debate on the topic, there is a lack of empirical evidence testing whether an increased concern for equity in PES will negatively impact the effectiveness of these programs.

R1: What are the interlinkages, synergies and tradeoffs between considering different dimensions of equity in PES design and their social and environmental outcomes? (Chapter 2).

G2: A historical deficit of democratic processes has been noted in environmental decision-making, but insufficient guidance has been offered regarding the best way to engage stakeholders, particularly in the Global South.

R2: Can deliberative approaches effectively be used in contexts of the Global South to elicit stakeholder preferences in a procedurally equitable way, and if so, what are the advantages of using this type of approach? (Chapter 3)

G3: Although there has been significant interest in PES in contexts of the Global South, the literature has only engaged to a limited extent with the particularities of designing these types of programs for indigenous communities.

R3: How can PES be adapted to indigenous communities, which have unique ways of relating to the environment, in ways that guarantee that they are equitable and do not lead to unintended negative outcomes? (Chapter 4)

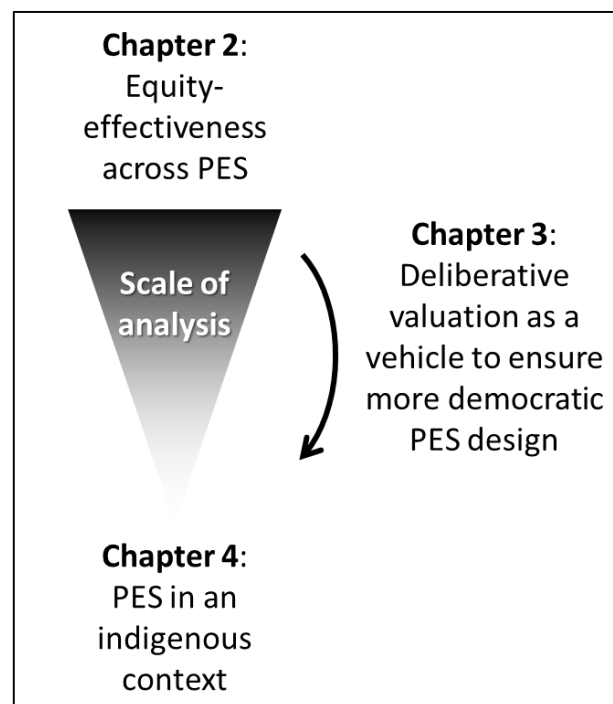


Figure 4 Structure of the chapters

In order to answer these questions, Chapter 2 begins by looking at PES from a macro-scale perspective by comparing equity and effectiveness across 45 PES programs in Latin America (Figure 4). I decided to limit the scope to Latin America because it is the region of the world where PES has been used most prominently (Schomers and Matzdorf, 2013; Hejnowicz et al., 2014) and for logistical purposes, as translating the survey I used to gather data to Spanish and Portuguese was sufficient to reach the overwhelming majority of PES managers in this region. While this approach allows us to consider the three dimensions of equity in broad terms (Figure 5), given its macro-level scope, it loses a certain amount of resolution and therefore cannot scrutinize certain important contextual considerations for each PES program (e.g. on-the-ground power dynamics, institutions, historical background). Importantly, Chapter 2 differentiates between social outcomes and equity concerns, which are not always clearly disentangled in the literature. Here, we assume that all PES can be more or less equitable across three different dimensions (recognition, procedure and distribution), irrespective of the social goals they have (such as trying to reduce poverty in a region). Therefore, equity is viewed as cutting across PES design and implementation, whereas social outcomes are used to describe a desired end point.

In order to explore equity considerations in PES at a higher resolution, Chapters 3 and 4 reduce the scale of analysis to focus on an individual case study. For this purpose, I chose to conduct my research in an indigenous community in Colombia where PES will likely be implemented in the near future. The selection of this case study is useful as it would mirror the type of process that an organization looking to implement PES would have to go through to engage local stakeholders in a co-design process. As explained above, conducting this research in an indigenous community is of particular interest for examining the role of equity considerations in PES, because indigenous peoples have, in many respects, a distinctive worldview and relationship with nature (Diaz et al., 2018).

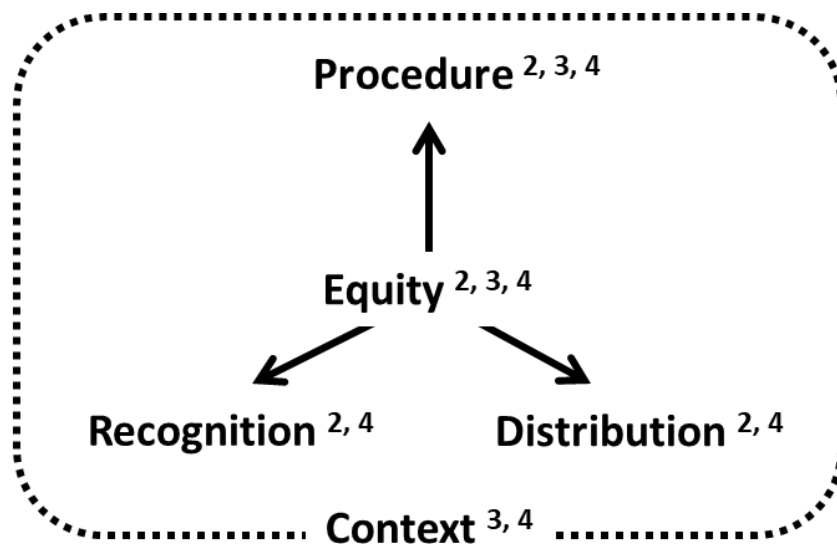


Figure 5 Equity framework. The superscripts indicate the chapters where this dimension of equity plays a central role. Adapted from Pascual et al. (2014)

Chapter 3 has a methodological focus and looks at how deliberative monetary valuation (DMV) may be used to democratically elicit values and preferences regarding PES design in a developing country context. In this regard, the focus on procedural equity and context of this chapter is highlighted in Figure 5. Chapter 3 describes the implementation of a deliberative choice experiment, a hybrid methodology that uses both quantitative and qualitative approaches, and in which 248 land users participated. Although past research of stakeholder participation in decision-making has not always found a direct link towards improved

environmental outcomes, participatory processes have been found to lead to a slew of positive intermediary outcomes such as trust-building, social capital improvements, institutional change, and the generation of new knowledge (Agrawal, 1995; Beierle and Konisky, 2001; Carr et al., 2012; Newig and Fritsch, 2009; Richards et al., 2004; Young et al., 2013). I therefore posit that the examination of the impacts of integrating participatory processes in what have traditionally been extractive research approaches such as monetary valuation (Christie et al., 2012) is a promising avenue of research. The contribution of this chapter to the literature is two-fold. First, it represents one of the first instances of deliberative choice experiments being used in the Global South (and the first in Latin America). Second, it explores how the preferences of participants regarding PES are (trans)formed as a consequence of the deliberative process.

Chapter 4, while still based on the results of the deliberative choice experiment, shifts its focus away from the methodological aspects covered in the previous chapter and analyzes more specifically the types of considerations that PES design must take into account in order to adapt itself to local contexts. This chapter therefore touches upon all dimensions of equity (Figure 5). To do this, I focus on an emblematic example of a situation in which two different worldviews come into contact with each other: an indigenous community where it is likely that a government-led PES will be implemented in the near future. Compared to Chapter 3, Chapter 4's approach is more ethnographic in its examination of the local context. The main contribution of this chapter is in trying to amend the unsatisfactory track record that PES have in many indigenous communities, highlighting that the design of these policies should be sensitive to the fact that different approaches and framings may be necessary to avoid perpetuating power asymmetries.

1.4 Stages of data collection and learning experiences

This section starts with an overview of the two main stages of data collection that took place during my PhD. It gives some background on the methodologies that I implemented and the reasons for choosing them. It concludes with some learning experiences acquired from conducting field work.

1.4.1 Phase one: building a database of PES across Latin America

The research I conducted during my PhD can be separated into two main phases. During the first phase, my goal was to build a database of PES programs across Latin America. To do this, I designed a survey targeting PES practitioners to collect first hand data. A similar approach was used by Zafra-Calvo et al. (2019, 2017), except in their case they targeted practitioners working in protected areas rather than PES. The survey included information about general PES characteristics (e.g. targeted ecosystem service, payment type, source of funding), social and environmental PES outcomes (e.g. changes in ecosystem service provision, impact on vulnerable stakeholders), and a broad range of equity considerations (e.g. degree of stakeholder participation in the design, satisfaction with payments, access to information).

I decided upon this approach after conducting a thorough literature review of the academic and gray literature and finding systematic gaps (Naeem et al., 2015) that would render unfeasible a non-superficial analysis of equity in PES. This was because each case study or source of information focused on specific characteristics of interest for the author, while leaving out many others that were beyond the studies' intended scope, but which were nevertheless necessary for my envisioned goal. The gaps of information ranged from basic information (such as what the intended goal of the PES was, who was participating, how was the PES financed, etc.), to whether the PES had achieved any measurable outcome. In some cases, different analyses of the same program would yield seemingly different results based on their methodology and the perspective taken by the authors (e.g. Pagiola et al., 2007; Van Hecken et al., 2015a).

Conducting the literature review, however, permitted me to identify gaps in the available information that I should make a priority to obtain via my questionnaire. Moreover, the literature review served as an entry point for becoming familiar with the current PES landscape in Latin America. Additionally, throughout the process I had gathered the contact information of many of the actors that had worked directly with PES programs (emails, websites, telephone numbers). Using a combination of established networks and the snowball method, I reached out to hundreds of PES practitioners by email and via a website that I

designed for this purpose (www.PESequityproject.com) which included information about the study and a link to the questionnaire. Ultimately I received responses from 61 practitioners, engaged in 45 different PES programs across 12 Latin American countries. The limitations of this approach are discussed in Section 1.6.3.

1.4.2 Phase two: Implementing a deliberative choice experiment in Colombia

The second phase of my PhD was focused on collecting and analyzing field data in Colombia. The approach I used to collect stakeholder preferences regarding an equitable PES design was a deliberative choice experiment, which is a subtype of deliberative monetary valuation (DMV), which in turn is a novel type of stated preference (SP) approach. The results of the field work are covered in detail in Chapters 3 and 4.

The theoretical groundwork for the SP approach dates back more than 75 years (Lo and Spash, 2013). At the time, the groundbreaking idea that surveys could be used to value public goods was forwarded by Bowen (1943) and Ciriacy-Wantrup (1947). Still, two decades passed before the first SP study was actually implemented by Davis (1963) to measure the value of outdoor recreation in Maine (United States) using contingent valuation. Since then, the use of the SP approach quickly gained traction, acquiring legitimacy and political acceptance over time as governments began using it to inform policy in the 1970s (Hoyos and Mariel, 2010) and with its use in high-profile cases like the Exxon Valdez oil spill in 1989. Ever since, the use of SP methods to value non-market goods has grown exponentially, branching out beyond environmental valuation and becoming commonplace in other fields like health and transport. Recently, however, SP methods have begun to receive criticism regarding the fact that many of their assumptions do not hold under certain conditions (e.g. pre-formed preferences over complex goods) (Alvarez-Farizo and Hanley, 2006; Kenter et al., 2016b), and that the type of values they are capable of capturing represent a very narrow understanding of the world (e.g. self-centered monetary values) (Jacobs et al., 2018).

In response to the increasingly apparent limitations of traditional SP methods (which we describe in detail in Chapter 3), several types of DMV methodologies have been recently

developed and are increasing in popularity (Bunse et al., 2015). The two main families of DMV are value juries and valuation workshops. One of the main characteristics of value juries is that they tend to rely on large groups (12-42 participants) which are ‘socially’ rather than ‘statistically’ representative (Bunse et al., 2015; Schaafsma et al., 2018). Over the course of multiple days, participants are asked to deliberate and discuss the issue at hand in great depth, asking as many questions as needed of ‘witnesses’ (normally experts in the subject matter who are convened for this purpose). Despite being a good approach to legitimize a consensually agreed upon outcome or ‘fair price’ (Kenter et al., 2015), the significant time and monetary cost associated with value juries makes them impractical in many settings, and, as a consequence, studies often rely on very small samples (Bunse et al., 2015).

Chapters 3 and 4 of this dissertation use the other main type of DMV approach, namely, valuation workshops. This methodology was first used by Macmillan et al. (2002), who sought “to combine the desirable features of group techniques such as citizen juries with the particular requirements of economic valuation.” They recognized the benefits that deliberating on a topic could provide; however, they were interested in also producing individual willingness-to-pay (WTP) estimates. According to them, valuation workshops brought to the table three main advantages over traditional SP: (1) participants had more time to think about the good in question, (2) participants also had more access to information they needed to make an informed decision, and (3) the deliberative process could provide decision-makers with richer information regarding participants’ perceptions and preferences. Despite these advantages, the use of DMV still remains limited and is almost exclusively centered around contexts of the Global North. Given that the overarching objective of this dissertation is to study the relationship between equity and PES, I chose this methodology as it embraces the democratic principles embodied in participatory approaches that have thus far scarcely been used in environmental decision-making, and creates a forum to deliberate upon and express a diversity of values.

During an initial visit to Colombia I visited several potential case study sites and ended up deciding to carry out my deliberative choice experiment in the indigenous community of Muellamues. I chose this community because it represented a unique opportunity to study equity considerations in PES design: from a sociocultural point of view, the fact that the

community was indigenous allowed me to explore the intricacies of designing PES in contexts where different worldviews are present; from an environmental and economic perspective, the fact that the community was undergoing a transition from traditional farming practices to producing milk for the national market, and that this was contributing to rapid environmental degradation of key ecosystems, presented a very concrete example of a situation that PES could be used to tackle. I spent five weeks in Muellamues conducting a total of 24 valuation workshops, which counted with the participation of almost 250 community members.

1.4.3 Learning experiences from conducting fieldwork

1.4.3.1 ‘Post-conflict’ lab-in-the-field experiment

During my visits to Colombia I had initially planned to carry out a lab-in-the-field experiment in addition to my deliberative choice experiment. The intended purpose of the lab-in-the-field experiment was to measure the social and environmental preferences of individuals that had been affected by the armed conflict in Colombia.

A peace treaty was signed between the Colombian government and the FARC guerrillas in November 2016. While this marked the end of a violent conflict that had raged for decades, it meant that large portions of the country that had until then been fortuitously preserved in conflict zones suddenly became accessible for production, and were thus quickly being degraded in the aftermath (Morales, 2017). My objective was to explore whether PES payments could serve as a vehicle to keep these areas protected while also serving the dual-purpose of offering reparations to the victims of the war. Unfortunately, during the months I spent in Colombia I learned that the ‘post-conflict’ period, as it has been (optimistically) called, should more accurately be referred to as the ‘post-peace-treaty’ period, as the dismantling of the FARC guerrilla resulted in a power vacuum that has in large part been filled by smaller criminal groups in their wake, in many cases increasing the conflict at a local level. In this sense, over the course of several field visits to areas that FARC had vacated it became apparent that ‘organized’ crime had simply been substituted by ‘disorganized’ crime, and unfortunately, I was not able to find anywhere suitable to conduct the lab-in-the-field experiment.

Despite this, throughout these visits I was able to talk to people on both sides of the conflict, including victims, policy-makers, government workers, ex-guerrilla members, soldiers, and displaced farmers. While I did not leave with the data I had hoped to collect for the lab-in-the-field experiment, I did leave with a new understanding of the ways in which the local context, history and institutions at work will undoubtedly interact with policy tools such as PES. This experience painted what had until then been my mostly theoretical understanding of PES programs with a practical coat of reality that in many ways changed how I thought about the interactions between policy, institutions and people. It helped me to understand the admonitions of authors such as Van Hecken and Bastiaensen (2010:437) that warn about the myopia of treating PES “as mere neutral transmitters of incentives” while ignoring the way in which they will interact and be co-produced by local contexts and actors.

1.4.3.2 Challenges encountered during fieldwork in Muellamues

During my stay in Muellamues, where I conducted my deliberative choice experiment, I learned firsthand about the types of logistical challenges associated with conducting field work in rural contexts of the Global South. These included issues related to: (i) materials, (ii) literacy and cognitive difficulty, (iii) gatekeepers and trust, (iv) lack of access to trained moderators, and (v) security.

In order to conduct my study, 6,000 pages of material had to be printed which posed two types of logistical issues. The first was associated with finding printing facilities in the area capable of handling the load. For example, on one occasion the only print shop in the nearby town ran out of print toner and they were unable to acquire more for two weeks. The second associated difficulty was the impossibility of transporting back all the material that was produced during the workshops, which instead had to be digitalized on a daily basis.

Given the low literacy level of many community members, the choice experiments and explanations relied heavily on pictures to help in their interpretation and understanding. This also meant that it was necessary to train a local moderator to help me offer assistance to many of the participants. The limited literacy levels proved particularly challenging in groups where many of the participants were older. This highlighted the importance of striving to make

explanations and procedures as simple and straightforward as possible in contexts where participants level of education may be markedly low.

A precondition for implementing our study in Muellamues was to meet with and obtain the approval of the indigenous council of leaders for reasons both practical (to justify my presence in the community) and ethical (free prior and informed consent of indigenous communities). Despite obtaining the approval from the council of leaders, gaining the trust of the community took some time until people learned (and believed) my motives for being there. This is because unfortunately my field work coincided with local elections and at first many people expected I had ulterior political motives for being there. Something that helped in this regard was that the local moderator that assisted me belonged to a well-known family, and her involvement in the workshops helped to put participants at ease.

A final consideration that had to be kept in mind was with regards to security. A week into the fieldwork, the ELN guerrilla called for a national blockade forbidding Colombians to travel using the country's roads under threat of violence. Because the area has had intermittent guerrilla presence in the recent past (e.g. houses in the outskirts of the villages still had "FARC" and "ELN" graffiti on them left behind from the last time that these groups had passed by) some of the workshops had to be postponed for several days until the end of the blockade.

1.5 Insights acquired from empirical results

In this section I outline how the findings of the three empirical chapters address the research questions laid out in Section 1.3.

1.5.1 Equity and socio-environmental effectiveness of PES are inextricably linked

Following hypotheses laid out by authors like Pascual et al. (2010; 2014) and Miller et al. (2012), the question that launched this dissertation (R1) was to identify the interlinkages, synergies and tradeoffs between considering different dimensions of equity in PES design and their social and environmental outcomes. The literature offered mixed accounts: there was

evidence, for example, that distributing payments more equitably would lead to significant losses in efficiency and effectiveness (Halpern et al., 2013; Jindal et al., 2013), while also showing that lack of perceived equity could lead to rejection of PES by participants (Miller et al., 2012a; Pascual et al., 2014; Reed, 2011), thus leading to the failure of the programs.

In Chapter 2, I present evidence that, contrary to the findings of other authors that have found tradeoffs (Halpern et al., 2013; Jindal et al., 2013; Martin Persson and Alpizar, 2013), having an equitable design is associated with improved social and environmental outcomes. I attribute this finding to the fact that this study is one of the first to empirically assess equity in a multidimensional way, by measuring 15 different indicators covering the dimensions of recognition, procedure and distribution. As such, while it is possible that individual equity measures (such as ensuring that payments are not allocated strictly on the grounds of highest efficiency) may indeed imply tradeoffs, the fact that PES are perceived to be fair by participants may be contributing to their positive reception, thus motivating greater participation and adherence to the goals of the programs. After all, unlike other types of environmental policies, participation in PES is normally voluntary on the part of ecosystem service providers. And given that these programs can often only afford small payments in exchange for conservation, ensuring that they are perceived as legitimate and just by participants may well be a prerequisite for their long term success.

In general, the findings presented in Chapter 2 suggest that the dimension of equity with the most room for improvement was the recognition of vulnerable individuals, with some evidence that stakeholders most needing of support may inadvertently be slipping through the cracks and harmed by PES. For example, a vulnerable collective that seems to be particularly at risk are farmers without formal land titles, who may be excluded from participating, or even in the worst of cases at risk of having the land that sustains them expropriated (Engel and Palmer, 2008). This possibility has been identified by other authors (e.g. Grieg-Gran et al., 2005; Wunder, 2008), who note that despite the pro-poor potential that well-designed PES may have by transferring funds from the relatively rich to the relatively poor (Pagiola et al., 2005), certain PES design choices may prevent “the poorest of the poor” from reaping benefits from PES programs (Wunder, 2005:17).

When analyzing the procedural dimension of equity, I find that overall stakeholder participation in PES design appears to be high. This suggests that PES are, at least to a certain degree, interacting with and being co-produced by the communities in which they are implemented. This finding may pose a challenge to the notion that all PES are products of the ‘global capitalist machine’ (Büscher, 2012; Fletcher and Büscher, 2017; Kosoy and Corbera, 2010; McAfee, 1999), an idea that has been criticized for relying on the ‘populist discourse’ (Adger et al., 2001) that characterizes local actors as passive victims of external interventions (Van Hecken et al., 2015b). On the contrary, PES practitioners’ perceptions that PES are incorporating stakeholders’ inputs echoes the insights derived from institutional economics that point out that PES unavoidably interact with local meanings, norms, institutions and value systems (Van Hecken et al., 2018). This is further supported by the fact that half of the PES practitioners in our sample consider that the social objectives of their programs were equally important to the environmental ones. This confirms the finding of earlier studies that far from being efficiency-obsessed, PES are in many cases actively being deployed with pro-poor objectives in mind (Wunder, 2008).

A surprising result of this study was that, overwhelmingly, PES practitioners did not believe PES was having much of an effect on distributional equity, in the sense that payments were having little to no impact on the relative poverty of participants. This contrasts with the fact that this very measure of equity is precisely the one that has been analyzed the most in the empirical literature thus far (Friedman et al., 2018).

It is important to note that the analysis conducted in Chapter 2 distinguishes between PES having social objectives (e.g. reducing poverty) and PES being equitable. This is because equity is conceptualized as something that permeates the entire process of PES design and implementation. Thus, a PES program does not need to have social objectives to be equitable, but rather must recognize the particularities of its local context, incorporate fair procedures, and ensure that the allocation of costs, benefits and risks are fairly distributed according to local conceptions of justice. The findings of this chapter suggest that the PES that fulfill these criteria are the most likely to promote environmental conservation.

1.5.2 The usefulness of deliberative processes to elicit preferences in the Global South

The second main research question (R2) of this dissertation is whether deliberative approaches can effectively be used in contexts of the Global South to elicit stakeholder preferences in a procedurally equitable way. And if so, what are the advantages of using this type of approach? In line with the findings of other studies that have used other DMV approaches (Bunse et al., 2015; Schaafsma et al., 2018), the results of my deliberative choice experiment suggest that hybridizing deliberative processes with stated preference methods is a promising way to capture more informed preferences that better reflect participants' values. This is evidenced by the fact that participants were considering more attributes by the end of the valuation workshop, were taking less time to complete the choice experiment, were asking fewer questions, making fewer mistakes, and were more capable (or willing) of considering tradeoffs.

In the past, it has been noted that given the cognitively challenging nature of stated preference surveys, the mental capacity of participants may be a limiting factor to obtaining valid results (Meyerhoff et al., 2013). The findings of Chapter 3 suggest that the deliberative choice experiment offers at least four learning opportunities that may contribute to significantly decrease the difficulty of the exercise: first, the initial presentation by the moderator; second, the individual reflection that takes place while completing the first choice experiment; third, the learning that takes place during the focus group; and fourth, an increase in the familiarity with the hypothetical market methodology afforded by being able to repeat the choice experiment for a second time. In particular, older and less educated respondents appeared to be benefitting the most from the learning and preference-formation opportunities afforded by the DMV approach. This suggests that DMV may be particularly useful as a valuation methodology in contexts where participant composition is especially marked by individuals with these characteristics.

A legitimate concern with deliberative approaches is the risk that more dominant participants may exercise undue influence on their peers, and therefore impose their views on others (Mansbridge et al., 2010). Evidence of this would put into question whether the

deliberative valuation approach is truly democratic (Wegner and Pascual, 2011). I thus test whether participants with characteristics that are associated with a lower social status in the community (younger, poorer, less educated, female) are more likely to change their preferences throughout the course of the DMV. I do not find conclusive evidence of this being the case. I attribute this finding in part to the fact that deliberative decision-making is quite common in the community where the study was conducted, and therefore the participants did not have any difficulty respecting each other's turn to express their views. This supports the notion that, at least in some contexts, a well-moderated discussion can contribute to elicit better formed preferences while respecting deliberative-democratic ideals (Kenter et al., 2016b).

Finally, I find that throughout the deliberative process participants expressed a broad set of diverse values (instrumental, relational and intrinsic) regarding nature and the characteristics of the PES program being assessed (Pascual et al., 2017). This is evidence that DMV may provide much richer information than traditional stated preference approaches. This fact is important given that the results of valuation studies are often used as a proxy for the social impacts of decisions (Kenter et al., 2016b), and therefore using approaches that only capture one dimension of value (such as willingness to pay) may be losing critical information necessary for effective and just decision-making (Vatn, 2009).

1.5.3 The importance of meaningful participation and co-creation to adapt PES to indigenous communities

Having seen the advantages of ensuring an equitable PES design in Chapter 2, and the usefulness of using deliberative methodologies to elicit preferences regarding an equitable PES design in Chapter 3, in Chapter 4 I address the final research question (R3): How can PES be adapted to indigenous communities, which have unique ways of relating to the environment, in ways that guarantee that they are equitable and do not lead to unintended negative outcomes? I continue using the case study of the indigenous community of Muellamues in Colombia, but take a more ethnographic approach to explore this question.

In this chapter I first look at the ways that, in recent history, well-intentioned government and international programs have inadvertently led to negative consequences for

the community. This highlights the importance of engaging stakeholders before decisions are made that have the potential to cause significant impacts to their ways of living, something that has been championed by advocates of free prior and informed consent (FPIC) in the past (Szablowski, 2010; Zafra-Calvo et al., 2017). I then show that the deliberative process led to a homogenization of participants' preferences. This could prove useful in cases where it is of interest to achieve (or approach) a consensus before making a decision. Despite the fact that other DMV approaches such as value juries have been used explicitly for this purpose in the past (Bunse et al., 2015; Kenter et al., 2015), the findings of Chapter 4 suggest that valuation workshop approaches such as the deliberative choice experiment I use may share some of these benefits at a considerably smaller time cost (valuation workshops can last a few hours as opposed to value juries which often last several days).

The most valued attribute across the board by participants was the ability to have an active participation in the design process of any future PES program. This is unsurprising given the governance style of the Muellamues, which often relies on community decision-making. However, this is obviously not a unique fact about Muellamues, but something that is shared by many indigenous communities around the world, who, in large part as a direct consequence of past injustices, place a high importance on their sovereignty (Goldtooth, 2004; Murillo, 2009; Reed, 2011). In fact, other recent studies have found that respecting indigenous sovereignty and self-determination in program implementation can contribute to producing positive socio-environmental outcomes (Denham, 2017).

After deliberating about PES design, distributive concerns became more important for participants. Although there was no consensus over whether they preferred an equal per capita payment (which reflected more closely traditional norms) or an effort-based payment (which was expected to reduce free-riding), the least preferred option was an equal payment per land unit. The reason for their rejection of the latter rule is closely tied to the local history and context and is described in more detail in Chapter 4, but the finding is notable as an equal payment per land unit is the most commonly used distributional rule applied in PES programs worldwide (Wunder et al., 2018). This highlights the fact that without prior consultation and involvement of stakeholders, PES design may well be maladapted to local contexts. By contrast, in places where indigenous communities have been allowed to co-design PES, for

example by defining their own community-decided distribution rules, PES programs have been perceived as being more legitimate and thus PES uptake has been increased (Nieratka et al., 2015).

Implicitly, the fact that in the analysis of the choice experiment not only the coefficient for the ‘increase in monthly earnings’ is significant, but also those for ‘degree of participation’ and the ‘distribution rules’ suggests that participants were willing to trade-off some monetary gains for a PES they considered more equitable. This has implications for the overarching question of this dissertation—whether making PES more equitable increases the likelihood that they will be successful—by suggesting that PES implementers would do well to pay attention to equity concerns beyond those involving financial benefits if they wish to make participation in PES more attractive for land-users.

A common occurrence during the deliberative processes was an apparent shift in the framing of PES. Throughout many of the workshops, participants would shift the terms in which they talked about the program from being paid to provide ecosystem services, to a more indigenous framing of being helped or recognized for being stewards of ‘mother nature’. This shift was often accompanied by a change in their human-nature relational model (Muradian and Pascual, 2018). In these cases, the environment often went from being initially framed instrumentally as the backdrop over which people made their living, to a more relational or intrinsic framing of the environment, inextricably linked to people’s identity and sense of duty.

In summary, Chapter 4 demonstrates the value of approaching PES research from a transdisciplinary lens, showing that combining economic, ethnographic and participatory approaches can help to design more socially-informed PES that are more capable of understanding the interactions between policy, context and local institutions (Van Hecken et al., 2015b).

1.6 Concluding remarks

This section begins by looking at how the findings of Chapters 2, 3 and 4 address some of the gaps that were identified in the literature. Next, I consider how some of the findings of

the dissertation may connect with the broader environmental governance literature. I then consider some of the limitations of the approaches I followed, and close with opportunities for future research.

1.6.1 Addressing gaps in the literature

The empirical chapters of this dissertation tackle three gaps in the PES equity literature. Chapter 2 represents one of the first approximations to measure equity across PES programs from a multidimensional perspective. Through this approach I contribute to the long-lived debate about the degree to which PES design should concern itself with equity concerns (Corbera and Pascual, 2012; Kinzig et al., 2011). By analyzing firsthand information provided by 61 PES practitioners, I find that the PES with the most equitable designs (as measured by 15 indicators) were generally the ones with the best social and environmental outcomes. This implies that policymakers should not ignore equity concerns when designing PES, even when their goal is to maximize their environmental effectiveness.

Chapter 3 looks at whether the purported advantages of DMV as a methodology to elicit preferences and values (Kenter et al., 2016b; Schaafsma et al., 2018) hold in the Global South, where despite gaining recent interest, its implementation has so far trailed behind (Christie et al., 2012; Rincón-Ruiz et al., 2019). I find that using a deliberative choice experiment has significant advantages in this setting, as it offers multiple learning opportunities for participants to form more informed preferences and gives them the chance to express a more diverse set of values than those contemplated within a conventional choice experiment.

Given the close proximity between many indigenous communities and preserved natural resources (Garnett et al., 2018), environmental policy often has a direct impact on the lives and livelihoods of these groups. Despite this, the PES literature has not engaged much with issues of sovereignty and the differential world views that indigenous peoples may have (Denham, 2017). For this reason, in Chapter 4 I analyze a case study in which many of these issues are prominent, and find support for the fact that PES must engage these communities in processes of co-design if they are to be well-adapted to these specific contexts.

1.6.2 Connections to broader debates on environmental governance

The overarching question that this thesis intended to shed some light on was whether making PES more equitable would increase the likelihood that they would be successful. The findings of the three empirical chapters are important because they demonstrate that equity concerns cannot be a mere afterthought if PES is going to be effectively used to curb environmental degradation. Contrary to other types of environmental policy tools, participation in PES is voluntary (Engel 2016). As such, these programs require a degree of legitimacy to engage participants and motivate land use changes. Additionally, given the limited funds available for many of these initiatives, ensuring that PES are equitable, for example through increased stakeholder participation, is a valuable undertaking that will contribute to their effectiveness. This is because, as Miller et al. (2012) point out, the impact of environmental initiatives on socio-ecological systems are subject to feedbacks between the social impacts of policies and people's behavioral responses to them (Figure 6). Therefore, programs that elicit a positive or negative social response, are more likely to reinforce positive or negative behavioral change, respectively.

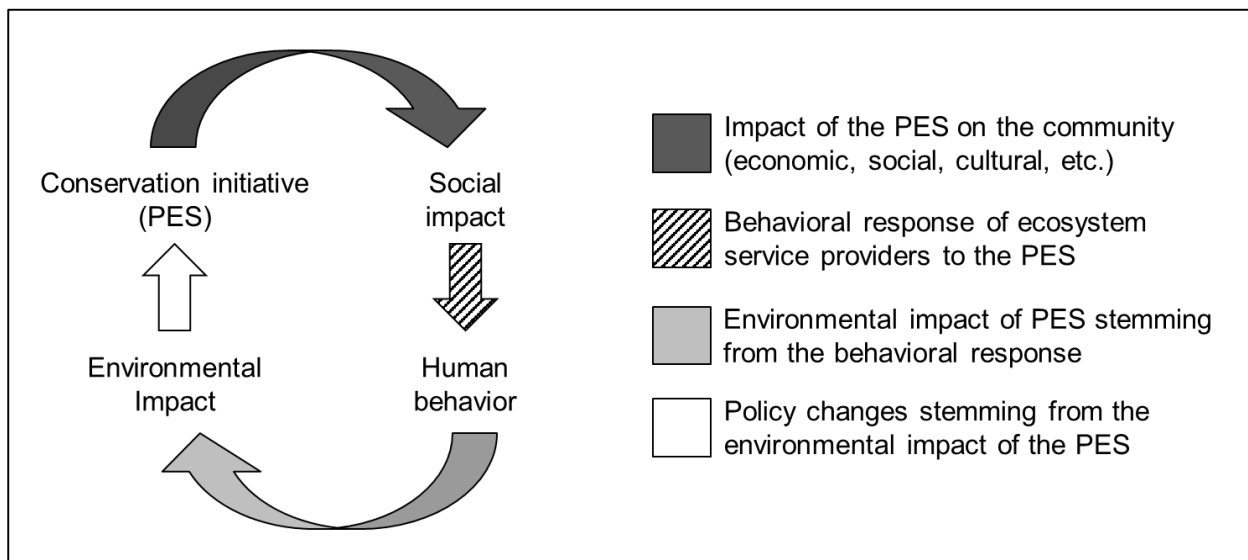


Figure 6 Feedbacks between conservation initiatives, society and the environment. Adapted from Miller et al. (2012).

This dissertation highlights that equity is a situated, context-based phenomenon and as such must be understood and evaluated with respect to the culture, history, practices, norms, and institutions in question (McDermott et al., 2013). However, the implication of this is that no one design of PES will be universally equitable, as different dimensions of equity will be more important depending on the context (Pascual et al., 2014). The framework I use in this PhD attempts to address this by not being overly prescriptive, but rather highlighting the types of considerations that are necessary to arrive at an equitable outcome instead. Of course, this means looking beyond distributive considerations alone, which have been the main focus of equity research in the past, and beginning to consider issues of participation and recognition more centrally (Friedman et al., 2018).

Putting this into practice would also respond to continued calls from within the broader environmental justice movement to include more democratic processes in environmental decision-making (Carrozza, 2015). Much can be learned from the field of participatory citizenship in this regard, which conceives of citizenship as something that is practiced rather than given (Gaventa, 2004), and thus recognizes the agency of local actors as ‘makers and shapers’ rather than passive ‘users and choosers’ of interventions designed and implemented from above (Cornwall and Gaventa, 2000). This resonates with the findings of Chapter 2, in which PES practitioners perceive that stakeholder involvement during the design process is generally high. Similar findings have been noted elsewhere, underlining that PES are not implemented on a blank canvas, but rather that these programs are inevitably imbued with local meanings, values and institutions wherever they are implemented (Van Hecken et al., 2018).

In this sense, environmental policy in general, and PES design in particular, can be thought of as a product of ‘institutional bricolage’ (Van Hecken et al., 2015b), which can be understood as “a process in which people consciously and non-consciously draw on existing formulae (styles of thinking, models of cause and effect, social norms and sanctioned social roles and relationships) to patch or piece together institutions in response to changing situations. These institutions are neither completely new nor completely traditional but rather a dynamic hybrid combining elements of ‘modern’, ‘traditional’ and the ‘formal’ and ‘informal’” (Cleaver, 2012:45). This can be seen in Chapter 4, where over the course of the workshops participants would reframe PES to fit their traditional practices and worldviews.

In this regard, if PES are in fact in a constant process of evolution via interaction with local contexts, then it is critical to actively consider how to guarantee that preexistent inequalities are ameliorated rather than further entrenched by the implementation of PES. This is because stakeholder participation in and of itself is not a guarantee that PES will be more equitable, if the stakeholders that are allowed to participate and have their voices heard do not include those that were already marginalized or invisible to begin with (Behera and Engel, 2007). This is due to the fact that there can be power imbalances not only between PES implementers (e.g. the government) and ES providers (e.g. rural farmers), but also within the group of ES providers themselves (Rodríguez de Francisco et al., 2013). As can be seen in Chapters 3 and 4, using deliberative approaches may offer a promising avenue to create platforms in which diverse values can be expressed by a wide range of stakeholders. In these cases, the role of the moderator or facilitator cannot be overstated as it is in their hands to ensure that the deliberative process be free of coercion and that everyone is capable of expressing themselves freely and being heard (Kenter et al., 2016a; Mansbridge et al., 2010). This is not an easy task in situations where significant power imbalances exist, but as I find it Chapter 3, it is indeed possible to achieve or at the very least minimize. However, it must be noted that the case study described in this thesis involved participants who were already used to collective decision-making. The question of whether deliberative approaches would work as well in different contexts is an empirical one that remains to be tested.

Empowering stakeholders in this way is not in and of itself a novel idea. For decades it has been advocated for by supporters of forest and other resource-dependent peoples (Sikor et al., 2010) through other processes such as free, prior and informed consent (FPIC). However, the reality so far is that in many (if not most) circumstances, genuine FPIC is rarely practiced in environmental decision-making (Szablowski, 2010). This is because even in cases where FPIC nominally takes place, “these processes have often gone hand in hand with adverse social consequences for local populations, such as the exacerbation of conflicts, the division of communities and the weakening of indigenous organizations” (Schilling-Vacaflor and Eichler, 2017:1439). In these cases, rather than legitimizing the outcome of the decision as would be hoped for, hollow participatory processes risk perpetuating inequitable outcomes that only serve to generate frustration and disenchantment among those affected (Whiteman, 2009).

Thus, ensuring that PES are well adapted to their setting by securing adequate and meaningful participation of stakeholders may be a prerequisite to prevent PES from becoming tools for powerful actors to extend their control over more vulnerable individuals (Fletcher and Büscher, 2017) thus perpetuating the ‘slow violence’ and ‘attritional lethality’ of environmental injustice (Nixon, 2011).

1.6.3 Limitations of my approach

It is important to acknowledge some of the limitations of the methodologies followed in this dissertation. In Chapter 2, I attempted to explore the interlinkages, synergies and tradeoffs between considering different dimensions of equity in PES design and their social and environmental outcomes by relying on the perceptions and on-the-ground knowledge of PES practitioners. The main reason for following this approach was because the data underpinning most PES programs is quite poor, not least due to a lack of scientifically rigorous impact assessments (Naeem et al., 2015; Engel, 2016; Wunder et al., 2018). A potential limitation of the approach I followed is that using a survey to obtain data entails a certain degree of subjectivity as it relies on the perceptions of the respondent. However, this approach has been used successfully for similar purposes when assessing the equity impacts of protected areas (Zafra-Calvo et al., 2019, 2017) as it offers several significant advantages. PES practitioners are often the only people that have been involved with PES programs throughout the entire design and implementation process, meaning that they have a wealth of information that is otherwise hard to come by relying only on secondary sources. Additionally, they are in a privileged position as they represent the nexus between all the stakeholders involved in PES (funders, participants, policy makers, etc.). In this sense, their on-the-ground experience represents one of the biggest and most comprehensive pools of knowledge of individual PES programs. Consequently, after taking measures to reduce any potential bias in their responses (such as guaranteeing anonymity and explaining clearly the objectives of the study), I argue that the first hand perceptions and knowledge of practitioners represent an up-to-now scarcely used resource in large-scale PES reviews that can give new insights into the design considerations necessary to ensure the success of these policy tools.

However, in the future, a more robust analysis could be done if PES started being evaluated more systematically (Naeem et al., 2015). Although it is now almost a decade out of date, a laudable effort was carried out by watershedmarkets.org in which they compiled a database of PES around the world with basic information, academic analyses and contact details. A similar effort to centralize all information regarding PES currently in operation would help design more effective and equitable programs going forward. Nevertheless, acquiring scientifically robust data tying PES to changes in the environment will continue being a tricky and costly endeavor, as even obtaining baseline data and using control groups will not always be sufficient due to the fact that “nature is not always ‘well-behaved’” (Wunder, 2005:3) and a broad range of factors beyond the reach of PES may impact ES provision.

Chapter 3 uses a deliberative choice experiment methodology to elicit better formed values than those obtained using conventional stated preference methods. This approach, however, has three main limitations. The first is that deliberative approaches may not be equally well suited to all contexts. In Muellamues, the community where I carried out the deliberative choice experiment, group decision-making is quite common and therefore participants were used to voicing their opinions in front of a group and respecting each other’s turn to speak. This likely meant that the benefit participants derived from this process may have been greater than it could be elsewhere. Additionally, in places where participants are less accustomed to deliberative processes, the role of good moderation is particularly critical. This is because in deliberative settings the use of coercive power will ideally be minimized; however, the very act of moderating a group challenges this ideal as it puts the moderator hierarchically above the rest of participants. This means that good moderators must have a light touch while carrying out a delicate balancing act. On the one hand, they must guarantee a fair space where all participants are free to express themselves without exercising coercive power of any kind over each other (Habermas, 1984); on the other, they must keep in mind practical considerations and exercise a certain degree of control over the process, such as ensuring that rambling or domineering participants allow others to express themselves as well, that the discussion does not go significantly off-topic, and that the discussion’s length is kept according to schedule. In this regard, “the absence of coercive power is a regulative ideal, impossible to

achieve but serving in many circumstances as a standard against which to measure practice” (Mansbridge et al., 2010:80).

The second limitation is that the methodology I followed did not let me disentangle the effect of each of the four learning opportunities that took place during the workshop. Therefore, although I found that participants were considering more attributes by the end of the valuation workshop, were taking less time to complete the choice experiment, were asking fewer questions, making fewer mistakes, and were more capable of considering tradeoffs, it was impossible to say with certainty if this was primarily due to a specific learning opportunity or due to a combination of them.

The third limitation is associated with the fact that due to the rural, Global South context in which I carried out my research, the cognitive difficulty of the exercise was a major hurdle even after taking some steps to minimize it (such as using illustrations, reducing as much as possible the amount of written material, and having multiple moderators to help participants individually). In the future, attempts to elicit values in similar contexts should test alternative, less cognitively demanding, deliberative methodologies that may prove to be better suited such as storytelling, arts-led dialogue or participatory mapping, among others (Kenter et al., 2016a).

The results of Chapter 4 highlight how much value respondents placed on being able to meaningfully participate in the design of a PES that was implemented in their community. A natural caveat to extrapolating this result more broadly to other (non-)indigenous communities is that my findings are based on a single case study. Secondly, no PES has been implemented in Muellamues yet, so it is impossible to determine whether having participated in our deliberative study would have an impact on the deployment and performance of PES. Cavalcanti et al. (2013) found some evidence that engaging stakeholders early on with participatory process could contribute to pro-environmental actions in the future, although they warn that this impact was relatively short-lived in their case. This does suggest, however, that these processes may contribute to actors developing a sense of ownership over the conservation initiative, which would be expected to increase the likelihood of their environmental success.

However, participatory processes are not devoid of potential shortcomings. First, carrying out a participatory process that is ultimately perceived to be tokenistic, culturally

inappropriate or devoid of actual consequences may be counterproductive by generating more frustration than not allowing any participation to begin with (Whiteman, 2009). Second, is that simply including more voices and views does not immediately guarantee a better outcome, and in fact carries the risk of generating discord among participants (Jasanoff, 1996). There is no doubt that making processes more democratic will make their outcomes more legitimate, but it also raises the question of what to do when views are irreconcilable. In cases where despite the use of deliberative means arriving at a satisfactory consensus is impossible, then the goal should become for participants to at least achieve a reciprocal understanding of each other's reasons, and engage in other agreed upon democratic processes such as negotiation, compromise, or decisions by majority rule (Lo and Spash, 2013; Mansbridge et al., 2010).

1.6.4 Future avenues of research

The findings of my thesis open multiple avenues for future research. In Chapter 2, I surveyed PES practitioners for their perceptions regarding the equity and outcomes of PES and found that those with the most equitable design were often the ones with the best social and environmental outcomes. However, although the logistical challenges may be higher, future studies could ask the ES providers themselves about their perceptions in this regard to test if the findings of Chapter 2 hold from their perspective as well. In Chapter 3, I find evidence that the deliberative choice experiment approach offers at least four learning opportunities. However, the design I used does not allow me to disentangle their impacts on participants. Future deliberative choice experiment designs could attempt to tackle this issue by having different treatments (e.g. comparing a control group with a simple one-time choice experiment with a first treatment group that repeats the choice experiment twice but does not deliberate, and with a second treatment group that deliberates but only completes the choice experiment once). The results from Chapter 4 show how important being able to participate in the design process of PES is for the land users of the community of Muellamues. However, from the point of view of PES implementers and funders, it would be valuable to know whether the additional cost associated with organizing participatory processes translates into more effective PES in the long run. One practical way to simulate this would be combining participatory processes

(e.g. deliberative choice experiments) with lab-in-the-field experiments to test if and how land use decisions change.

The overarching goal of this thesis was to explore if making PES more equitable increases the likelihood that they will be successful. However, interesting research is being done to better understand other factors that affect the success of PES. A promising field of research that is gaining more attention is in trying to explain the discrepancies between PES theory and observed behavior on the ground. This ranges from trying to understand why some PES programs continue to function even when there is little evidence that they are effectively providing environmental benefits (Santos de Lima et al., 2019), to diving into the broad range of behavioral and psychological factors that interact with PES. Among these, currently the most prominent seem to be concerned with motivational crowding (Rode et al., 2015a; Moros et al., 2017; Ezzine-de-Blas et al., 2019) and with how different ways of framing PES may encourage different types of behaviors and promote certain types of relational values (Bétrisey et al., 2018; Bremer et al., 2018; Muradian and Pascual, 2018). There is also a growing awareness of the importance of recognizing the wide range of values of nature that guide humans, as evidenced by the current IPBES assessment on the diverse conceptualization of the values of nature. This is leading to calls to make many of these implicit values more explicit (Schneider et al., 2019), in a way leading to a deliberate politicization of environmental policy in an attempt to make more transparent the drivers of environmental governance.

Chapter 2 The impact of social equity on the outcomes of payments for ecosystem services: Practitioners' perceptions in Latin America

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2.1 Introduction

Payments for ecosystem services (PES) are conditional positive incentives based on a “steward-rewarded” principle. They are used as an alternative to command-and-control regulation, which can often be overly burdensome for low-income landholders, by instead seeking to create contracts or transactions that compensate individuals or communities for supplying socially valuable ecosystem services (ES) (Engel, 2016; Engel et al., 2008). The goal of this paper is to contribute to one of the main questions surrounding PES: to what degree should PES design focus on non-environmental concerns, in particular those concerning social equity? The answer to this question requires understanding whether there are trade-offs between environmental effectiveness and social equity in PES design and implementation (Pascual et al., 2014).

The literature on the topic has yet to reach an undisputed consensus. There are those who advise that PES perform best when their focus is primarily on delivering ES in the most cost-effective and efficient way possible, leaving social concerns to other types of policy instruments (e.g., Kinzig et al., 2011; Wunder, 2005). This line of thinking contends that focusing on equity as an objective of PES may imply trade-offs which can reduce their environmental effectiveness (e.g. Halpern et al., 2013; Jindal et al., 2013; Martin Persson and Alpizar, 2013). Others argue that the existence of trade-offs between environmental effectiveness and equity (sometimes framed as pro-poor outcomes) depends on the context, and that it may be reasonable to address hurdles to participation of poor landholders in PES design for equity reasons (Grieg-Gran et al., 2005; Pagiola et al., 2005; Zbinden and Lee, 2005). A growing body of research goes even further to suggest that perceived inequity and unfair PES processes can also undermine environmental outcomes of PES (e.g. Miller et al., 2012; Pascual et al., 2014, 2010). The underlying idea behind this position is that because participating in PES is generally voluntary, programs that are perceived to be fair and equitable are more likely to motivate participation and adherence to their objectives by increasing their legitimacy in the eyes of participants (e.g., Corbera et al., 2007; Muradian et al., 2010). Thus, considering equity aspects in PES design and implementation is hypothesized to be conducive to improving not only the social, but also the environmental outcomes of PES.

More recently, it appears these diverse schools of thought are beginning to converge on the shared view that, especially in the Global South, social equity considerations are an ineludible component in the design of PES, which should still reflect basic economic design principles (Andeltová et al., 2019; van Noordwijk et al., 2012; Wunder et al., 2018). So far the link between environmental effectiveness, social outcomes and the consideration of social equity in PES has been explored primarily from a conceptual standpoint with PES outcomes and equity considerations rarely being measured in an empirical way (Halpern et al., 2013; Pascual et al., 2014, 2010). In addition, due to the heterogeneous quality of available data from case studies, recent attempts to address this gap (e.g., Calvet-Mir et al., 2015) have had to resort to analyzing equity in relatively simple terms, for example by using dichotomous measures of equity (i.e. equitable/inequitable). We improve upon these measurements by looking at equity

in a multidimensional way (McDermott et al., 2013, Pascual et al, 2014), analyzing different components of equity more granularly.

Our empirical analysis draws data and information from the expert judgement and on-the-ground perceptions of PES practitioners, including, inter alia, PES implementers working for governments, NGOs, and private companies. To the best of our knowledge this is the first study which carries out a relatively large survey of PES practitioners (n=61; closely associated with 45 different PES programs across 12 Latin American countries) on the perceived trade-offs between social equity and environmental outcomes of PES programs. Notwithstanding that a focus on the perception of implementers of PES programs entails an irreducible degree of subjectivity, PES practitioners represent a key nexus between policy makers, funders, providers and beneficiaries of ecosystem services and are knowledgeable about the contextual features and the complexity of the process of establishing PES on the ground. Their role within PES programs has been found to be a key determinant of PES success or failure (Leimona et al., 2015), but despite this their views have largely not been explicitly accounted for (see Namirembe et al. (2017) and Santos de Lima et al. (2019) for some notable exceptions).

The scope of our analysis covers PES in Latin America as it is the region where the greatest number of PES has been implemented over the last two decades (Schomers and Matzdorf, 2013). This means that there is a sufficient amount of cases to study and that enough time has passed for these projects to mature and for practitioners' perceptions to take shape.

We administered a survey tailored to the Latin American context and focused on a wide range of equity indicators associated with PES. We follow this approach recognizing that there is a growing need to acknowledge the multiple dimensions of equity in relation to conservation actions (Friedman et al., 2018): recognition, procedural and distributional equity. Distributional equity focuses mainly on the economic aspects of equity and is concerned with the allocation of costs, risks and benefits (McDermott et al., 2013). Procedural equity covers the political dimension and more specifically encompasses the decision-making process of PES design and implementation. Equity in recognition can be seen as the cultural dimension of equity, ensuring that the values and identities of actors which can potentially be engaged in PES are respected (Martin et al.,

2016). A review by Friedman et al. (2018) concludes that while distributional equity tends to be frequently analyzed, procedural equity is weakly addressed in research and recognition is even more rarely the focus of attention.

The goal of this study is to identify the existence of tradeoffs or synergies between considering the dimensions of equity in PES design and the attainment of environmental and social goals. In this regard, we treat equity concerns and social outcomes as distinct. As an example, we consider using participatory mechanisms during the design process to be a procedural equity matter, whereas we consider improving the livelihoods of participants to be a social outcome.

The next section covers the methodology used and presents descriptive statistics of the sampled case studies. Section 2.3 presents the main results regarding the relationship between equity and social and environmental outcomes of PES, based on the data collected from PES practitioners in Latin America. Then, Section 2.4 discusses the relevance of the findings and the mechanisms through which equity and PES outcomes may interact. Section 2.5 concludes with some final remarks based on our findings.

2.2 Description of methods and data

2.2.1 The PES practitioner survey

Meta-analyses on PES have noted the difficulty of measuring the impact of social equity considerations on the environmental effectiveness of these programs (e.g. Brouwer et al., 2011; Locatelli and Vignola, 2009; Martin-Ortega et al., 2012). This is because available case studies have focused on particular dimensions of equity, while at the same time leaving out other key PES aspects that are required to conduct a systematic assessment across cases, such as specific program characteristics or key elements associated with specific equity dimensions. In order to overcome this hurdle we designed a survey targeting PES practitioners that would allow us to systematically obtain homogenous information on all equity dimensions as well as environmental and social outcomes. For the purpose of our study we defined a PES practitioner as someone who

was very familiar with a specific PES and had been involved in its design and/or implementation.²

We recognize that PES practitioners may have personal agendas and be tempted to give biased responses when evaluating PES with which they have worked. In order to tackle this potential bias, respondents were reminded on several occasions that the survey was anonymous, and that the results would not single out any PES program. As such, they were requested to be as honest as possible not only about how the PES with which they had experience had accomplished its intended goals, but also where it had struggled or failed. In order to test for any possible bias, our analysis controls for PES that had carried out studies to measure changes in ecosystem services. In order to draw robust and generalizable conclusions we analyze survey results in aggregate as making inferences from individual cases requires due caution.

The questionnaire was composed of three sections. The first included general questions about the PES program with which the respondent had first-hand experience, such as which ecosystem services were targeted (e.g., water quality and quantity, carbon.) or the source of the funding (e.g., user-financed, public). The second was comprised of a broad range of questions covering three dimensions of equity (recognition, procedure and distribution). Finally, respondents were asked to rate the extent to which the environmental and social targets of the PES were achieved.

Although asking practitioners to rate the degree to which the PES program's intended goals had been met rather than measuring impacts in an objective way is not ideal, it was a necessary second-best option given the paucity of existing data and absence of valid counterfactuals (Salzman et al., 2018). This is due to several factors, such as the difficulty in directly measuring a change in the targeted ecosystem service (ES), which means that in many cases ES providers are compensated not for actual provision but for proxy land-use changes that are assumed to increase the target ES (Wunder et al., 2008; Muradian et al., 2010; van Noordwijk and Leimona, 2010). Compounding the problem is

² With these criteria we managed to obtain responses from a wide range of stakeholders working for public institutions, NGOs, private companies and others. However given the small amount of responses from each stakeholder-type we do not differentiate in the analysis to avoid drawing non-robust conclusions due to small sub-samples.

the fact that due to the additional cost these would entail, the vast majority of PES assessments have not carried out baseline analyses to measure changes in the level of ES (Naeem et al., 2015; Pattanayak et al., 2010). This is evidenced by the fact that only 36% of the PES covered in our survey had conducted studies to verify impacts on ES³.

The questionnaire used a multiple choice format for general PES characteristics and a seven-point Likert scale format to gather practitioners' perceptions of the outcomes of their PES in relation to different equity dimensions. In order to ensure that the Likert items were interpreted similarly by all respondents we labelled the end points with specific criteria as can be seen in Figure 7. Beneath each Likert item we included a space that allowed practitioners to qualitatively explain their responses and justify their scoring. These spaces were frequently used by respondents to give examples and provide evidence for their responses to the corresponding Likert items. A summary of the equity and outcome questions from the survey can be found in Section 2.2.3 and the full version of the questions is available in Appendix A.

9. How easy was it for ES providers to COMMUNICATE with the program implementers to obtain INFORMATION or share their concerns and suggestions?

Communication can include the use of many different means: telephone, email address, through a representative, through periodic informative meetings, etc.

	1	2	3	4	5	6	7	
There was no practical way for ES providers to reach program designers & implementers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	Many different means of communication were made available

Comments or clarifications on Question 9

There was an excellent communication because several members of the NGO and academicians live in the area. One of the main elements of success is that several forest owners and local leaders already knew these NGOs members and had confidence on them.

Figure 7 Example of a question from the survey with the response of one of the PES practitioners.

³ Unfortunately, we were unable to acquire the results of these studies as they are internal documents so we cannot compare their findings with the results from our questionnaire.

2.2.2 Sampling strategy and descriptive statistics

The survey was administered online between November 2016 and May 2017 using two dissemination strategies. The first was by getting in touch with key contact persons (e.g., through the IPBES Latin America regional group representing Latin American governments) in each country who had collaborated with a wide number of PES programs. This included people working in ministries that managed PES programs or who had contacts with PES practitioners outside the governments, such as in NGOs or the private sector. The second approach was using the “snowball technique” in which we asked survey respondents and PES scholars to share the survey with PES practitioners of whom they knew in Latin America. Random sampling was impossible given that the majority of PES programs in Latin America are small-scale and have not been reported in the peer-reviewed literature (Wunder et al., 2008). Ultimately, we obtained responses representing a wide range of PES programs covering extensively different design characteristics (Figure 8).

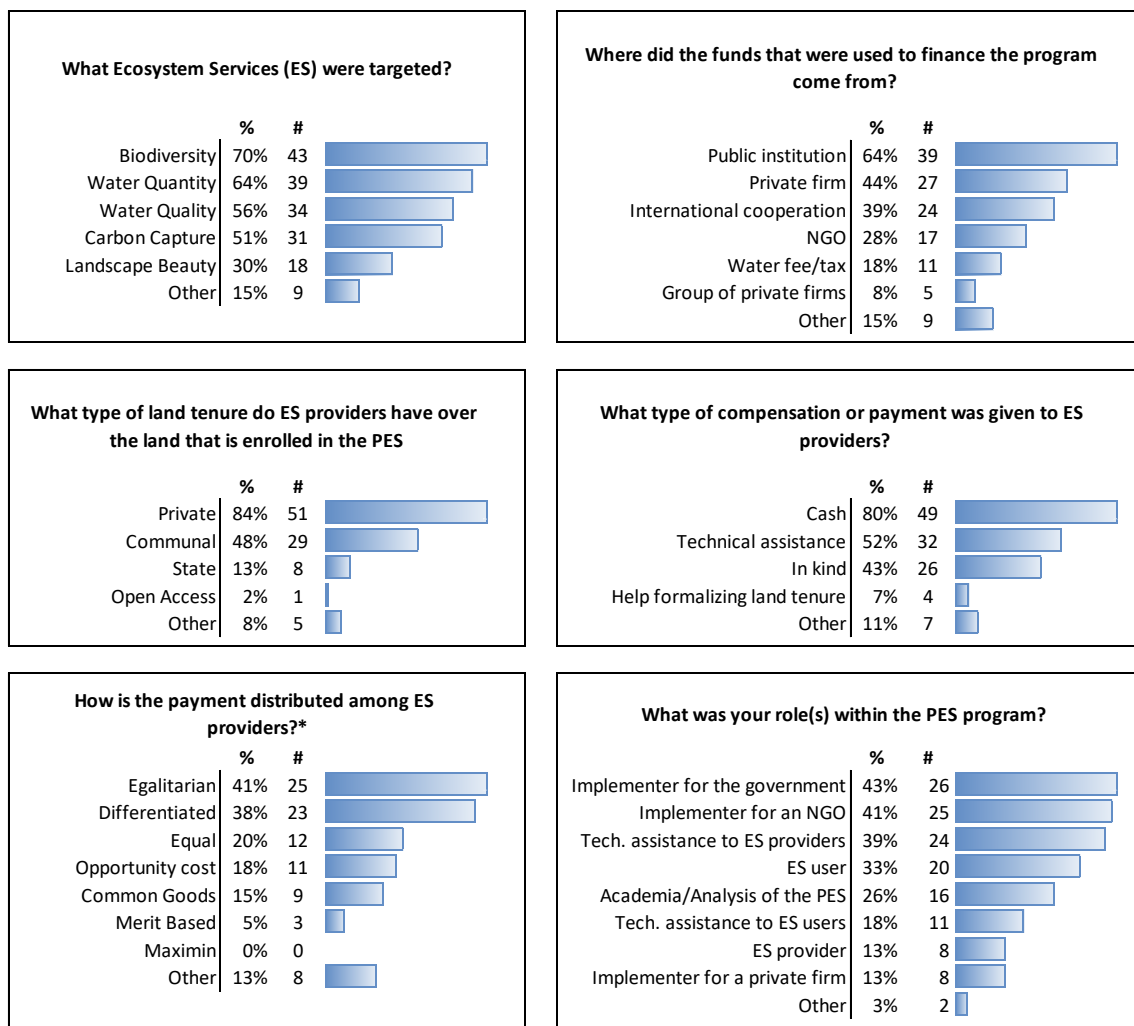


Figure 8. Characteristics of the sampled PES programs and practitioners' profiles. Responses were not mutually exclusive so percentages do not add to 100%. (*Definitions of these terms were provided in the questionnaire and follow those used in Pascual et al. 2010)

We find that 80% of the PES in our sample target more than one ecosystem service, most frequently biodiversity and water quantity. About two thirds of the programs receive public funding, but private firms also contribute to 44% of the PES. Although the majority of the PES (84%) target private land, close to half of them also include communal property. 80% of the PES reward participants with cash and 43% offer in kind compensation. The way in which payments are distributed is quite heterogeneous, but the most common distribution rules were a fixed rate per land unit (“egalitarian”) or a payment “differentiated” by the type of activity performed (e.g. restoration vs. conservation). The PES practitioners held a variety of roles in the programs, most commonly as implementers for governments or NGOs.

The questionnaire was administered in Spanish, English, and Portuguese, which allowed us to cover the overwhelming majority of PES cases from Latin America. In some cases different respondents had experience with the same PES program but in separate locations within the country or different phases of the project (e.g. pilot phase vs. full implementation). Given these particularities we treat their responses as separate. Figure 9 shows the location of the PES, their scale, and how the roles of respondents within the PES were distributed across our sample.



Figure 9. Location of the 45 sampled PES programs across 12 Latin American countries.

2.2.3 Methods

PES practitioners assessed different equity considerations using a Likert scale with scores ranging from one to seven and labeled end points (Figure 7). As would be expected, responses to some of the Likert items are highly correlated as they cover aspects of equity that occasionally overlap (see correlation table in Appendix B). Using a factor analysis (Bartholomew and Knott, 1999) as guidance, we grouped the equity questions into three indicators (see Table 1; details of factor analysis in Appendix C). We confirm that our groupings are internally consistent by calculating their Chronbach's alpha (Appendix D). The resulting indicators map onto three equity (E) dimensions relevant to all PES cases: "recognition of vulnerable groups" (E_R), "fair procedures in decision-making" (E_P) and "fair distribution of benefits" (E_D). We also create a synthetic indicator to capture all three equity dimensions, which we term "multidimensional equity" (E_M). Lastly, indicators for "environmental outcomes" (O_E) and "social outcomes" (O_S) were also calculated to reflect the degree to which PES had accomplished their goals based on the practitioners' perceptions.

Creating the equity and outcome indicators was a three-step process: i) as reflected in Table 1, we determined the survey questions that composed each indicator using the factor analysis as a guide; ii) in order to avoid double counting we averaged the scores of items that had a correlation greater than or equal to 0.7; iii) the remaining items in each group were averaged to create one indicator score per grouping. For instance, in the case of the indicator associated with recognition of vulnerable groups (E_R) we first determined which items related to this equity dimension: questions 1, 2, 3, 4 and 5 (cf. Table 1). Then, we averaged the responses of questions 1 and 3, because their correlation was greater than 0.7. This was followed by averaging across all remaining items in this component (the previously averaged scores for 1 and 3, and the scores for items 2, 4 and 5).

Table 1. Survey questions included in each of the equity and outcome indicators

Dimension/ indicator		Survey questions/Likert items
Multidimensional equity (E _M)	Recognition of vulnerable groups (E _R)	1. Degree to which measures were taken to reduce or avoid negative impacts on vulnerable groups (3)◇ 2. Degree to which local or traditional norms, customs and knowledge influenced the PES (4) 3. Degree to which potential impact on vulnerable groups was considered (2)◇ 4. Degree to which vulnerable groups were able to participate in design process (11) 5. Recognition of traditional land-use rights (without formal titles) for participants (5)
	Fair procedures in decision-making (E _P)	6. Degree to which the PES avoided being affected by preexisting power dynamics (15) 7. Ease for ES providers to communicate with PES practitioners to obtain information and share concerns (9)□ 8. Degree to which public participation mechanisms were used to elicit participation from ES providers (10)■□ 9. Degree to which problems and conflicts have been addressed and resolved (12) 10. Degree to which ES providers participated in the decision-making process (7)■
	Fair distribution of benefits (E _D)	11. Degree of satisfaction of ES providers with the payments they received (18) 12. Effect of the PES on social or economic equity between the participants and non-participants (20b) 13. Effect of the PES on social or economic equity among the participants (20a) 14. Degree to which ES providers decided how payments would be distributed among themselves (14)● 15. Degree to which ES providers decided the type of payment or compensation (cash or in-kind) (13)●
PES outcomes	Environmental outcomes (O _E)	16. Success of the PES in providing the targeted ecosystem services (21a) 17. Degree to which the PES met its environmental goals and targets (22a)
	Social Outcomes (O _S)	18. Impact of the PES on the livelihoods of vulnerable ES providers (19) 19. Degree to which the PES met its social goals and targets (22b)

Questions within each indicator are ordered in descending order according to the average score given by respondents. The numbers in parentheses after the questions correspond to the original questionnaire. Questions followed by a shape had a correlation ≥ 0.7 and were averaged before generating the indicators under the assumption that they were capturing the same aspect and not doing so would entail double counting.

The indicators for the equity and outcome variables were used in an ordinary least square (OLS) model to test the relationship between the three equity indicators as independent variables and the outcome indicators as dependent variables. Additionally, we included three dummy variables that we expected would have an impact on our results: (i) whether the PES had measured environmental impacts through a study or whether the environmental outcomes reported were based only on expert opinion, (ii) if the PES was implemented at the national scale, and (iii) whether the PES had received public funds or not. The first dummy variable was included to control for potential biases in practitioners' responses. We expected that despite our efforts to control for this (e.g. by making survey anonymous) it would be possible that the impacts of PES that had not been measured by a study might be exaggerated by respondents. We include dummy variables controlling for scale and public finance because we suspected that national and publicly financed PES, which are often controlled by governments and have mixed objectives, could be prioritizing social outcomes at the expense of environmental outcomes (Wunder et al., 2008).

We assume a linear relationship and test four models:

$$O_E = \beta^E_M E_M + \beta^E_M E^E + \beta^E_N E^E + \beta^E_P E^E + \alpha^E + \varepsilon \quad (1)$$

$$O_E = \beta^E_R E_R + \beta^E_P E_P + \beta^E_D E_D + \beta^E_M E^E + \beta^E_N E^E + \beta^E_P E^E + \alpha^E + \varepsilon \quad (2)$$

$$O_S = \beta^S_M E_M + \beta^S_M E^S + \beta^S_N E^S + \beta^S_P E^S + \alpha^S + \varepsilon \quad (3)$$

$$O_S = \beta^S_R E_R + \beta^S_P E_P + \beta^S_D E_D + \beta^S_M E^S + \beta^S_N E^S + \beta^S_P E^S + \alpha^S + \varepsilon \quad (4)$$

where O_E and O_S are the dependent variables and represent environmental and social outcomes of the PES program, respectively; E_M , E_R , E_P , and E_D , are the explanatory variables and represent the indicators for *multidimensional equity*, *recognition*, *procedure*, and *distribution*, respectively; β^i_M , β^i_R , β^i_P , β^i_D ($i=E, S$) are their respective regression coefficients; M is a dummy variable to control whether the PES conducted a study to measure ES change; N indicates if the PES was implemented on the national scale; P indicates whether the PES used public funding; α^i is the intercept, and ε^i is the

random error term. Thus, models (1) and (3) include the multi-dimensional equity indicator, while models (2) and (4) include the three dimensions of equity separately.

2.3 Results

Figure 10 presents a stacked bar chart, used to synthesize the results of Likert scales. The figure shows the distribution of scores for each question from 1 to 7, where a higher score (in green) represents a more equitable outcome and a lower score (in red) represents a less equitable outcome. The bars are centered on the mid-point.

As other PES reviews have found (Adhikari and Agrawal, 2013; Calvet-Mir et al., 2015), PES practitioners in our sample reported that environmental objectives are met more frequently than social ones, although overall they seem mostly satisfied with both types of outcomes. 75% of them gave a high score (5, 6 or 7) to their environmental goal success (question 16) compared to 12% who gave a low score (1, 2 or 3). Looking at the perceived success of the social goals (question 19), 61% of respondents thought this was high, vis-à-vis 22% who thought it was low. Respondents perceive that the impact of PES on the livelihoods of vulnerable stakeholders is positive in general, as evidenced by fewer than 20% of responses to question 18 being low.

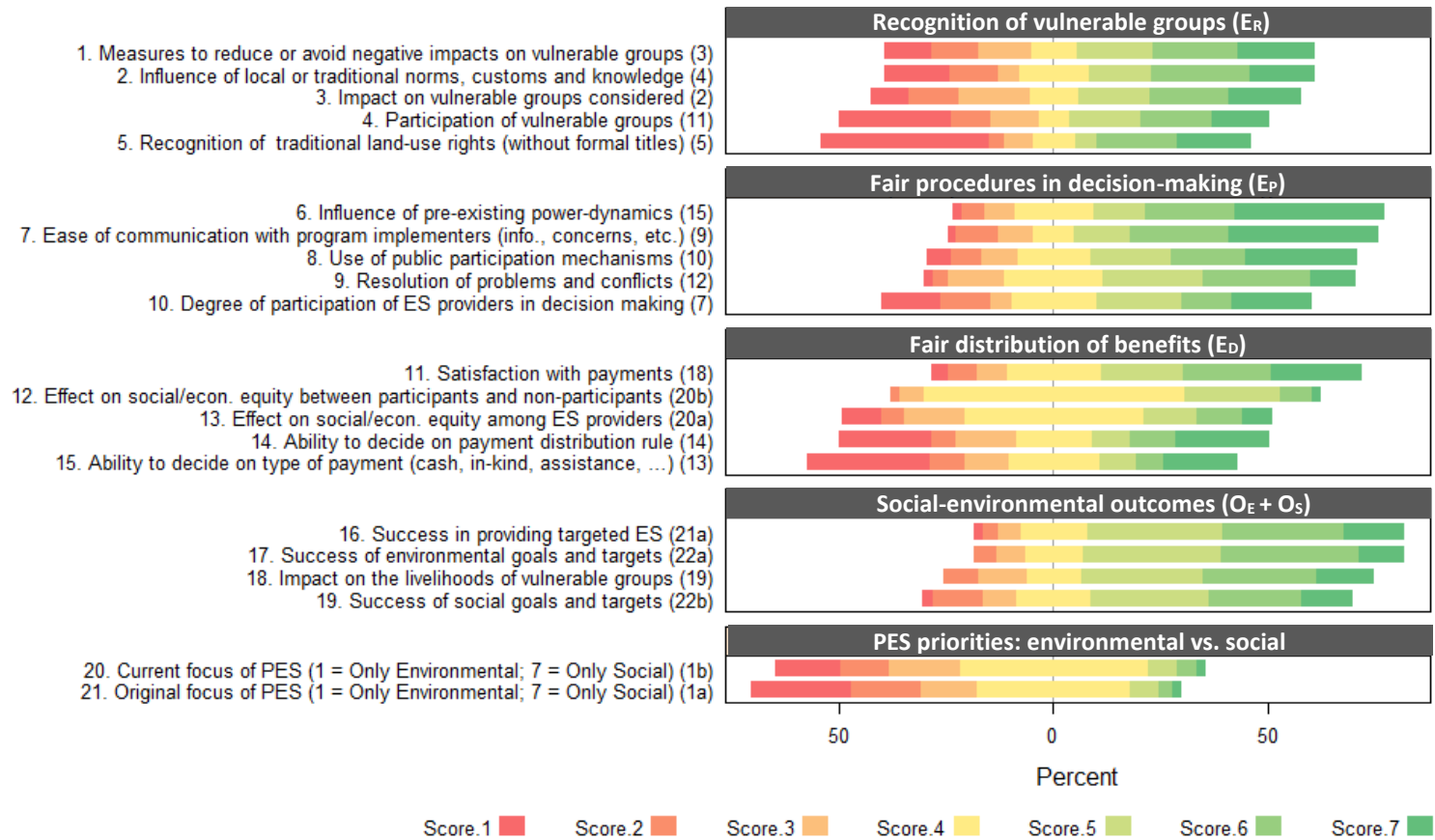


Figure 10. Diverging stacked bar chart showing survey scores for each seven-point likert item. The width of each colored bar represents the frequency of the score. Low scores (red) represent low equity and high scores (green) represent high equity. The numbers in parentheses correspond to the original questionnaire.

The data suggests that PES practitioners in our sample have a more optimistic outlook on the positive impacts of PES—both social and environmental—than do many academic experts (Börner et al., 2017). For example, Bond and Mayers (2010) find that while there is little evidence of PES doing harm to the poor, their ability to improve livelihoods is quite limited. Academic studies on the environmental impacts of PES are also mixed (Alix-Garcia et al., 2015, 2012; Arriagada et al., 2012; Börner et al., 2017; Jayachandran et al., 2017; Pattanayak et al., 2010; Robalino and Pfaff, 2013). One potential explanation for the more optimistic evaluation of PES outcomes by practitioners is that academics use more sophisticated measures of impacts, accounting for self-selection biases between PES participants and non-participants and/or for general time trends in outcome variables that are independent of PES. It is also conceivable that some practitioners may have more of an interest in the continuation of PES as a policy tool than academics do, and that their relatively higher opinion of PES reflects this.

In line with recent findings by Wunder et al. (2018), we find that the threat of sanctions in PES programs is relatively low. Of the 20 respondents who specified the sanction mechanism used in cases when ecosystem service providers renege on their contracts, all but one stated that suspension of future payments was the deterrent for not complying. Only in one case did they report the use of fines to sanction non-compliance.

The results for question 20 indicate that while half of the PES programs in our sample prioritize environmental goals over social ones, the other half considers both to be equally important (score of 4). In fact, we can see that as PES are developed over time (comparing the answers of question 21 to 20) there is a small net shift toward including more social objectives. Although there are indications in the literature that state-funded PES are more likely to allow social goals to be introduced over time into the scope of the program (e.g., Wunder et al. 2008), our data shows that non-publicly financed PES are not immune to this phenomenon (Table 2). It is three times as likely for publicly financed PES to include additional social objectives than additional environmental objectives over time; PES without public funds are twice as likely to do so.

Table 2. Percentage of PES that see a shift in objectives over time

Shift in objectives	Publicly funded	Non-publicly funded
PES becomes more environmental	10%	14%
PES becomes more social	33%	27%
No change	56%	59%
Total	100%	100%

The equity indicator whose components routinely received relatively low scores was the recognition of vulnerable groups (E_R). The vulnerable groups that the questionnaire covered included poor farmers with land, landless workers, customary land users (farmers without formal land ownership), women, and indigenous communities. The low score of this indicator highlights the risk that negative impacts to vulnerable groups may go under the radar during PES design (Mustalahti and Rakotonarivo, 2014)⁴. In line with Pagiola et al. (2005), our data indicate that the vulnerable stakeholders whose livelihoods are improved the most by participating in the PES programs are poor farmers who have formal titles over their land. On the other hand, farmers without formal land titles are much more frequently excluded from participation (Sunderlin et al., 2014). According to respondents, this is often the case because of limits imposed by legislation on the use of public funds to pay farmers without formal land titles. Different solutions were proposed by respondents to get around this problem from seeking private funds which did not carry these restrictions, to getting local authorities and neighbors to vouch for the ownership of the land of individuals without formal titles, to accepting documents that suggested de facto control. Our data suggests that another group for whom negative livelihood impacts are particularly common is landless workers, who rarely receive direct benefits from PES, and whose employment may be threatened by “use-restricting” PES (Wunder, 2005).

⁴ E.g. one of the respondents noted that their PES had inadvertently excluded from participating some individuals which were nevertheless affected by new restrictions on forest use, and consequently had to increase the distance and effort required to collect firewood for their homes without being compensated for it.

Relative to the rest, the scores given by respondents to the questions concerning fair procedures in decision-making (E_P) were the highest on average. Half of the respondents consider that the participation of ecosystem service providers in the design of the PES program was high (scores of 5, 6 or 7). Community participation can take many shapes, from working hand in hand with ecosystem service providers to electing a representative to represent the community's interests. More than two-thirds of respondents stated that communicating with PES practitioners and obtaining information about the PES program is easy for PES participants⁵.

When we look at the fair distribution of benefits (E_D), practitioners overwhelmingly perceive that PES participants are satisfied with the type and level of payments. Interestingly, several practitioners also note that the payments provide only a small complement to farmers' income, in some cases not even fully covering opportunity costs. This seeming contradiction has been noted in the literature which posits alternative explanations for why PES beneficiaries may continue to participate in PES even when payments do not cover the opportunity costs, including cultural or intrinsic motivations (Kosoy et al., 2007; Muradian et al., 2010; Van Hecken et al., 2017; Zabala et al., 2017).

The literature on equity in PES has for the most part focused on distributional impacts (Friedman et al., 2018). We find that the responses to questions 12 and 13 which ask about the distributional impacts of PES have the highest amount of middle responses (score of 4). This fact, along with the qualitative information provided by respondents in the space provided (see Figure 7), suggests that in general PES practitioners are either uncertain about the impact of PES on income distribution or they feel that the payments are so modest that the impact is quite negligible⁶. This is interesting given the amount of attention this dimension of equity has

⁵ E.g. one respondent reported that this was done by having a local office that is in charge of managing the PES; another respondent said that since the PES was located in a particularly remote area where telephone and internet service is low or non-existent, periodic visits are organized to monitor the PES and deal with concerns and conflicts.

⁶ E.g. one respondent noted that: "*Poverty is the result of a broad economic and social disparity that cannot be solved through PES. It is also a situation that has been going on for many decades or centuries. [...] PES were*

received in the literature (ibid.). Our results suggest that most of the PES practitioners consider distributional impacts of PES to be quite small.

Finally, we find that decisions regarding how payments are distributed (Figure 8; e.g. equal per capita, according to opportunity cost) and what type of compensation is received (Figure 8; e.g. cash, in-kind) are taken in a top-down manner with relatively little input from ecosystem service providers. Several respondents claimed that their hands were tied on this matter because the type of compensation and its distribution were decided independently, either by the financing agents or legislation. The cases that proved to be exceptions to this rule were generally those targeting communal lands, where ecosystem service providers typically decided collectively how to distribute the compensation.

Having analyzed the performance of PES programs in our sample across different dimensions, we now look at the relationship between equity considerations in PES design and outcomes. In Figure 11 we plot the individual scores across our sample in terms of environmental outcomes (O_E) against social outcomes (O_S). Each dot represents an individual PES program. The color gradient represents the score of the synthetic multidimensional equity (E_M) indicator—which aggregates the scores associated with all the equity questions—with greener or redder dots signifying respectively more or less equitable PES as perceived by the practitioner. The scatterplot indicates that PES programs that are perceived to be more equitable overall also tended to receive higher social and environmental outcome scores (top-right quadrant).

not created to solve that.” Another said that: “PES can help some of the poorest people live better [...] but it does nothing to solve their poverty or marginality.”

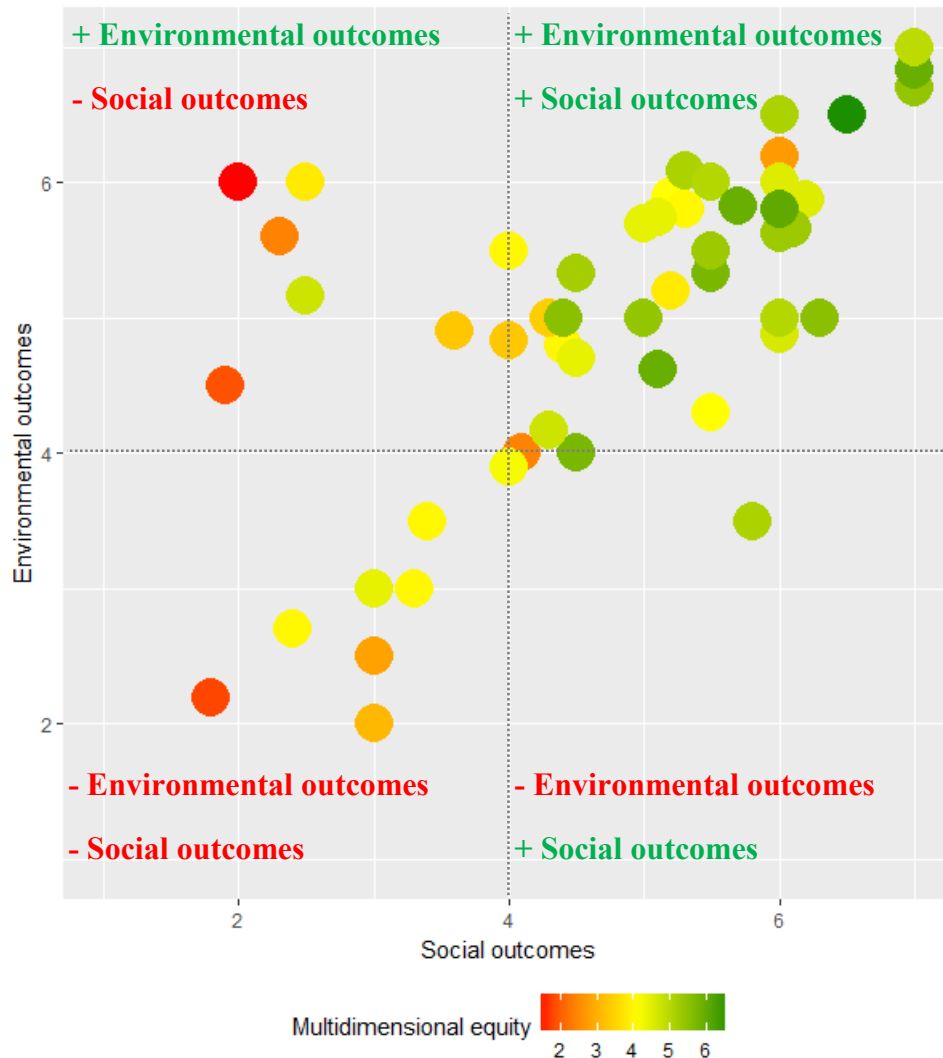


Figure 11. The PES schemes that practitioners perceive to have had the best social-environmental outcomes (top-right) are also seen to be the most equitable overall.

In a handful of cases, PES programs that managed to score positively in terms of environmental outcomes were perceived to score poorly on multidimensional equity and deliver low social outcomes (top-left quadrant). These PES programs tend to be characterized by being large in scale, with only one out of eight in this quadrant being local in scale. When we look at cases in the lower-left quadrant (low environmental and social outcomes) we do not

find any shared features among them. Each of these seemed to perform poorly for different reasons, including inter alia, efforts being directed at areas that were not at risk, funds being mismanaged, payments being too small to make a significant difference, perverse incentives leading to deforesting land that was not eligible, or a lack of technical expertise of PES implementers.

Despite the heterogeneity of the sample, the data do not support the idea that an increased concern for equity in PES design and implementation is associated with inferior social and/or environmental outcomes. Quite the contrary, the data seem to support the idea that PES that are perceived to be more equitable overall tend to have superior social-environmental outcomes. While it is unsurprising that the data suggest a close, positive relationship between equity and social outcomes of PES, it is interesting to note that practitioners' perceptions do not indicate a negative relationship between social equity and environmental effectiveness.

In order to control for more nuanced aspects of such relationships, Table 3 presents the results of the OLS regressions specified above, where the dependent variables are the indicators for environmental outcomes (O_E) (models 1 and 2) and social outcomes (O_S) (models 3 and 4).

Table 3. OLS regression results with equity as covariates and PES outcomes as dependent variables.

	Environmental outcomes (O _E)		Social outcomes (O _S)	
	(1)	(2)	(3)	(4)
Multidimensional equity (E _M)	0.41*** (0.13)		0.97*** (0.13)	
Recognition of vulnerable groups (E _R)		0.08 (0.11)		0.32*** (0.11)
Fair procedures in decision-making (E _P)		0.005 (0.16)		0.27* (0.16)
Fair distribution of benefits (E _D)		0.41** (0.19)		0.41** (0.19)
Dummy: ES change measured by study (M) (1=yes, 0=no)	0.55* (0.30)	0.51* (0.30)	-0.03 (0.30)	-0.05 (0.31)
Dummy: National Scale (N) (1=yes, 0=no)	0.51* (0.30)	0.56* (0.30)	0.34 (0.29)	0.36 (0.31)
Dummy: Received public funds (P) (1=yes, 0=no)	-0.27 (0.29)	-0.27 (0.31)	0.07 (0.30)	0.04 (0.32)
Constant	3.06*** (0.69)	2.79*** (0.74)	0.31 (0.70)	0.25 (0.76)
Observations	59	59	56	56
R ²	0.28	0.31	0.54	0.54
Adjusted R ²	0.23	0.23	0.51	0.48
Residual Std. Error	1.05 (df = 54)	1.05 (df = 52)	1.01 (df = 51)	1.04 (df = 49)
F Statistic	5.23*** (df = 4; 54)	3.86*** (df = 6; 52)	15.19*** (df = 4; 51)	9.62*** (df = 6; 49)

Note: *p<0.1; **p<0.05; ***p<0.01

Standard errors in parentheses. Of the original 61 responses two were dropped in all models due to missing responses. In models 3 and 4 (“Social Outcomes”) we dropped three additional observations because respondents claimed the PES did not have social objectives and did not provide responses to the social outcome questions.

When we model the effect of multidimensional equity (E_M) on environmental outcomes (O_E) and social outcomes (O_S), models 1 and 3 respectively, we find a highly significant positive association in both cases. As expected the size of the impact of multi-dimensional

equity (E_M) on social outcomes (O_S) is larger than for environmental outcomes (O_E). Models 2 and 4 look at equity more granularly by including the indicators for the three dimensions of equity as independent covariates. We find that environmental outcomes (O_E) as perceived by practitioners are significantly and positively associated with a fair distribution of benefits (E_D), whereas social outcomes (O_S) are significantly and positively affected by all three equity indicators: recognition of vulnerable groups (E_R), fair procedures in decision-making (E_P), and fair distribution of benefits (E_D). It should be acknowledged that the effect of fair procedures in decision-making (E_P) is only weakly significant, which might be due to the fact that all PES programs scored relatively highly on this equity dimension. An interesting finding is that those PES where a study had been carried out to measure ES change appear to have better environmental outcomes. This could indicate that more successful PES are also more thorough in terms of evaluating their outcomes. The result is somewhat comforting with respect to concerns about potentially biased answers of practitioners. If practitioners gave biased answers, we would have expected that particularly those where no study exists to objectively judge impacts would have been more likely to exaggerate positive outcomes. Yet this does not seem to be the case. Our results instead suggest that practitioners were cautious when reporting environmental impacts when these had not been measured. Surprisingly, our results indicate that PES operating at a national scale seem to achieve their environmental objectives more often than PES working more locally. Social outcomes do not appear to be significantly affected by the scale. Receiving public funding does not have a significant effect on either type of outcome, although it should be noted that the coefficient is negative for environmental outcomes.

2.4 Discussion

In this paper we treat equity not as an outcome of PES but rather an aspect that permeates the entire process of PES design and implementation. In this sense, while it evidently has a close relationship with the degree to which PES programs can meet their social goals, we differentiate the two. We do not take a stance on whether, a priori, all PES should include explicit social objectives regardless of context. Rather, it is important to recognize that PES are not implemented in a vacuum, but within a broad range of social-ecological systems (Ostrom,

2009). Therefore, designing effective environmental policies requires taking into account complex and context-dependent human-nature dynamics and their interactions. Ignoring them or assuming that PES can somehow tackle the environmental dimension in isolation from the social one can be counterproductive⁷ (Pascual et al 2014). With about half of the PES practitioners claiming that environmental and social goals were equally important in their PES program, we can assume that PES are often being used with the goal of not only increasing the provision of ecosystem services but increasing quality of life more broadly (Díaz et al., 2015). While a wide range of design features of PES can have an impact on their social-ecological performance (Engel, 2016), in this paper we focus our attention on the role of social equity and of its different dimensions (recognition, procedure and distribution). We find that while a fair distribution of benefits (E_D) is strongly associated with better environmental outcomes (O_E), all three equity dimensions (E_R , E_P , E_D) are perceived to play a positive role in achieving the social outcomes (O_S) of our sample of 45 Latin American PES programs.

Our results suggest that equity and conservation outcomes in PES do not necessarily bring about hard trade-offs. We posit that a possible explanation is in large part due to the way in which we treat social equity. Rather than looking at only one equity measurement, such as a Gini coefficient which is a single, narrow measure of distributive equity, we focus on multiple dimensions of equity using 15 different variables that encompass aspects of recognition, procedure and distribution. Consequently, while it may be the case that trade-offs do exist for certain individual measures of equity—for example, distributing payments more uniformly across a population may come at the cost of including less-than-optimal land in the PES (Muñoz-Piña et al., 2008; Wünscher et al., 2008)—looking at equity more broadly we observe positive associations. In fact, we find that the most discussed aspect of equity in the literature (i.e. the change in the Gini coefficient of income attributable to PES) was the one that received the most ambiguous responses from PES practitioners in our survey (an average score of 4 on

⁷ As one of the survey respondents mentioned “*all environmental problems have a social and educational root, therefore we hope that this project has a long term effect on these issues.*”

the 7-point Likert scale)⁸. This suggests that practitioners are generally unaware of major impacts of PES on this particular measure of equity or think the impact may be negligible given the relatively low levels of payments. Whatever the case may be, as the positive association between our indicator for a fair distribution of benefits (E_D) and environmental outcomes (O_E) suggests, the inclusion of multiple measures of distributive equity—such as how satisfied people are with the compensation they receive or whether they have a say with regard to how it is distributed among their community—may change our understanding of the relationship between equity and environmental effectiveness.

It is unlikely that a single explanation can fully account for why we find a positive relationship between equity and PES socio-environmental outcomes, or at the very least not a negative one. There is growing evidence that perceptions of equity interact with participants' motivations, encouraging positive behavior when people feel like they have had a say on conservation decisions (Miller et al., 2012). In part, this is due to the fact that when PES practitioners avoid a one-size-fits-all design and instead engage participants to find home-grown solutions, they are more likely to encourage stewardship values in ecosystem service providers (Chan et al., 2017). Consequently, this can change the perception of PES participants, such that instead of feeling coercive and generating mistrust (Reed, 2011), the PES program can instead help to change norms around conservation in a positive way (Martin et al., 2014a), nurturing a crowding-in effect (Ezzine-de-Blas et al., 2019). Additionally, ensuring that practitioners encourage stakeholder participation from the beginning can promote PES participants taking ownership of the program (Cavalcanti et al., 2013), which in turn translates into lower costs of implementation (Cranford and Mourato, 2011). Through this psychological process even PES participants who incur a financial loss because of the program may continue to participate as they obtain a “warm glow” (Arriagada et al., 2015) by behaving consistently with their values and identities as stewards of nature (Chan et al., 2017). Furthermore,

⁸ Questions 12 and 13 look at this measurement of equity. For question 13, which asks respondents how the PES affected social and economic equity *among participants*, 49% of respondents either gave a neutral answer or left it unanswered. That number rises to 66% for question 12, which asks how PES affected social and economic equity *between participants and non-participants*.

participants may be more likely to comply with a program that they consider to be fair (Alpizar et al., 2017; Jindal et al., 2013; Pascual et al., 2014, 2010).

In line with these ideas, Cranford and Mourato (2011) propose a two-stage implementation of PES. They suggest a pre-deployment stage in which PES practitioners ensure that ecosystem service providers are socially and culturally aligned with the program, fostering a bottom-up, cooperative and reciprocal arrangement that moves beyond tapping solely into participants' pecuniary motivations. We posit that successfully building up and harnessing this trust and social capital (Bond and Mayers, 2010; Van Noordwijk et al., 2007) are crucial steps towards ensuring the long-term success and sustainability of PES, in particular when these programs have only modest or intermittent funding (as is often the case in many developing countries). If this holds, then it is possible that a lot of what are currently considered to be transaction costs, such as holding meetings with stakeholders to inform them and elicit participation every step of the way, may need to be reconsidered as key factors that contribute to successful PES.

2.5 Conclusions

The goal of this paper was to explore the relationship between equitable design and implementation of PES programs and their social-environmental outcomes. This study was motivated by the conflicting evidence in the literature of both potential tradeoffs (e.g., Halpern et al., 2013) and synergies (e.g. Miller et al., 2012) between social equity and conservation impacts. We contribute to this debate from an empirical angle, since despite the considerable amount of conceptual literature on the matter there has been relatively little empirical work to date. A likely reason contributing to the lack of consensus in the literature and the predominance of conceptual approaches is the dearth of scientific evidence on PES impacts. Evaluators rarely have access to baseline data, control areas or randomized designs (Salzman et al., 2018), rendering it quite difficult to robustly assess PES empirically. This spottiness of available information and the growing need to systematically collect environmental and socio-

economic data has recurrently been noted by recent PES reviews (Börner et al., 2017; Hejnowicz et al., 2014; Martin-Ortega et al., 2013; Naeem et al., 2015; Pattanayak et al., 2010).

In order to remedy this lack of data, our analysis uses the expert opinions and on-the-ground experience of PES practitioners, whose views and perspectives have not been sufficiently taken into account in the past despite their privileged insights into the inner workings of PES. This approach is not without its limitations, particularly the possibility of a selection bias. During our sampling, respondents were contacted when their PES had become “visible,” either in the PES literature or through a network of PES experts. Consequently, practitioners whose PES programs had not been sustainable may have been less likely to be contacted if the programs failed before they could be reported on in the literature or before they were connected to a network of other experts. While this limitation is not unique to our approach—all meta-analyses that have attempted to draw conclusions from multiple case studies have had to face this—it should nevertheless be acknowledged.

When we look at the performance of PES across 15 indicators for equity, we find that those that recognize vulnerable groups (E_R), ensure fair procedures in decision-making (E_P), and guarantee a fair distribution of benefits (E_D) are more likely to achieve their social-environmental goals. Although our results point to the fact that environmental outcomes are more closely tied with distributive equity considerations (satisfaction with payments, impact on income distribution, and the ability to decide the type of compensation and how to distribute it), we find that achieving positive social outcomes is tied to all three dimensions of equity (recognition, procedure, and distribution). With close to half of the PES practitioners stating that environmental and social goals were equally important for their PES programs, we put forward that all dimensions of equity should be carefully considered when designing and implementing PES.

Given the complexity of measuring both equity and PES effectiveness, empirical studies that look at how they interact are few in number. Nevertheless, exploring the complex relationships between equity, environmental outcomes, social-economic impacts, and participants’ motivations is a worthwhile pursuit. We hope that further examination leads to an increasingly rich and nuanced understanding of these interactions and tests the findings of this

study: that PES programs should not just strive to be equitable because it is the right thing to do, but also because they will perform better for it.

Chapter 3 Deliberative monetary valuation as a transdisciplinary approach to increase credibility and salience of valuation approaches in the Global South

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3.1 Introduction

Slowing the accelerating rate of environmental degradation around the planet represents one of the most ‘wicked problems’ that humanity has ever faced. To address this challenge, the values of nature must be made more salient, so that they can more readily be taken into account in decision-making and in the design of effective environmental policy instruments (Díaz et al., 2015, 2019; Chan et al., 2016; Pascual et al., 2017). However, the dominant approach to elicit the values of nature until now has relied on a predominantly technocratic and monistic approach that focuses exclusively on providing monetary values (Costanza et al., 2014). Monetary valuation, despite offering advantages such as the convenience of easily comparing values across multiple ecosystem services, has increasingly been criticized for its narrow conceptions of value (Hulme, 2010; Wegner and Pascual, 2011; Jacobs et al., 2016b).

Transdisciplinarity has been suggested as a possible avenue to tackle this problem. Key characteristics of transdisciplinary approaches include (i) addressing ‘societally relevant’ problems by (ii) bringing together knowledge from different scientific disciplines and from outside academia through participatory processes, (iii) in a way that leads to learning and the creation of new knowledge to be used by scientists and non-scientists alike (Lang et al., 2012). As such, transdisciplinarity takes the normative position that science is ‘socially constructed’ and thus researchers do not have a ‘monopoly’ on the generation of new knowledge (van Asselt Marjolein and Rijkens-Klomp, 2002). Rather, it recognizes that not just biodiversity, but also diversity of knowledge, cultures, values and approaches is a strength in the face of significant global environmental challenges (Salick and Ross, 2009).

A burgeoning new field of note is ‘integrated valuation’, which advocates for hybridizing different methodologies in ways that enable researchers to generate new types of knowledge (Jacobs et al., 2016b; Dendoncker et al., 2018; Dunford et al., 2018; Rincón-Ruiz et al., 2019; Schneider et al., 2019). One such promising approach is the marriage of group deliberation with more conventional valuation methodologies. Deliberation in this sense can be defined as a “group-based process of participation, social exchange, reflection, learning and meaningful debate” (Kenter et al., 2016:94). Its inclusion in environmental valuation has led to the rise of several deliberative monetary valuation (DMV) methodologies such as deliberative choice experiments⁹ (Bunse et al., 2015). Here we test the performance of DMV as a transdisciplinary approach in the Global South, where its use for valuation has only recently started receiving attention (Rincón-Ruiz et al., 2019). Our study started by identifying a societally relevant question that DMV can shed light on: how to design more equitable environmental policy instruments. More specifically, in this paper we use a deliberative choice experiment (CE) to elicit the diversity of preferences of actors within an indigenous community

⁹ Others covered in Bunse et al. (2015) include combinations of value juries and market stall approaches with contingent valuation methods.

in Colombia regarding the design characteristics of a potential payment for ecosystem services (PES) scheme.

Even though indigenous and local peoples manage or have tenure rights over a quarter of the world's land (Garnett et al., 2018), they are systematically underrepresented in academic, policy and public discourses on environmental decision-making (Salick and Ross, 2009). Given the broad range of context-specific equity concerns that must be considered in PES design (Pascual et al., 2014), we decided to use a transdisciplinary methodology to actively engage the local community, given the expectation of a national PES program to be deployed in the region, with the hope of ameliorating any democratic deficit that may occur in such environmental decision-making context (van Asselt Marjolein and Rijkens-Klomp, 2002).

For transdisciplinary approaches to be fruitful, they must be both 'credible' and 'salient'. Lang et al. (2012) define 'credibility' as being scientifically and epistemologically valid and reliable, and 'salience' as being practical, relevant and legitimate for stakeholders. In this paper we explore whether deliberative CEs can offer 'credible' approximations of participant preferences, while also being 'salient' in the sense of capturing the values with which local stakeholders identify, in ways which they consider legitimate and which generate new learning and knowledge.

The paper proceeds as follows. First we outline some theoretical considerations regarding the use of DMV. Then we describe the case study and the reasons why a DMV approach was well suited. In Section 3.4 we describe the methodology and the sample's characteristics. Section 3.5 presents the results, which we then discuss in Section 3.6. Finally, the paper concludes and points to future research opportunities.

3.2 Theoretical considerations

3.2.1 Deliberative monetary valuation versus stated preference methods

Traditional stated preference approaches have been criticized both internally (from those working within the valuation field) and externally (from those questioning these

approaches more fundamentally) (Lo and Spash, 2013). The main internal criticisms highlight that in some cases the task of valuing a hypothetical situation or good is too cognitively complex for people and thus not ‘credible’ (Lang et al., 2012). Unlike the ideal rational actor model, people do not always have complete, pre-formed, and invariant preferences waiting to be elicited at a moment’s notice, particularly when evaluating unfamiliar or complex goods (Alvarez-Farizo and Hanley, 2006; Wegner and Pascual, 2011; Kenter et al., 2011, 2016b). By hybridizing deliberative and stated preference approaches, DMV has been identified as a potential approach to address these concerns by easing the cognitive burden of participants and informing their responses (Schaafsma et al., 2018).

Thus, in these cases it is not the role of researchers to act “as archaeologists, carefully uncovering what is there, but as architects, working to build a defensible expression of value” (Gregory et al., 1993: 179). DMV improves upon traditional monetary valuation in this regard by giving participants more time to think and share thoughts with their peers, allowing them to fully form their preferences, while becoming familiar with the often cognitively demanding valuation approach (Brouwer et al., 2010; Czajkowski et al., 2014; Lienhoop and Völker, 2016; Völker and Lienhoop, 2016).

A type of DMV that is attracting attention are deliberative choice experiments (CE). The approach can be summarized as having: an introductory informational presentation, a valuation task completed by participants individually, a group discussion about the good being valued, and a repetition of the individual valuation task. We posit that this approach, thus, offers four learning opportunities that could culminate in more informed, and therefore ‘credible’ elicitation of values, while also being more ‘practically relevant’ and therefore ‘salient’ (Lang et al., 2012) (Figure 12).

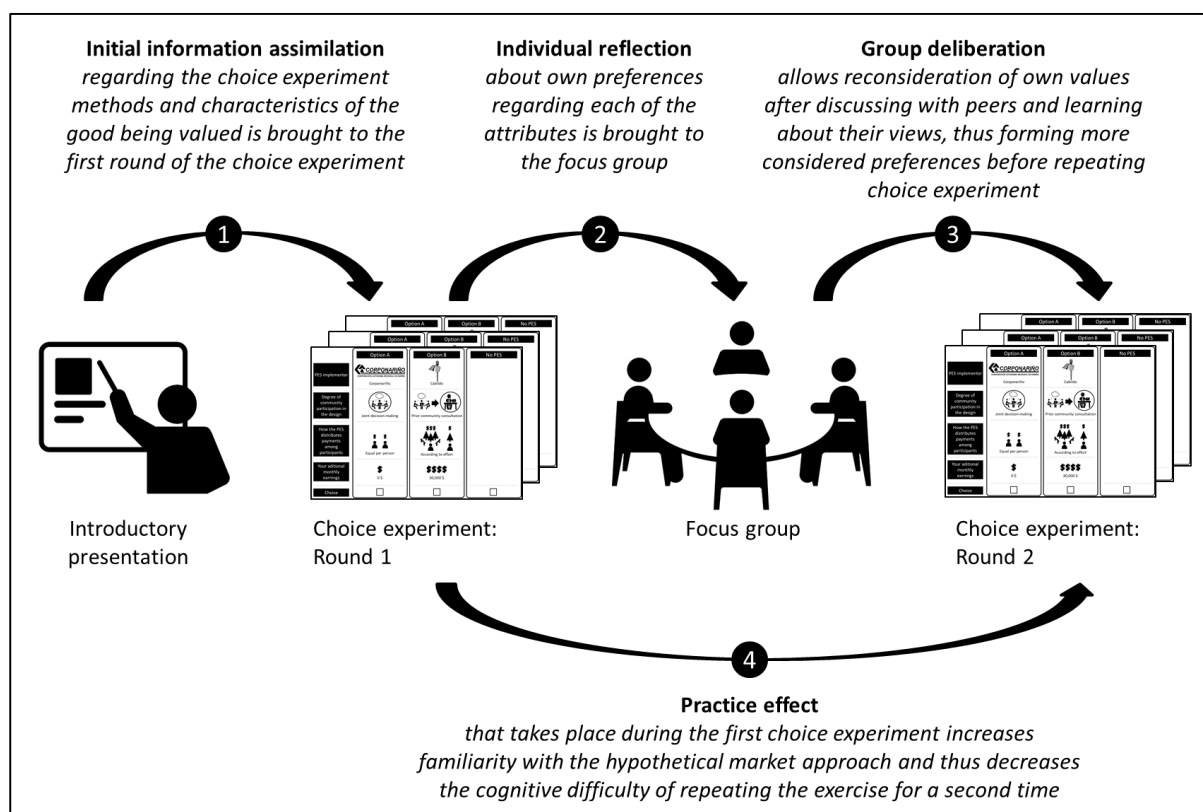


Figure 12. The deliberative CE provides four learning opportunities that inform subsequent phases.

The first learning opportunity in a deliberative CE is the initial presentation by the moderators, which gives all participants the same general information about the good being valued and the CE methodology. Second, the individual reflection that takes place while completing the first round of the CE informs the focus group as each participant comes to the table with a semi-formed notion of what they think about the good being valued and each of its main attributes. Third, the group discussion gives participants additional time to process information and an opportunity to learn about and challenge each other's views, which means that by the time they carry out the CE for a second time they are expected to have thought about their preferences more critically (Urama and Hodge, 2006). Fourth, because participants are given the opportunity to repeat the CE, they become more acquainted not just with what is being valued but also with the cognitively challenging task of filling out multiple choice cards. Within the neuropsychology field this has been called the 'practice effect', which refers to the increased ease with which respondents complete a procedure with which they have become

previously familiar (Lezak et al., 2004); the ‘practice effect’ has been found to be particularly high between the first and second experience with a cognitively challenging task.

In addition to being purported to offer better formed and thus more ‘credible’ (Lang et al., 2012) monetary estimates of value, DMV was also developed in response to the ‘external criticisms’ of conventional stated preference approaches, which deal with more normative concerns that have traditionally been kept at arm’s length by economists (Spash, 2008). Many of these criticisms focus on issues of procedural justice, legitimacy and incommensurability of different kinds of values (Lo and Spash, 2013). The proposition of hybridizing stated preference and deliberative approaches stems from the theory of deliberative democracy and Habermas’ ‘ideal speech situation’ (Habermas, 1984) among other political traditions that highlight the importance of a fair process in which affected actors participate in decision-making (Rawls, 1971; Sen, 2009; Sikor et al., 2010). These can increase the ‘salience’ of the valuations because participatory processes are perceived by stakeholders to be more legitimate and transparent (Carr et al., 2012). DMV practitioners recognize that deciding on how to measure values and which types of value to measure is a normatively loaded endeavor (Vatn, 2009; Wegner and Pascual, 2011). They also acknowledge that providing a forum for debate is a way of devolving power by creating spaces for a broad set of values to be articulated (Kenter et al., 2016b).

Consequently, one of the advantages of DMV as a hybrid methodology is that while the stated preferences component elicits values in a format useful to traditional practitioners and comparable across other studies, the deliberative component produces complementary qualitative knowledge by allowing participants to consider and express a diversity of values (Lo and Spash, 2013). These could include not only instrumental (as a means to an end) values, but also relational (stemming from our relations with each other and nature), intrinsic (inherent values independent of humans) and moral (related to equity, legitimacy and rights) values (Díaz et al., 2015; Pascual et al., 2017; Chan et al., 2018). This is expected to increase the ‘salience’

of DMV as participatory processes have been found to add legitimacy to outcomes, particularly when uncertainty, politics and inherent beliefs are involved (Coleman et al., 2017).

However, DMV is not without its limitations. While increasing stakeholder participation generally has a positive impact on intermediary outcomes such as increasing legitimacy and trust, past research has failed to produce unambiguous links tying participatory processes to improved environmental outcomes (Carr et al., 2012; Cavalcanti et al., 2013a; Young et al., 2013) and shown a potential for the powerful to influence deliberative process and decision making (Behera and Engel, 2007). Additionally, from a normative standpoint it is debatable whether it is more democratic to elicit values individually (where power asymmetries between participants do not play a role) or to elicit them in a deliberative setting where there is always a risk that some participants may exert a coercive influence over others (Kenter et al., 2016b). However, it has been argued that for individual aggregation of preferences with a ‘one person, one vote’ justification to be considered democratic requires a narrow and reductionist understanding of what it means for processes to be democratic (Wegner and Pascual, 2011). We posit that for valuation to be democratic and transdisciplinary it needs to be the product of ‘reasoned deliberation’ (Dryzek, 2002) and of an ‘exchange between competing discourses’ by citizens (Howarth and Wilson, 2006).

3.2.2 DMV in the Global South

Despite the growing interest in DMV (Bunse et al., 2015), its implementation in the Global South has surprisingly received relatively little attention until very recently (Rincón-Ruiz et al., 2019). It could be argued that the lower literacy rate of many rural areas in the Global South makes deliberative valuation approaches better suited to such contexts, for instance, as the reliance of other approaches on written material likely affects the ‘credibility’ of results (Christie et al., 2012). Additionally, many traditional societies, especially in the Global South rely on collective (rather than individual) decision-making (Lehmann et al., 2018), implying that a deliberative setting may contribute to its legitimacy and ‘salience’ in the eyes of participants (Kenter et al., 2011).

DMV may also help raise awareness of cultural differences between participants and researchers (Kenter et al., 2011; Christie et al., 2012). This is particularly important given the distinctly ‘Northern’ framing of valuing nature in monetary terms (Hulme, 2010), which may be exceedingly hard to accept by stakeholders in Global South contexts. Additionally, relying exclusively on willingness to pay as a proxy for value can be epistemologically problematic; if we understand the process of valuation as one of ‘assigning importance’ (Jacobs et al., 2016b) then the value of the good may be critically underestimated when respondents’ ability to pay is low (Kenter et al., 2011). A final advantage of DMV is its potential to reduce the extractive nature of research in the Global South (Christie et al., 2012). DMV, as a transdisciplinary approach, mitigates this problem by engaging stakeholders more actively with participatory processes, which have been shown to leave behind greater knowledge and altered cognitions, thus increasing the potential to catalyze positive change in study sites (Armitage et al., 2008; Pahl-Wostl, 2009; Fujitani et al., 2017).

3.2.3 Testing credibility and salience of DMV

This paper aims to test whether the use of DMV can increase the ‘credibility’ and ‘salience’ of elicited values compared to conventional stated preference methods. We test the ‘credibility’ of the values provided in several ways. First, we see if certain characteristics of PES that were not taken into consideration in the first CE were considered in the second following deliberation, as seen in other DMV studies (Urama and Hodge, 2006). Second, we look at whether the number of participants who chose the opt-out option during the CE (i.e. choosing the status quo over the available PES alternatives) decreases between rounds. Our reasoning is that in some cases participants may do so because carefully considering tradeoffs is too cognitively challenging, not because they actually believe a PES program would reduce their well-being or because they find the PES scheme to be unacceptable as a policy tool.

Choosing to opt-out due to cognitive challenges can be a consequence of participants ordering their preferences lexicographically in an attempt to simplify the task (Szabó, 2011).

Lexicographic preference orderings occur when respondents rank the attributes in the CE in order of importance (irrespective of their levels) and make decisions based on the highest priority attribute alone (Lancsar and Louviere, 2006). Thus, participants may be choosing the opt-out option when the level of their preferred attribute is below a certain threshold, ignoring the levels of the rest of the attributes. This can lead to situations where even a significant increase in the level of one attribute cannot compensate for even a small loss in another attribute. While some lexicographic preferences can be a consequence of legitimate ethical concerns (which would not be expected to change between CE rounds) they may also stem from the use of simplifying heuristics (Spash and Hanley, 1995) which we expect to decrease between rounds if participants are expressing more informed preferences by the end of the exercise.

A third way in which we test the ‘credibility’ of the values captured with a DMV approach is by examining how this approach affects participants with lower cognitive capacities. We expect that older (Salthouse, 2010)¹⁰ and less educated participants (Urama and Hodge, 2006; Meyerhoff et al., 2013), who are more likely to find the CE more cognitively challenging, will be more likely to learn throughout the deliberative choice experiment and therefore to change their responses between rounds.

We also test for the occurrence of a significant risk associated with DMV: that more dominant participants exert undue influence over the group during the deliberative process, therefore hampering rather than enhancing the ‘credibility’ and ‘salience’ of DMV. This has been seen in other studies where more dominant members of society are able to pressure relatively weaker individuals (Behera and Engel, 2007). We check whether older, high-income, high-education and male participants, who have a higher social status in our study site (Kloosterman, 1997), are less likely than their counterparts to change their preferred choices after deliberating. If we find this to be the case it could put into question the usefulness of DMV since increasing stakeholder participation might have reinforced preexisting power inequalities. It is also conceivable, however, that if less dominant actors change their choices more often between rounds it is not necessarily due to ‘peer pressure’ but because they simply

¹⁰ Salthouse (2010) finds that multiple measures of cognitive capacities decline linearly with age from early adulthood

require more time to form their preferences, as the changes may not be in the direction of dominant participants. This is an empirical question to be tested.

Lastly, we test whether DMV can be used to elicit other types of values that conventional stated preference approaches are unable to capture, something that would undoubtedly greatly increase their ‘salience’ (Lang et al., 2012). There are reasons to expect this will be the case as others have found that deliberation can help participants more carefully consider a wider diversity of values (Kenter et al., 2016b).

3.3 Case study background

This case study is based on Muellamues, an indigenous community in Colombia’s Southwestern Andean region (Figure 13). Over the last three decades the local economy has shifted away from subsistence agriculture towards cattle farming. This has increased the demand for pastureland and contributed to ecosystem conversion, which in turn has led to seasonal water scarcity that increasingly threatens local livelihoods. Muellamues would be a good candidate for PES in this sense because most of the expansion into hydrologically valuable ecosystems is being done by poor farmers who do not have any other means of subsistence. Additionally, because this land is under indigenous control, command-and-control alternatives to PES cannot be easily implemented by the government, despite the fact that urban centers outside of Muellamues rely in part on the water sources within the community. Therefore, water users outside of Muellamues have an incentive to encourage more ecologically friendly land uses within Muellamues, creating fertile ground for a PES scheme.



Figure 13. The pin on the map indicates the location of Muellamues near the border between Colombia and Ecuador. Source: mapsopensource.com/colombia-capital-map-black-and-white.html. Original, unedited map licensed under CC BY 3.0

At the village level, Muellamues is governed by associations where communal decision-making is the norm. The next level of governance is an elected council of local leaders that is responsible for making decisions for all 6,000 Muellamues residents. This council regularly holds open meetings and invites community members to participate. The council is tasked with managing the community's finances and lands, and represents the community's interests when dealing with the Colombian government.

Muellamues has several characteristics that make the use of DMV particularly appropriate. First, education and literacy levels are low, particularly among middle-aged and

older individuals. This means that cognitively demanding approaches where respondents are expected to absorb a large amount of information and learn the operation of an unfamiliar hypothetical market in a short amount of time may face significant hurdles. Giving participants more time to think by providing a forum for deliberation could help. Additionally, because group decision-making over many important matters is customary, deliberative approaches are familiar and perceived as legitimate. Additionally, because local incomes are low, a hybrid instrument such as DMV is recommendable in order to elicit more than just monetary estimates of value. A final consideration that makes a deliberative valuation approach well suited to Muellamues is the strong sense of traditional culture and identity among locals, which they perceive to be in opposition to western worldviews. This implies that open discussion during valuation could surface subtle values that may not be immediately apparent to researchers (Kenter et al., 2016b).

3.4 Methodology

3.4.1 The deliberative choice experiment

The CE methodology provides participants with a sequence of alternatives with different characteristics. In our CE, participants repeatedly chose among three different hypothetical PES programs with varying attributes: ‘PES A’, ‘PES B’, or ‘No PES’ (Figure 14). After each participant made a sequence of choices, these were used to construct a probability model capable of calculating the relative importance of each attribute in determining participants’ choices.

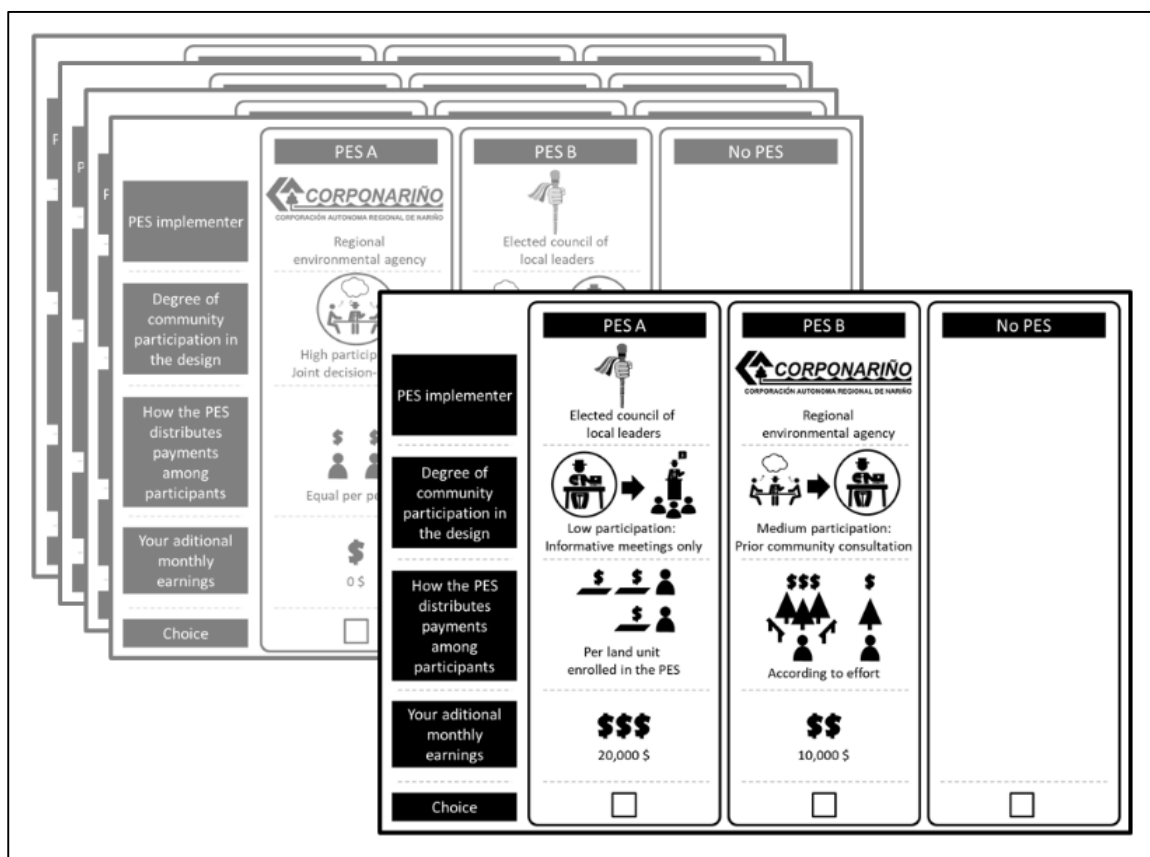


Figure 14. Example choice cards

We used two latent class (LC) models. The advantage of LC models is that they are capable of measuring heterogeneity across participants by separating them into two or more groups according to their preferences (Hensher et al., 2015). In our case, the LC models were estimated assuming only two classes of participants as the computational complexity of the models, our sample size, and the dummy-coding of the attributes meant that there was not sufficient variation between attribute levels to estimate models with more classes. The LC approach was also considered as separating participants into classes with different preferences is important from a valuation perspective if we acknowledge that many environmental problems and conflicts stem from differences in values held by diverse groups of stakeholders (Jacobs et al., 2016b). From the point of view of PES, it has been shown that their design and implementation can be highly political in the sense that social power relations between stakeholders often shape these programs (Van Hecken et al., 2015b). Even within the same community, it is therefore a mistake to regard all members as homogenous (Rodríguez de

Francisco et al., 2013). Thus, using an LC we can inspect whether significant differences exist in community members' preferences.

Because conventional LC models were not designed to analyze multi-round data, in order to apply this type of model to a deliberative CE we extended the LC model and made a two-round latent class (2RLC) model, the specification of which can be found in Appendix E. By adding a dummy variable that accounts for the round in which each choice was made, we can estimate the preferences of participants in the first round and a differential effect for the second round that indicates whether respondent preferences for an attribute changed throughout the deliberative CE.

In addition to the payment level attribute, the other three attributes describing the PES in the CE (Table 4) represented three dimensions of social equity (recognition, procedure and distribution) which have been stipulated to be important for PES design in the Global South (Pascual et al., 2014). To address the recognition dimension, we considered who would be in charge of implementing the PES scheme: the regional environmental agency of the central government or the elected council of local leaders of Muellamues. To address procedural equity, we considered the degree of direct participation that community members would have in the design of the PES: low, medium and high participation. To address distributive equity, we considered the payment distribution rule that would be used to reward PES participants. For the payment level, we considered the net increase in monthly income that the PES participants would receive. Table 4 provides information on how the different levels of the four attributes were defined.

Table 4. Choice experiment attributes and description of their levels

PES implementer	
Elected council of local leaders	Responsible for managing the community and defending their interests. Elected on a yearly basis and seen as the legitimate authority of Muellamues.
Regional environmental agency	Responsible for environmental management of the broader region. Because a major source of water lies within the territory of Muellamues, there has been some friction in the past concerning ownership over natural resources.
Community level participation in PES design	
Low	The community's participation would be limited to informative meetings. All decisions on the PES design would be made by the PES implementer.
Medium	The community would be consulted about their design preferences, but the PES implementer would ultimately decide on the final design.
High	All decisions on the design of the PES would have to be agreed upon between the community and the PES implementer through participatory meetings.
Payment distribution rule	
Per capita	All participants would be expected to contribute equally to conservation and would receive the same compensation.
Per land unit	Participants would be able to decide how much of their land would be managed under PES-mandated rules and would receive compensation accordingly.
Per effort	Participants would choose the amount of time and conservation actions they carried out and would be compensated according to their effort.
Increase in monthly earnings via PES scheme	
0 COL\$	Only covers opportunity costs. No change in income
10,000 COL\$	Increase of 10,000\$
20,000 COL\$	Increase of 20,000\$
30,000 COL\$	Increase of 30,000\$
40,000 COL\$	Increase of 40,000\$
50,000 COL\$	Increase of 50,000\$

We used an experimental design generated in Ngene (ChoiceMetrics, 2012a) with 24 different choice cards. As usual, we distributed the choice cards across different sets (in our case three sets with eight choices in each) to limit the amount of choice cards faced by each participant. Each participant responded to the same set of eight cards in both rounds, but each time the order was randomized.

3.4.2 Sample characteristics

In total, 248 people participated in 24 valuation workshops. On average, each workshop consisted of 10 participants. The smallest group featured six participants and the largest, 14. Because Muellamues has no publicly available census and phone service is low to non-existent, random sampling of participants was impracticable, so we relied on local leaders in each of the villages to act as ambassadors for the study and invite participants personally. The sample is gender balanced (53% women/47% men) and has people spanning a broad range of ages (average is 43 with a standard deviation of 15). The only exclusion criterion was that participants had to be at least 16 years old. Education levels were low, with a quarter of participants not having completed primary school. Half of all participants had a monthly family income of less than 300,000 COL\$ (approximately 100 USD\$).

3.4.3 Valuation workshop methodology

The workshops consisted of four stages (Figure 15) and lasted approximately two hours. They began with an introduction of the moderators (one of the authors of this paper and a local helper), followed by a general presentation of the workshop's objectives. After addressing any questions, participants were asked to sign informed consent forms, which were read aloud by the moderators.

1. Introduction	<ul style="list-style-type: none"> • Presentation (5 min.) • Overview of workshop objectives (5 min.) • Signing of informed consent form (5 min.)
2. Poster presentation	<ul style="list-style-type: none"> • Payments for ecosystem services definition and examples (10 min.) • Choice experiment attributes and methodology (10 min.)
3. Deliberative choice experiment	<ul style="list-style-type: none"> • Round 1 of choice experiment (20 min.) • Focus group (40 min.) • Round 2 of choice experiment (10 min.)
4. Conclusion	<ul style="list-style-type: none"> • Survey (15 min.) • Thanks and farewell (5 min.) <ul style="list-style-type: none"> ○ 10 seedlings per participant ○ Certificate of participation

Figure 15. Stages and duration of the valuation workshop

The second stage was a poster presentation that introduced the concept of payments for ecosystem services (PES), the functioning of a CE, and the attributes that would be included in the exercise. Given the low literacy level of many participants, the explanations and choice cards relied heavily on pictures to aid understanding.

The third stage was the deliberative CE. In the first round, each participant sat separately and responded individually to eight choice cards in a randomized order. Once all participants had finished, the chairs were reorganized into a circle for the focus group, which lasted on average 40 minutes.

Before the focus groups began, participants were informed that the audio would be recorded. The moderators followed a guide with questions to structure the focus groups (Appendix F). To start, participants were asked about their general perceptions regarding PES. Next, they were asked if they had chosen the opt-out ‘No PES’ option for any of the choice cards and, if so, to explain why. Subsequently, each of the four attributes was discussed in depth. Finally, participants were asked if they had any additional thoughts or suggestions for a

potential future PES scheme for their community. The moderators did not actively seek to create consensus when differing opinions existed. However, participants were always prompted to explain their reasoning to the rest of the group.

After the focus group ended, participants completed the second round of the CE, individually and privately responding to the same cards as they had in the first round but in a different, randomized order.

The fourth and final stage of the workshop included a survey with questions about PES, environmental attitudes, and sociodemographic characteristics. Finally, participants were given 10 seedlings of local varieties of trees and a certificate to thank them for participating.

3.5 Results

We begin by looking at the results of the CE models and examining the differences in the expressed preferences between the two rounds of the CE. We continue by looking at the drop in the number of participants who chose the opt-out alternative on any of the choice cards. We follow by exploring what socio-demographic characteristics were most associated with changes in responses between rounds. Finally, we present the diversity of values that were expressed by participants during the deliberative process.

3.5.1 The latent class models

Table 5 presents the results of two models: a conventional latent class (LC) (column I) which we use for reference, and an extended two round latent class (2RLC) (column II) which differentiates between the coefficients estimated for the first round (rows A and B), and the differential effects of the second round (rows C and D). The results for the 2RLC and the LC present very similar estimations of the class allocation function parameters and corresponding constants (row E). Additionally, the classes in both models are defined according to the same preferences, as indicated by the significant coefficients in rows A and B—namely, a preference

for ‘high levels of participation’ in the first class (which we label the ‘Participators’), and a preference for the ‘elected council of local leaders as PES implementer’ in the second class (which we label the ‘Traditionalists’). A difference between the two models is that in the 2RLC the monetary attributes are no longer significant at the 10% level for either class (column II, rows A and B). Given the fact that this attribute is significant in the more basic LC model (column I, rows A and B) it appears that the added complexity of the 2RLC (which requires estimating 10 additional parameters for the differential effects) means that our sample of 248 participants may not be sufficiently large for a more precise estimation in the 2RLC model. Moreover, the payment coefficient of the second class in the first round (column II, row B) is not significant only marginally, which adds support to the idea that the lack of significance of the monetary attribute in the 2RLC is possibly the product of the sample size for a model of this complexity.

Table 5. Latent lass (LC) and Two-round latent class (2RLC) model results.

			(I) Latent class model (LC)			(II) Two round latent class model (2RLC)		
			Coeff.	SE		Coeff.	SE	
(A)	Latent class 1: 'Participators'	ASC 1	5.36	0.42	***	5.33	0.42	***
		ASC 2	5.11	0.43	***	5.07	0.43	***
	<i>Round 1 coefficients for the 2RLC</i>	PES implemented by elected council of local leaders	0.06	0.08		0.07	0.12	
		Degree of participation	0.13	0.04	***	0.15	0.05	***
		Distribution rule: per capita	0.04	0.07		-0.04	0.09	
		Distribution rule: per effort	0.07	0.06		-0.05	0.08	
		Increase in monthly earnings	0.03	0.01	**	0.02	0.02	
(B)	Latent class 2: 'Traditionalists'	ASC 1	-0.02	0.46		-0.06	0.48	
		ASC 2	-0.26	0.52		-0.30	0.57	
	<i>Round 1 coefficients for the 2RLC</i>	PES implemented by elected council of local leaders	0.55	0.28	**	0.68	0.36	*
		Degree of participation	0.09	0.08		0.05	0.15	
		Distribution rule: per capita	0.05	0.35		-0.39	0.41	
		Distribution rule: per effort	-0.24	0.31		-0.44	0.46	
Increase in monthly earnings	0.09	0.06	*	0.12	0.08			
(C)	Latent class 1: 'Participators'	PES implemented by elected council of local leaders				-0.02	0.15	
		Degree of participation				-0.05	0.07	
	<i>Differential effect of round 2</i>	Distribution rule: per capita				0.15	0.12	
		Distribution rule: per effort				0.23	0.10	**
		Increase in monthly earnings				0.02	0.03	
(D)	Latent class 2: 'Traditionalists'	PES implemented by elected council of local leaders				-0.23	0.37	
		Degree of participation				0.08	0.23	
	<i>Differential effect of round 2</i>	Distribution rule: per capita				0.84	0.50	*
		Distribution rule: per effort				0.43	0.66	
(E)	Latent class 2: 'Traditionalists'	Constant	-6.40	1.40	***	-6.42	1.39	***
		Sex (1=woman, 0=man)	-0.32	0.67		-0.35	0.67	
	<i>Class allocation function parameters</i>	Age	0.03	0.02	*	0.04	0.02	*
		Education	0.39	0.28		0.40	0.27	
		Income	0.30	0.16	*	0.29	0.16	*
(F)	Log-likelihood		-2611			-2606		
	Number of parameters		19			29		
	Observations		3617			3617		
	Akaike Information Criterion		5260			5270		
	Bayesian Information Criterion		5377			5450		

*p<0.1; **p<0.05; ***p<0.01; ASC = Alternative Specific Constant

The positive and significant parameters of the class allocation function for the ‘Traditionalists’ (row E) for age and income indicates that older and wealthier participants are more likely to belong to this class. Thus, younger and lower income participants are more likely to belong to the ‘Participators’ class. In appendix G we show how the willingness to pay for different PES characteristics changes for participants of different ages and incomes. The preferences and socioeconomic characteristics of the two classes (‘Participators’ and ‘Traditionalists’) we find in our models accurately reflect a rift currently taking place in the community of Muellamues. In recent decades several traditional indigenous institutions have started to decline as the community opens up to a market economy. Although older community members still hold considerable attachment to these traditions and institutions (e.g. elected council of local leaders), younger members are increasingly pushing to achieve more recognition in a society that has traditionally been led by elders. For instance, after a group of university students from Muellamues recently made a push to become part of the elected council of local leaders, the ruling members changed the statutes to prevent them from doing so by making marriage a requirement for eligibility, thus limiting the access of younger candidates. The fact that the ‘Traditionalists’ class is not just composed of older participants but also higher income ones reflects the fact that most members of the elected council of local leaders are quite wealthy themselves, and their governance may be helping perpetuate the current status quo. This class also has a preference in the second round for an “equal per capita” distribution rule. This is in line with traditional institutions such as *mingas* (communal work), where all community members are expected to contribute their time towards a common goal. It is possible that high income participants prefer this distribution rule because they have higher opportunity costs and therefore less of an incentive to participate in conservation activities. The fact that the ‘Participators’ class prefers an “according to effort” distribution rule is in line with the concern that came up in almost every group discussion that they were afraid that a PES program that rewarded everyone the same was apt to encourage free-riding, and that it would be unethical not to recognize those working harder.

Our main focus in this paper is whether preferences changed between the two rounds. Rows A and B of column II represent the coefficients for the first round of the deliberative CE, while Rows C and D show the differential effects on the coefficients of the second round.

Statistically significant coefficients in these rows indicate that expressed preferences for those attributes in the second round were different to the first round. We find statistically significant differential effects for the distribution rules ‘according to effort’ for the ‘Participators’ class (row C), and ‘per capita’ for the ‘Traditionalists’ class (row D). This suggests that the deliberative process increased the concern for these distributional equity attributes by the second round and supports our expectation that a deliberative CE enables participants to consider a broader range of attributes than a conventional CE.

3.5.2 Changes between rounds

Participants took on average twice as long to complete the first round than the second. We interpret this decrease in time as a reflection of the learning that took place throughout the deliberative CE (Figure 12), with regard to PES design preferences and the hypothetical market setting of the CE. This too supports the notion that the values expressed by the second round were more informed and therefore more ‘credible’. Additionally, participants made fewer mistakes in the second round (e.g. choosing more than one alternative when they liked both equally, or leaving choice cards blank when they found them too challenging).

The number of participants who chose the opt-out alternative on at least one of the eight choice cards dropped by two-thirds, from 9.7% in the first round to 3.5% in the second. We use the McNemar test and verify that this decrease is significant at the 99% level (McNemar, 1947). In most choice cards where respondents chose the opt-out alternative a certain attribute level did not change between the two available alternatives (‘PES A’ and ‘PES B’). The most common case was when the ‘government environmental agency’ was the only option for the PES implementer attribute. The second most common was when both available alternatives had ‘low community participation’ in PES design. This could be interpreted as participants expressing lexicographic preferences, and the decrease between rounds seems to imply that these were the consequence of a simplifying heuristic.

On average, respondents changed their responses on 2.7 cards out of 8 between rounds. Only 6% of respondents did not change any of their choices. Table 6 shows a binary logit model estimation comparing the characteristics that are associated with a greater propensity to change choices between rounds.

Table 6. Binary logit model estimation of the number of changes in choices between the two rounds

	One or fewer changes	Two or more changes	Three or more changes	Four or more changes	Five or more changes
	(I)	(II)	(III)	(IV)	(V)
Sex Man=0, Woman=1	0.69** (0.35)	-0.69** (0.35)	-0.25 (0.28)	0.41 (0.32)	0.92** (0.45)
Age (Years)	0.01 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.02* (0.01)	0.05** (0.02)
Education	0.40** (0.18)	-0.40** (0.18)	-0.11 (0.15)	0.03 (0.17)	0.11 (0.22)
Income	-0.05 (0.10)	0.05 (0.10)	0.08 (0.09)	0.08 (0.09)	0.05 (0.12)
Constant	-2.62*** (1.01)	2.62*** (1.01)	0.003 (0.82)	-2.41** (0.95)	-4.75*** (1.34)
Observations	220	220	220	220	220
Log Likelihood	-116.66	-116.66	-150.40	-125.93	-82.25
Akaike Inf. Crit.	243.32	243.32	310.80	261.87	174.50

* p<0.1; ** p<0.05; *** p<0.01

We do not find concrete evidence that participants with a higher social standing had an undue influence on others' expressed preferences in the second round. While higher education was associated with making fewer changes, age was not. On the contrary, older participants were more likely to change their choices between rounds. Income level did not appear to have

an impact, and gender had a peculiar effect: women were among those who changed both the fewest and the most choices (columns I and V, respectively), whereas men were in the middle. Appendix H contains more information on changes separated by gender. Consequently, we do not find conclusive evidence that members with a lower social status in the community were more or less likely to change their choices between rounds, and therefore it does not seem like power dynamics played a measurable role.

3.5.3 Expression of diverse values during the focus groups

One of the biggest advantages of using deliberative CEs as a transdisciplinary tool is that the deliberative process provides a platform for a diversity of values to be raised. During the focus groups participants discussed a wide variety of values including instrumental, relational, intrinsic and moral (Díaz et al., 2015; Chan et al., 2016; Pascual et al., 2017). Table 7 illustrates some examples of the types of values that were assigned to nature and the CE attributes.

Table 7. Examples of diverse kinds of values that were brought up during the deliberative process

	Instrumental values <i>As a means to achieve a particular end</i>	Relational values <i>Stemming from our relations with each other and nature</i>	Intrinsic/moral values <i>Inherent values/related to equity, legitimacy, rights</i>
Nature	As a source of: Water; Clean air; Food; Soil; Wood; Human health	As a defining cornerstone of their community's identity; As part of the community's "inalienable territory"; As a spiritual entity	Protection of "mother earth" is a duty; Nature is life; Future generations deserve to have access to a healthy environment
PES implementer	Who would manage PES funds better; Who would be able to mobilize the community more; Who has more environmental knowledge	Who is trusted more; Who is a "father figure" to the community; Who has shown greater concern for the environment in the past	Who is more legitimate to make decisions over how indigenous territory should be managed
Participation	More participation will lead to better outcomes; Including more people will ensure that the desired land use changes can actually be adopted by everyone	Making decisions as a group over important matters like nature is the way things are done in the community	It is not right to exclude people from decision-making on matters that will affect them
Distribution rules	Distributing per effort will make people work harder; Paying per unit of land will make people conserve as much as possible	Everyone has always been expected to contribute their work to matters concerning land management, so payments should be equal per person	It is wrong to compensate those who keep deteriorating nature the same as those who protect
Payment	Payments can motivate people to take care of the environment; Payments can ensure people can continue making a living	Payments can erode communal local land practices; Payments can change non-instrumental reasons for which people protect nature	It is wrong to get paid to do your duty; Concern for money has made people lose their moral compass

3.6 Discussion

Based on the results of our deliberative CE, we suggest that the participatory nature and multiple learning opportunities offered by this valuation approach helped participants provide

more considered and informed preferences than when using conventional CEs, and that these methods represent a promising avenue to increase the ‘credibility’ and ‘salience’ of stated preference valuation methods in contexts similar to ours in the Global South.

Firstly, we find that although participants had clear preferences concerning certain PES attributes from the beginning (namely, the ‘level of participation’ and ‘PES implementer’), their preferences concerning the importance of PES distribution rules (‘per effort’ and ‘equal per capita’) changed over the course of the 40-minute group discussion, as evidenced by the significant differential effect coefficients (cf. Table 4). This suggests that even relatively short deliberative processes may be enough to catalyze changes in expressed values (Kenter et al., 2016b) by broadening the diversity of issues being considered (Lienhoop and Völker, 2016). Additionally, a second opportunity to complete the choice cards allowed participants to become more familiar with the hypothetical market setting, which translates into participants taking less time to respond to the choice cards, asking fewer questions of the moderators, and making fewer mistakes.

The value of these multiple learning opportunities (Figure 12) should not be understated given that less than 15% of participants had ever heard of PES before, and likely even fewer had ever considered their own preferences regarding specific PES design characteristics. This unfamiliarity with the good being valued is not uncommon in other stated preference studies. Since the results of valuation studies are often used as a proxy for the social impacts of decisions, it is critical from a ‘credibility’ standpoint that participants have the opportunity to develop well-formed opinions before answering (Kenter et al., 2016b). Here lies one of the advantages of deliberative methods as a transdisciplinary tool to tackle societally relevant problems while generating learning processes that are useful not only for research purposes but also for local stakeholders.

The number of respondents who chose the opt-out alternative at least once decreased by two-thirds after deliberation. Large decreases in opt-out responses after deliberation have also been observed elsewhere (Szabó, 2011). We posit that this is due to a reduction in

lexicographic-like preferences. Traditionally, one of the difficulties for researchers in interpreting lexicographic preferences in CEs is determining if they are a true reflection of respondents' preferences or a consequence of a simplifying heuristic (Spash and Hanley, 1995; Szabó, 2011). Because participants were asked during the deliberative process to explain their reasons for opting out, it was possible to determine that their motivations were most commonly associated with rejecting PES that they perceived would threaten their sovereignty as an indigenous community. This occurred in choice cards in which neither alternative ('PES A' or 'PES B') would be implemented by 'the elected council of local leaders' or where 'high participation' was not an option.

We interpret the decrease in opt-outs by the second round as being a consequence of participants more carefully considering the social and environmental benefits that a PES could bring to the community after deliberating as a group. This could be explained using the framework proposed by Daw et al. (2015) where what was initially rejected due to being perceived as a 'taboo tradeoff' that required giving up a non-economic good (sovereignty) in exchange for an economic one (income increase), was reframed as a more acceptable yet difficult 'tragic tradeoff' that required exchanging two non-economic goods (namely, sovereignty in exchange for the water security that PES was expected to provide). Additionally, it is possible that during the focus group some participants who opted out at first, saw that their peers did not consider the tradeoff to be 'taboo' and adapted their preferences accordingly to the perceived social norm. The increased understanding of the community's preferences towards tradeoffs that are considered to be delicate promises to increase the 'salience' of these valuation methodologies.

Participants in our study changed on average a third of their choices between rounds. By contrast, Lienhoop and Völker (2016) find that participants in their deliberative CE only changed one out of six choice cards on average. We attribute this difference to two factors. First, their study was conducted in Germany, where the average level of education is considerably higher. This means that their CE was likely less cognitively demanding for participants; thus, the learning attributable to the 'practice effect' (Lezak et al., 2004) (Figure 12) that resulted from repeating the exercise was likely larger for our sample. Second, having two more choice cards per round means that participants in our study would have a harder time

remembering their decisions from the first round, contributing to the likelihood of changing their choice.

Perhaps the biggest risk of DMV methods is the possibility that during the deliberative phase, unequal power dynamics lead to some participants imposing their views on others through coercive means (e.g. dominant participants interrupting, correcting or berating others) or through social desirability bias (Kenter et al., 2016b). In our case, we do not find any concrete evidence that participants associated with less dominant roles in the community were more likely to change their choices after deliberating. This may be attributable to the fact that in our case study site, community meetings are quite common and people are used to respecting each other's turn to speak, which may not be the case in other settings.

Finally, perhaps one of the biggest advances of our DMV method was the opportunity for participants to bring up a diversity of values reaching far beyond what a traditional CE methodology is capable of measuring. For example, discussions around the ethics of paying money to protect nature, the fairness of distributive rules, the justness of the national government dictating policy that affects an indigenous community, and the importance of protecting the environment for future generations took place in almost every focus group. In this sense, the discussion about PES went beyond simply looking at personal preferences, often touching upon what would be best for the community as a whole and the framing of PES itself. The richness of this information provides valuable knowledge for researchers and policymakers at relatively low additional cost¹¹ and offers clear advantages with regards to the 'salience' of this method to have a meaningful local impact and be considered socially legitimate, given the normativity of any valuation approach (Pascual et al 2017).

¹¹ A normal choice experiment takes between 20 to 30 minutes to complete per person, whereas our deliberative choice experiment took about two hours for 10 people.

3.7 Conclusions

Our study contributes to the valuation literature in several ways. First, it represents one of the first applications of a deliberative CE in the Global South, a setting where the theoretical arguments in favor of DMV are particularly strong. Second, we show that deliberative CEs can lead participants to consider a wider range of attributes compared to traditional CEs. Additionally, we find evidence that using DMV as part of a transdisciplinary approach to tackle societally relevant problems may be more ‘credible’ and robust than conventional stated preference approaches, while simultaneously being more ‘salient’ and legitimate for stakeholders.

With DMV increasingly gaining recognition within the environmental valuation field (Dendoncker et al., 2018; Dunford et al., 2018; Rincón-Ruiz et al., 2019), future research should continue exploring the ways in which deliberative processes help participants to construct their values. For example, being able to isolate the impact of each of the four learning opportunities in our experiment could more clearly differentiate the added value of each of them separately, something that we were unable to do in our study. Due to many of the community’s characteristics (Section 3.3), deliberative approaches appeared to be particularly well suited to Muellamues. However, given the little use that approaches such as deliberative CEs have seen in the Global South thus far, additional studies should be carried out in a variety of contexts to further test the potential appropriateness and advantages of these types of methods.

Last but not least, we think that DMV can offer a promising opportunity to inform decision making in complex settings, as was the case in our deliberative CE which took place in the context of post-conflict and indigenous-controlled regions in Colombia, where social learning may be necessary. DMV can thus reveal key sociocultural subtleties that would otherwise be impossible to pick up using conventional valuation methodologies.

Chapter 4 Payments for ecosystem services or collective stewardship of Mother Earth? Applying deliberative valuation in an indigenous community in Colombia

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4.1 Introduction

Indigenous peoples are key social actors in over a quarter of the world's land and about 40% of the world's protected areas (Garnett et al., 2018). Given that many indigenous peoples are pushing to achieve increased autonomy and recognition (Laurent, 2016)—including the right to manage the natural environment within their territories—effective policy-making must be adapted to these contexts. Particularly, for global conservation efforts to succeed, it is imperative that environmental policy be compatible with and relevant to the way indigenous peoples choose to live and govern their territories.

Payments for ecosystem services (PES) are increasingly being implemented throughout Latin America, often with the dual goals of increasing conservation while simultaneously having positive social impacts (Adhikari and Agrawal, 2013; Börner et al., 2017; Calvet-Mir et al., 2015; Wunder et al., 2018). The definition of what exactly constitutes PES has been a matter of some contention (Wunder, 2015), but we use the definition provided by Engel (2016:133), which defines PES as “positive economic incentives where environmental service (ES) providers can voluntarily apply for a payment that is conditional either on ES provision or on an activity clearly linked to ES provision.” Contrary to other types of policies, such as protected areas or fines, which follow a ‘polluter-pays’ approach, PES uses a ‘steward-rewarded’ approach (Engel et al., 2008) that makes these policies suitable to promote the conservation of land under indigenous control. This is evidenced by the fact that many of the most emblematic PES programs are setting their sights on indigenous communities in order to recognize and incentivize their roles as stewards of nature. For instance, in Ecuador the “Socio Bosque” PES program was designed to allow both individual and collective contracts in order to encourage indigenous communities to participate in PES schemes (Krause and Loft, 2013). In Mexico, the well-known “Pago por Servicios Ambientales Hidrológicos (PSAH)” program has also targeted indigenous communities by using group-level contracts, with some evidence that these policies are strengthening social capital and collective action (Nieratka et al., 2015). Community-level contracts have also been allowed in later phases of Costa Rica’s national PES program, after indigenous groups managed to show that their original exclusion from the PES was illegal (Borge and Martínez, 2009).

A review of the literature examining PES in the context of indigenous communities shows mixed results, however. On the positive side, there are several experiences where PES have been shown to empower indigenous communities (Zander et al., 2013). There are documented cases of PES programs that have been able to respect indigenous sovereignty and self-determination without forgoing positive social and environmental outcomes (Denham, 2017). In Australia, for example, some indigenous communities have been keen to participate in carbon credit schemes (Robinson et al., 2016). In Colombia, new legislation passed in 2017 states that indigenous communities will be prioritized as recipients of PES funds and that these programs will be implemented according to indigenous peoples’ practices and customs. Of

particular note are the four references in the law with regard to using PES in a way that contributes to the *buen vivir*¹² (living well) of indigenous peoples in connection with nature.

Nevertheless, due caution is warranted as not all experiences with PES in indigenous communities have been positive. In Ecuador, where 60% of the remaining forested land is under indigenous control, many communities have opposed REDD+ projects (Reed, 2011). A large contributing factor to this rejection is the feeling that their voices have not been listened to throughout the design process of these schemes, despite the schemes' potential to significantly affect those whose livelihoods directly depend on forests. There are also documented cases of PES being implemented in indigenous territories that inadvertently cause harm, with detrimental impacts on local diets, food sovereignty, traditional practices and indigenous and local knowledge (ILK) more broadly (Ibarra et al., 2011; Rodríguez de Francisco et al., 2013). In some instances, negotiations between indigenous communities and PES managers have been characterized by power asymmetries that have perpetuated and entrenched preexistent inequalities, for example by reducing indigenous communities' access to water in favor of giving it to wealthier downstream farmers (Rodríguez de Francisco and Boelens, 2016, 2014). The worst transgressions of poorly implemented PES have even led to the outright eviction of indigenous groups from their homeland (Griffiths and Martone, 2009).

Socio-environmental conflicts between indigenous and non-indigenous groups can often be attributed to stark differences in relational models concerning humans and nature (Muradian and Pascual, 2018) and conceptions of justice (Whiteman, 2009). The question is thus whether and how the preferences of indigenous peoples may be elicited in order to adapt environmental policies so that they do not clash with their world views. We argue that while

¹² The concept of *buen vivir* is often used in indigenous circles and is closely associated with others such as *sumac kawsay*, *suma qamaña*, and *vivir bien* (Hidalgo-Capitán and Cubillo-Guevara, 2014). *Buen vivir* can be understood as an aspiration to live in harmony with nature and with each other. The concept is often called upon as an alternative to the western notion of "development," which indigenous communities often see as not only an economic goal but also a cultural one (Escobar, 2011). They argue that "development" seeks to prioritize western ideals and views of the world, namely by separating the economy from society and nature.

PES tailored to indigenous communities may share some framing and design features with conventional PES (Muradian et al., 2010; Wunder et al., 2018), in order to be successful they ought to be co-designed and voluntarily accepted as legitimate by the communities themselves (Corbera et al., 2007; Cranford and Mourato, 2011). Otherwise there exists a high risk of implementing maladapted PES schemes that are prone to causing further harm to indigenous peoples and thus unlikely to be sustainable in the long run.

Thus, in order to study under what conditions indigenous communities are more likely to accept PES, we implemented a deliberative choice experiment (DeCE)—a novel participatory valuation methodology that hybridizes both quantitative and qualitative techniques. Although there are other examples in the literature of conventional choice experiments being used to elicit stakeholder preferences regarding PES design (e.g. Espinosa-Goded et al., 2010; Kaczan et al., 2013; Costedoat et al., 2016; Randrianarison and Wätzold, 2016), this is the first example of a DeCE being used for this purpose. Using choice experiments to study PES design preferences is useful to shed light on questions such as if PES implementers should only focus on things like getting the price right, or if on the contrary, PES participants also care for other design characteristics to the extent that they may be willing to receive lower payments in exchange for them. Thus, we consider that the DeCE's mixed-methods approach is particularly well suited to this task because it can shed not only on what elements of PES design are most important to participants but also, crucially, to understand why it is that they value those elements (Schaafsma et al., 2018). This study is of note on two counts. Firstly, this was one of the first implementations of DeCE in the Global South¹³, as there are significant technical and logistical challenges associated with this methodology (Christie et al., 2012). Secondly, our sample size of 248 participants far exceeds the usual, smaller samples of 100 people or less seen in most other DeCE studies to date (Bunse et al., 2015).

¹³ To the best of our knowledge the only other documented application of DeCE in the Global South was done by Kenter et al. (2011) in the Solomon Islands (Oceania).

4.2 Case study background

This section has two parts. First we provide a description of the case study area and population. Then we discuss the relevant historical policy context in which a new PES would have to be embedded. Most of the information in Section 4.2.2 was obtained from discussions with locals, particularly older members of the community.

4.2.1 The Resguardo of Muellamues

We conducted our study in Muellamues, an almost 400-year-old *resguardo*¹⁴ (indigenous reservation) situated in the Andes Mountains in the southwestern region of Nariño in Colombia. This community is of interest because it fulfills all of the prioritization criteria of the new Colombian PES law: it is under indigenous control, poverty levels are high, there is presence of illicit crops in the region, and it is located in a paramo. Paramos are biodiversity rich ecosystems unique to northwestern South America and Central America. In Colombia, although paramos only cover 1.7% of the country's land surface, they provide 70% of the country's fresh water (WWF, 2018). Muellamues lies at an altitude of 3,000 to 6,000 meters above sea level. Other than on the steepest slopes, few trees remain standing as most of the land has been converted to pastures. Muellamues has a very small urban center since the majority of the approximately 6,000 residents live in small, scattered villages (Figure 16).

¹⁴ *Resguardos* are socio political institutions formed and led by an indigenous community according to their traditions and guidelines.



Figure 16. The red triangle on the map indicates the location of Muellamues, near the border of Colombia with Ecuador. The photo shows an aerial view of the community. The small urban center can be seen at the bottom of the image. The agricultural frontier has significantly encroached into the paramo, which is the source of most of the community's water (top). Imagery ©2018 CNES / Airbus, Map data ©2018 Google

The vast majority of the inhabitants of Muellamues belong to the Pasto indigenous ethnic group. Although due to outside influence they have lost some of their traditional knowledge and customs (Kloosterman, 1997), many others such as the *minga* still remain relevant nowadays. *Mingas* are a traditional indigenous institution whereby the community gathers to contribute their labor towards a common goal (Murillo, 2010). *Mingas* are still used today in Muellamues to build houses, dig ditches or clean litter, among others. The concept of the *minga* is also used when residents gather to deliberate on important matters for the community; in these cases, they are referred to as *mingas de pensamiento* (*mingas* of thought). The practice of *mingas de pensamiento* is very salient in Muellamues and can be seen for example in the weekly meetings with indigenous authorities where community members gather to take decisions that affect the entire reservation, or in the more local meetings of the *juntas de acción communal* (community councils) where village-related issues are managed in assembly. In these meetings community members do not shy away from voicing their

(dis)agreement with the matters being discussed and will deliberate extensively until a decision is reached.

4.2.2 Historical policy context

Historically, subsistence agriculture had been the main industry in Muellamues until the 1970s when the Colombian government implemented a series of incentives to promote the production of milk as a development strategy. As part of these efforts, two milk processing plants were built near Muellamues (Kloosterman, 1997). Competition between these two milk plants led to an increase in the price of milk purchased from farmers, which catalyzed a regional shift from traditional agricultural practices¹⁵ almost exclusively to milk production. Until then, milk had only been produced in small quantities for personal consumption, with most of the local economy relying on bartering with neighboring regions that were located at different altitudes and could therefore grow different crops.

Although the shift to milk production increased the income of farmers, it unintentionally gave rise to multiple ecological, social and cultural problems. First, the shift away from subsistence agriculture greatly impoverished the variety of food available to locals, contributing to increasing malnutrition. Second, it ended the bartering system that had traditionally been practiced between the inhabitants of Muellamues and neighboring regions, eroding social ties and practices such as the *minga*¹⁶ (communal work), while instead promoting a more market-oriented economy. Third, the growing cattle population put pressure on locals to convert parts of the paramo into pasture. As the paramo deteriorated, water scarcity became more pronounced downstream. This, in conjunction with the high water consumption of the cattle variety being used, led to the disappearance of many of the streams that used to

¹⁵ Before this transition they used to grow local varieties of potato, olluco, mashua, turnip, fava bean, quinoa, wheat, and barley, among others.

¹⁶ Although no longer the case, *mingas* used to be tied with agriculture as well. For example, if a farmer asked friends and neighbors to help with their harvest, they were in turn expected to return the favor in the future as well as provide food and drink or part of the harvest as compensation.

pepper the landscape. The local environmental agency, Corponariño, has since made some efforts to remedy this environmental problem. However, the inhabitants of Muellamues are not keen to have a government agency mandate what they should do with regard to their natural resources, given that in the past there have been some conflicts associated with the ownership of the water that originates within their territory.

The new development strategy also led to problems associated with land tenure which reduced the authority of the *Cabildo*¹⁷ (council of indigenous authorities) and the territorial sovereignty of the reservation. The arrival of the milk plants encouraged farmers to obtain loans to buy cattle. To do this, they approached banks that asked for collateral before granting access to credit. Although by law all land within the Muellamues is technically communal—to be distributed for use by the indigenous authorities using *documentos* (indigenous land titles that are only valid within the reservation)—many people went behind the *Cabildo*'s back to notaries who drafted private titles to the land which they then offered to banks as guarantees. In the case of default the bank would assume ownership of what was previously indigenous land. In this way the communal ownership of the reservation became increasingly (albeit illegally) privatized (Kloosterman, 1997).

In the mid-2000s the United Nations World Food Programme (WFP) identified Nariño as an area with a high degree of malnourishment. As part of an effort to address this problem, an initiative was implemented in Muellamues that rewarded workers with food in exchange for labor (PMA, 2007). Just like many times in the past, residents of the reservation were summoned to participate in communal work (*mingas*) to fix the roads of Muellamues. However, while the WFP was executed in the region, all people who participated received bags of rice as compensation for their labor. This led to a crowding out (Frey and Oberholzer-Gee, 1997) of the pro-social motivations that had previously underpinned the collective action of the *mingas*. Whereas residents had traditionally participated in *mingas* to fix the roads out of a sense of civic duty and commitment to the community, their motivation changed in response to the introduction of economic incentives that rewarded individuals for their labor (Moros et

¹⁷ *Cabildos* are elected indigenous councils that govern over the reservations in Colombia. The members are elected on a yearly basis. They hold meetings each weekend to discuss important matters and community members are invited to come and voice their (dis)agreement with the decisions being made.

al., 2017). Consequently, when the WFP's activities in the region ended, many community members ceased participating altogether in forthcoming *mingas* to fix the roads.

Legislation was passed in 2017 in Colombia to regulate and encourage the use of payments for ecosystem services (PES). This poses both opportunities (in the form of additional funds for conservation) and risks (that these programs will negatively interact with local institutions and conservation norms as seen above). The regional environmental agencies of Colombia, such as Corponariño, are therefore assigned the difficult task of designing programs that work in a variety of different contexts. The goal of this paper is to explore the types of characteristics that PES would need to be successful in an indigenous context such as that of Muellamues so that the mistakes of the past are not needlessly repeated.

4.3 Methods

The deliberative choice experiment (DeCE) approach is described in detail in Section 4.3.2, but in essence, our approach had small groups of participants completing two sets of choice experiments with a deliberative component in between. We chose this methodology as it has been found to successfully address a lot of the criticisms and limitations of traditional valuation approaches by reducing the cognitive burden on participants and allowing them to acquire a better understanding of the problem in question (Bunse et al., 2015). This is particularly relevant when participants are asked to value an unfamiliar good, which is the case with PES in Muellamues. While the choice experiment component was useful to get the participants to think about specific elements of PES implementation and provide quantitative evidence of the importance of equity considerations, the focus groups between round one and two of the DeCE were where participants were most comfortable expressing their ideas, as the format was similar to the types of *mingas de pensamiento* (deliberative communal meetings with collective decision-making) they regularly hold in their community.

4.3.1 Sample and workshop design

The choice experiment attributes were chosen after an initial exploratory field visit to the community in September 2017. Two pretest valuation workshops were conducted in January 2018, after which small changes were made to the choice cards and presentation to make them easier to understand. Data collection took place over the course of 4 weeks in February 2018. Given on-the-ground logistical challenges, it was not possible to randomly sample participants for the implementation of the DeCE. Instead we asked individuals from the different villages of Muellamues to assemble groups of about 10 people to participate in the workshops. The workshops were conducted either in the organizers' homes, in the village communal houses where public assemblies are generally held, or in local schools. In total 248 people (Table 8) participated in 24 workshops. Workshops generally lasted about two hours. All the workshops were moderated by one of the authors along with a local helper that was trained for this purpose.

Table 8. Descriptive statistics of the sample

Number of participants	248	Schooling:	
Number of groups	24	<i>None</i>	7%
Minimum number of participants per group	6	<i>Some primary</i>	26%
Maximum number of participants per group	14	<i>Primary</i>	30%
Average number of participants per group	10	<i>Secondary</i>	25%
Median number of participants per group	10	<i>Technical school</i>	9%
		<i>University</i>	4%
Percentage of women/men	53%/47%		
Average household size	4.1	Average age	43
Percentage that had previously heard of PES	14%	Median age	42
Monthly family income:		Age structure:	
<i><300.000 COL\$</i>	49%	<i><20</i>	5%
<i>300.001-400.000 COL\$</i>	20%	<i>20-29</i>	14%
<i>400.001-500.000 COL\$</i>	11%	<i>30-39</i>	24%
<i>500.001-600.000 COL\$</i>	6%	<i>40-49</i>	26%
<i>600.001-800.000 COL\$</i>	6%	<i>50-59</i>	15%
<i>800.001-1.000.000 COL\$</i>	4%	<i>60-69</i>	12%
<i>>1.000.000 COL\$</i>	3%	<i>>69</i>	5%

Although there is no publicly available census to check the representativeness of the sample, efforts were made to include people from all the different villages of Muellamues. Muellamues has a population of around 6,000 people, so our sample included a little more than 4% of the residents. The sample has an almost equal representation of men and women, and people of all ages participated. The only restriction for participants was that they be at least 16 years old.

The DeCE approach we followed was partly based on the valuation workshop methodology proposed by Kenter et al. (2011) and Völker and Lienhoop (2016). The workshops had four parts: the introduction, the DeCE, the survey, and the conclusion. For the

introduction, participants were welcomed and the objective of the workshop was explained; then, participants signed an informed consent form that stated among other things that they were free to leave at any point. This was followed by a poster presentation in which the general idea of PES was explained and examples of working PES were given to illustrate different possible modalities. Finally, the different attributes that would be included in the choice experiment as well as the instructions of how to complete the exercise were explained and any questions were answered. This was followed by the DeCE, which consisted of three parts: the first round in which participants individually answered eight choice cards, followed by a moderated focus group discussion in which all participants took part, and which concluded with a second round of choice experiment in which participants once again individually answered the eight choice cards. Once the DeCE was concluded, participants were asked to answer a survey that included questions to gather basic socio-demographic information. At the end of the workshop, participants were given 10 seedlings each along with a certificate that acknowledged and thanked them for their attendance to the workshop.

During the introduction, participants were told that the objective of the workshops was to capture the preferences of the community with regard to a potential PES for Muellamues. It was made clear that although the PES in question was hypothetical, legislation had recently been passed in the country in which areas like Muellamues would be prioritized and that the information obtained could be used to inform policy makers. Certain characteristics of the hypothetical PES were left purposefully vague, as one of the attributes that was valued in the choice experiment was the degree to which community participation would be capable of shaping the program. Participants were allowed to ask questions to either of the two moderators at any point in the workshop. Those who had trouble completing the choice cards and the survey (particularly older and illiterate participants) received help from the moderators. In order to facilitate the understanding of the different alternatives on the choice cards, pictures were used and carefully explained to make it easier for participants who had difficulty reading.

4.3.2 Deliberative choice experiment design

The attributes that respondents were asked to consider in the choice experiment (Table 9) included the payment amount and three dimensions of social equity: recognition, procedure

and distribution (Pascual et al., 2014). The motivation to tackle equity concerns in PES stems from the fact that in the past, when western and indigenous conceptions of justice have conflicted, they rarely met as “equal and opposing paradigms” (Whiteman, 2009). Instead, the western paradigm has routinely dominated the indigenous one. There is increasing recognition that environmental decision-making is inevitably value-laden (Schneider et al., 2019) and will have justice implications by creating winners and losers (Sikor, 2013). As such, in order to avoid perpetuating this historical inequality, bringing justice concerns (Agyeman et al., 2016) to the forefront of a discussion around PES is a logical first step before their implementation.

To cover the recognition dimension of equity (Martin et al., 2016), two options were included: a PES that was implemented by the indigenous leadership of the *Cabildo* of Muellamues and therefore recognized indigenous control over natural resources vis-à-vis one implemented by the environmental agency of the regional government (Corponariño). The importance of this attribute was identified during the first field visit to the community, as discussions with community members about local environmental degradation and possible solutions highlighted tensions over territorial sovereignty between the indigenous authorities and Corponariño. This is because according to Colombian law, many of the natural resources in indigenous lands fall under the jurisdiction of the state. This has led to past conflicts in Muellamues between the community and the regional environmental agency, Corponariño.

For procedural equity, three options were included reflecting increasing degrees of community participation in the design of a PES scheme (Arnstein, 1969; Richards et al., 2004) (Table 9). This attribute was selected after the initial field visit made obvious that community decision-making (tied to the practice of *mingas de pensamiento*) was common in Muellamues, and that therefore a PES that was perceived to be designed and implemented without community input risked being perceived as illegitimate.

For distributional equity, three different ways of distributing the payment among community members were included (Table 9). We selected three common distributional rules that are used in PES around the world, but which are based on different fairness criteria

(Pascual et al., 2010). This attribute was chosen as allowing communities to decide how to distribute benefits has been found to be important in determining the equity outcomes of PES (Gebara, 2013). Payment amounts were formulated in terms of how much the participant's monthly earnings would increase if they participated in the PES schemes; six options were included ranging from 0 COP (the PES would only cover opportunity costs) to 50,000 COP (approximately 17 USD, about 10% of the average monthly income per family). This attribute represents the payment net of opportunity costs rather than the PES payment itself, and is a more appropriate measure of the financial benefit from participating in PES (Pagiola et al., 2005).

Table 9. Attributes and levels of the deliberative choice experiment

Attribute	Description	Attribute levels
PES implementer	Agency responsible for implementing and coordinating the PES	<ul style="list-style-type: none"> • <i>Cabildo</i>: council of indigenous authorities • Corponariño: environmental agency of the regional government (<i>base level for dummy coding</i>)
Participation in PES design	Degree of community participation and input in the design of the PES	<ul style="list-style-type: none"> • Low: only informative meetings with no active participation from the community • Medium: meetings where participants would be consulted about their preferences, but in which the PES implementer decided on the final design • High: joint decision making in which participants and the PES implementer had to agree on the final design of the PES
Payment distribution rule	How PES compensation would be distributed among participants	<ul style="list-style-type: none"> • Per capita • According to conservation effort • Per land unit enrolled in the PES (<i>base level for dummy coding</i>)
Increase in monthly earnings	Change in income per month from participating in the PES	<ul style="list-style-type: none"> • 0 COP • 10,000 COP • 20,000 COP • 30,000 COP • 40,000 COP • 50,000 COP

A D-optimal fractional factorial design for a Random Parameter Model (RPL) was generated using the NGENE software (ChoiceMetrics, 2012b) with 24 rows which we distribute across three blocks. Across all workshops three different sets of eight choice cards were used (totaling 24 different choice cards). In any given workshop all participants answered the same choice cards but each of them in a randomized order. Each participant individually answered eight choice cards (see Figure 17 for an example) in round one, participated in a 40-minute focus group moderated by one of the authors and assistant local helper, and then

repeated the choice experiment individually in round two by answering the same choice cards again in a different order than in the previous round (once again randomized).




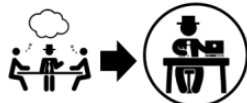



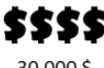
PES implementer	Option A	Option B	No PES
Degree of community participation in the design	 CORPONARIÑO CORPORACIÓN AUTÓNOMA REGIONAL DE NARIÑO Corponariño	 Cabildo	
How the PES distributes payments among participants	 Joint decision-making	 Prior community consultation	
Your additional monthly earnings	 Equal per person	 According to effort	
Choice	 0 \$	 30,000 \$	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 17. Example choice card. Each choice card had three alternatives (A, B, Opt out).

The focus group format followed a guide with questions covering each of the attributes (Appendix F). Before the discussion started participants were informed that the audio would be recorded for note-taking purposes. The focus group began by asking participants what they thought of the workshop thus far (this was included as a warm-up question for participants to get more comfortable). Then they were asked how they felt towards PES as an environmental policy and if they thought it could work in their community to help address environmental degradation. Following this, each of the attributes was discussed one by one in the order that they appear in the choice cards. When the conversation did not flow naturally, the moderator asked questions about the attributes to engage participants and encourage them to discuss further. The conversation was generally allowed to continue at each point until participants had nothing more to say. Finally, participants were asked if they had any final thoughts or recommendations on how to best adapt the PES scheme to their community.

In the following section we present the results of the choice experiments for both rounds. We use RPL models to analyze our results. We include the model specification in Appendix I. We also follow Kenter et al. (2011) by presenting a summary of the major themes that surfaced during the focus groups and the debates that took place.

4.4 Results

Table 10 shows the results of the RPL models for round one (pre-deliberation) and round two (post-deliberation) respectively. The size of the mean coefficients can be interpreted as the change in the representative utility for individuals from a one-unit increase in the attribute. Given that RPL models do not assume that all individuals have homogeneous preferences, the standard deviation coefficients reflect how broad the distribution of measured preferences is (Hensher et al., 2015). The significance of the alternative specific constants indicates that respondents' utility is higher for the first two alternatives than from the opt-out alternative.

Table 10. Random Parameter Logit (RPL) Models for round one (pre-deliberation) and round two (post-deliberation)

RPL (Round One)				RPL (Round Two)			
<i>Alternative specific constants</i>				<i>Alternative specific constants</i>			
	Coef.	Std. Error			Coef.	Std. Error	
ASC 1	3.173	0.237	***	ASC 1	3.647	0.273	***
ASC 2	2.965	0.240	***	ASC 2	3.304	0.276	***
<i>Attributes (means)</i>				<i>Attributes (means)</i>			
PES implemented by Cabildo	0.126	0.115		PES implemented by Cabildo	0.083	0.110	
Degree of participation	0.186	0.056	***	Degree of participation	0.084	0.051	*
Distribution rule: per capita	-0.004	0.089		Distribution rule: per capita	0.160	0.087	*
Distribution rule: per effort	-0.019	0.093		Distribution rule: per effort	0.144	0.088	*
Increase in monthly earnings	0.033	0.020	*	Increase in monthly earnings	0.050	0.020	**
<i>Attributes (sd. deviations)</i>				<i>Attributes (sd. deviations)</i>			
PES implemented by Cabildo	0.620	0.142	***	PES implemented by Cabildo	0.454	0.161	***
Degree of participation	0.295	0.078	***	Degree of participation	0.126	0.147	
Distribution rule: per capita	0.184	0.310		Distribution rule: per capita	0.142	0.378	
Distribution rule: per effort	0.320	0.196	*	Distribution rule: per effort	0.004	0.231	
Increase in monthly earnings	0.086	0.042	**	Increase in monthly earnings	0.087	0.044	**
Log-likelihood	-1382.5			Log-likelihood	-1339.9		
Number of parameters	12			Number of parameters	12		
Observations	1819			Observations	1840		
Akaike Info. Criterion	2789.0			Akaike Info. Criterion	2703.8		
Bayesian Info. Criterion	2855.1			Bayesian Info. Criterion	2770.0		

***, **, *: significant at the 1%, 5% and 10% level

Normally distributed coefficients: 'PES implemented by Cabildo', 'Degree of participation' and 'Distribution rule'

Log normally distributed coefficients: 'Increase in monthly earnings'

Focusing on the means of the estimated distributions, in round one the only significant non-monetary coefficient was the degree of participation by the community in designing the PES scheme. As expected, the change in monthly income also had a significant and positive impact. Preferences regarding the implementing agency of PES as well as the distributive rule

show non-significant mean coefficients, but their standard deviations show significant high unobserved preference heterogeneity. Given their zero mean coefficients, these attributes seem to be controversial in the sense that their impact for approximately half of the respondents is positive and for the other half is negative.

The results from the second round are quite different. A striking difference is the decrease in the preference heterogeneity among the respondents, as only two out of the five standard deviations of the attributes are statistically significant, as compared to four out of five in the previous round. This suggests that the deliberative process that took place between the two rounds may have had a homogenizing effect on the preferences that were expressed by the participants regarding the distribution and degree of participation attributes. The extent to which this apparent convergence of preferences may be due in part to some participants not fully understanding the exercise in round 1 and thus answering randomly, but then acquiring a better understanding by round 2, is an empirical question that we cannot shed more light on in this study but which warrants further attention. Even if this were the case, however, it would be a point in favor of this methodology over conventional choice experiments for being capable of eliciting more informed preferences by the second round.

Another difference between the rounds is that while community participation is still clearly important to respondents, it is relatively less so, while the rules around the distribution of the payments become more of a concern. Specifically, given the positive and significant mean coefficients of both “equal per capita” and “according to effort” distribution rules, we can infer that a distribution rule “according to the area included” in the PES is highly disfavored, as it is the baseline against which the other two coefficients are measured. Finally, the number of participants that chose the opt-out alternative at least once decreases by two thirds between rounds, from 9.7% in the first round to 3.5% in the second.

Table 11 summarizes the main themes and debates that surfaced during the focus groups. These are used to interpret the results from the choice experiments in the next section. A version of this table with a selection of illustrative quotes can be found in Appendix J.

Table 11. Recurring themes and debates across the 24 focus groups. The third column indicates the number of groups where the theme was relevant for the discussion.

Theme	Description	#
In favor of the Cabildo	They are the legitimate authority that represents the community's sovereignty and thus have more sway with locals. They are the holders of indigenous and local ecological knowledge. They are a "father" to the community. They are respected both inside and outside the community.	17
Against the Cabildo	They only look out for themselves and are involved in politicking. There have been instances of elite capture in the past. They have failed to protect the environment so far. They buy back plots of land under the pretext of conservation and then sell it to their supporters. A new Cabildo is elected yearly making it very hard for project continuity.	15
In favor of Corponariño	Much more interested in the environment than the Cabildo. Better track record as they have carried out environmental projects in the past. More technical expertise and resources. More capable of offering PES continuity.	12
Against Corponariño	Lack of trust in them. They are only interested in taking control over the water of Muellamues and charging residents for it. Letting them run the PES would be selling off the territory. They don't possess local ecological knowledge and would thus be incapable of offering appropriate environmental solutions.	12
Collaboration	The Cabildo and Corponariño should collaborate to implement the PES together.	5
Importance of community participation in PES design	Important because: It is not legitimate when the few decide for the many. The more people participate the more knowledge is shared and the better the outcome. Important to listen to all views and arrive at a consensus. Everyone relies on nature so everyone should be part of the solution. Participation reduces corruption and politicking. Participatory decision-making is the indigenous way.	16
Distribution rules	In favor of per effort: Fairest rule. Hard work should be recognized. Would prevent free-riding.	22
	In favor of equal per capita: So there is no inequality. To reduce envy. To make everyone aware of the benefits of conservation. Because it reflects how traditional 'mingas' work.	10
	Against per unit of land: Not fair to offer more payments to the biggest land owners. Could cause problems (e.g. limits between neighbors are not always clear).	9
In favor of paying to conserve nature	People are poor and live from the land, so payment is necessary so they can keep making a living. Conservation is hard work that should be recognized. Payment will motivate many more people to conserve. Money is a necessary evil.	17
Against paying to conserve nature	Caring for the environment is a moral duty. Environmental benefits from conservation should be reason enough. Taking care of the environment should not be seen as a cost but rather as an investment. Money has made people lose their moral compass. Paying risks eroding traditional practices like the 'minga'. Paying for conservation will mean people do it for the wrong reason. Conservation should not become a business.	18
Linking PES with indigenous terminology and concepts	Participants would often use indigenous terminology and concepts to discuss PES, such as: 'territory', 'mingas', 'mother earth', 'mother nature', 'indigenous authority', 'indigenous identity', 'chagras' (indigenous medicinal gardens), 'duty', talking about 'help' or 'support' rather than 'payments'.	19
Bequest value of nature	The environment must be protected for the children and for future generations to come.	11

4.5 Discussion

The fact that the degree of community participation was deemed important from the start was not entirely surprising given that as we described in Section 4.2.1 community members are quite used to collective decision-making in Muellamues. Additionally, given historical conflict and struggles for their land (Kloosterman, 1997), there is a sense that active community participation is important when making decisions concerning land use. Others have noted the importance of communal decision-making in indigenous contexts (e.g. Kenter et al. 2011), highlighting the centrality of this attribute for effective PES design and implementation. However, involving the community in the design of PES should only be done if their participation is meaningful as there are numerous examples of tokenistic gestures in this regard that have ultimately led to frustration among the communities in question (Whiteman, 2009).

The decrease in the coefficient value for participation in the second round of the DeCE is most likely due to other aspects that were not considered in round one gaining more relevance after group deliberation. Specifically, distributive concerns change from being almost entirely ignored in round one to being significant in round two. This change is likely a result of the deliberative process, as during the focus group participants were asked to carefully consider and discuss the impact of each attribute one at a time. As seen in Table 11, there were differing opinions on whether people most preferred an effort-based payment (which according to them was the fairest as it would reduce free-riding) or an equal-per-capita payment (which would be more in line with traditional practices such as the *minga* where everyone is expected to contribute equally to the community). Interestingly, the equal-per-land-unit payment was overwhelmingly rejected despite it being the most commonly used approach in PES programs (Wunder et al., 2018, 2008). The focus group discussions shed some light on why this may be. Land ownership is a sensitive subject in Muellamues for multiple reasons. As described in Section 4.2.2, some of the land has unclear tenure due to illegal privatization. Additionally, the

fact that the redistribution of land that the reservation recovered¹⁸ in the past has been subject to some favoritism by previous *Cabildos*, contributes to the community's guardedness on the subject, which means that many people are not keen on a PES that draws attention to how much land they own.

This highlights how local context may interact in unexpected ways with specific PES characteristics that may easily go unnoticed by PES implementers who are not intimately familiar with participating communities, and offers support for the importance of ensuring community participation during the design of these programs. This stands in contrast to the fact that only a minority of PES allow participants to decide how they prefer to share the benefits derived from PES. However, there are some notable exceptions where indigenous populations have been allowed to allocate payments according to complex community-decided distribution rules (Nieratka et al., 2015). Engaging communities in this process in future PES could help increase the legitimacy and uptake of PES, in addition to making PES more transparent and reducing the potential for elite capture.

Participant preferences with regard to who should implement the PES program (the traditional indigenous authority of the *Cabildo* or the regional environmental agency, *Corponariño*) requires careful interpretation. Like Costedoat et al. (2016), who used a (non-deliberative) choice experiment to ask farmers about their preferences regarding PES, we find that involving a government agency appears to have little effect on participants preferences from a statistical point of view. However, at least in our case, the fact that the mean for the estimated distribution of this coefficient was not significant in either of the two rounds should not be understood as a lack of importance, as this attribute was often the most heatedly debated topic during the focus groups (cf. Table 11). The issue elicited a broad range of opinions from participants which they generally felt very strongly about. This lack of consensus is reflected in the RPL models as a lack of significance for the attribute means, but a highly significant attribute standard deviation. This implies that for about half of respondents this attribute was

¹⁸ The amount of land directly under the control of the reservation has been in flux since it was established four centuries ago. Most recently in 1985 a large estate controlled by a non-indigenous farmer was occupied and eventually absorbed into the reservation and distributed among residents. The redistribution favored heavily the members of the *Cabildo* (indigenous authority) and those that were close to them (Kloosterman 1997).

positive and for the other half it was negative; that is, half preferred a PES program lead by the indigenous authorities while the other half preferred the regional environmental agency. The focus group discussions revealed that the majority of the people hold a deep respect for the *Cabildo* as an indigenous institution, even if some do not like the political or personal inclinations of a specific *Cabildo* in a given year (a new *Cabildo* is elected on a yearly basis). In this regard the *Cabildo* is seen as a legitimate authority over indigenous matters by the overwhelming majority of respondents. For example, participants often spoke of the *Cabildo* in terms of it acting as the “father” of the community. This is paired with the fact that there exists a widespread feeling of wariness towards Corponariño which stems from past efforts of the government to gain greater control over the water sources in the paramo within the reservation. Nevertheless, there is a prevailing sense that previous *Cabildos* have not done enough to protect the environment; participants most frequently cited cases in which a past *Cabildo* has used public funds to buy back plots of land in the paramo meant for conservation, only for the following *Cabildo* to simply sell them back to its own supporters the next year. This is why a significant percentage of participants shied away from selecting PES alternatives led by the *Cabildo* and felt that, as an external environmental institution, Corponariño could be better suited to manage the PES. There was also a feeling that project continuity would be hard to achieve with the yearly changes of the *Cabildo*, while Corponariño’s involvement would likely grant the program more permanence. However, in five separate focus groups respondents suggested that ideally the PES should not be implemented by a single entity but rather by a collaboration between the *Cabildo* and Corponariño. In this way the PES could benefit from the *Cabildo*’s local knowledge and legitimacy as well as Corponariño’s technical expertise. Similar community preferences for co-management systems have also been noted in other contexts of the Global South (Hind et al., 2010). The suggestion of a co-management system demonstrates how involving communities in PES design may not only help to choose between alternative design options, but may also surface options not previously considered.

It is worth noting that, in the second round RPL, the monthly earnings attribute also had a significant standard deviation. We attribute this heterogeneity in preferences to the fact that

part of the focus group discussion covered whether people should be paid for protecting the environment or whether it should be done for free. The majority of participants expressed that PES was a good idea as receiving compensation would allow them, as poor farmers, to invest in conservation efforts. However, in most groups at least one or two people would often argue that protecting nature was the “duty” of all people and expressed reservations as to whether bringing money into the equation would be productive in the long term or whether conserving nature would simply “become a business.” Therefore, it is possible that while the payment attribute was important for the majority, others may have balked at choosing choice card alternatives with high payments for moral or ethical reasons. Another possible explanation that cannot be discarded is social desirability bias, where some respondents may not have wanted to appear to be choosing PES alternatives based primarily on financial gain, despite the exercise being individual and anonymous.

An interesting implication of the significant coefficients for the participation and distributive rule attributes is that respondents would be willing to receive lower PES payments in exchange for more equitable PES. If this were not so, we would expect to find that only the monthly earnings attribute was significant. This implies that policy makers would do well to carefully consider equity concerns in PES design if these are to be well received by local communities.

Generally, PES is often framed using economic terminology (e.g. increasing the provision of ecosystem services, internalizing externalities, aligning incentives, compensating opportunity costs). While this jargon is useful to dissect and analyze PES in certain academic and policy making contexts, in an indigenous context such framing could well be counterproductive. This is because in Muellamues, like in many other indigenous communities, there is an active resistance to the encroachment via ideological imposition of what are perceived to be “western” ideas. Therefore, it was interesting to observe how, as participants became more familiar with the concept of PES, they often began using their own framing and semantics to talk about the use of these programs and their surrounding environment during the focus groups (cf. Table 11). When this took place, the change in language often appeared to be accompanied by a change in their human-nature relational model (Muradian and Pascual, 2018). Specifically, these discussions began with nature being talked about as the backdrop

over which community members made their living, where the value of nature was discussed primarily in instrumental terms. However, as conversations about PES and environmental degradation progressed, participants often began to draw on indigenous expressions and concepts. They talked about using “*mingas*” to “care” for their “territory”; they referred to their “duty” to guard “Mother Earth”; and they underscored the necessity to preserve nature for their descendants. Interestingly, they also often used terms such as receiving “help” or “support” from the government rather than “payments.” All this highlights the importance of considering relational values when looking at indigenous peoples’ relationship with nature (Chan et al., 2018, 2016; Pascual et al., 2017). This conscious shift in framing around PES could be understood as a change in the human-nature relational model being used to talk about PES from “utilization” to one of “wardship” or “devotion” (Muradian and Pascual, 2018), with nature seen as something worth being protected for its own sake and for future generations, and not just as means to an end. This visible contrast between the often monistic, western representation of nature and ecosystem services and that of indigenous peoples’ is increasingly receiving attention in the scientific literature. Notably, the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) recently included in its framework the concept of “nature’s contributions to people” (NCP) (Pascual et al., 2017; Diaz et al., 2018), a reframing of ES that attempts to be more inclusive of the diverse set of world views and values associated with the benefits (and detriments) that nature provides to humankind.

Adapting the PES framing to a more indigenous worldview and aligning it more closely with their intrinsic motivations (Midler et al., 2015) and traditional knowledge, including their cosmology, culture, identity and values (Houde, 2007), seems like a promising way to help PES succeed in these communities. Using their own terminology and conceptualization of nature could potentially help to rally indigenous communities around conservation in a similar way to how indigenous politicians in Colombia have begun to dress in traditional garments to externalize their “indigenusness” in an attempt to signal to their supporters and bring indigenous identity to the forefront (Laurent, 2016). In this regard there is already some

evidence that community identity and pride can be tapped into to motivate participation in PES (Bremer et al., 2014).

The importance of encouraging community participation in the design of PES to tailor these programs to their specific contexts should also not be underestimated if we consider the potential PES has to create, interact with, and change existing social norms (Kerr et al., 2017), in turn crowding in or out participants' motivations (Chan et al., 2017). For example, the debate that arose in several focus groups during the DeCE about whether people should be paid to do their "duty" highlights an important conundrum. Depending on how participants perceive PES, the act of paying to protect nature can contribute to the creation of one of two opposing norms. In the best case scenario, the implementation of PES is accompanied by an effort to engage the community, tapping into pre-existing pro-social motivations to conserve and transmitting the value of protecting the environment. This in turn sends the message that people are receiving help to protect nature because its stewardship is a vital exercise that the government is willing to support. In this case even if payments were to stop at some point, the social norm that conservation is important may have been reinforced and people may be more willing to continue expending effort in the pursuit of the endeavor. On the contrary, if PES is seen as foreign—as a way for the government to manipulate individuals into doing something that is not worth doing for its own sake—the social norm that is created is that conserving nature is not a worthwhile effort unless you get paid to do it (similar to the experience with the UN World Food Program in Muellamues described in Section 4.2.2). Avoiding this is certainly no easy task given that pecuniary and social motivations often interact in unexpected ways (De Martino et al., 2017). Ultimately, the effect that a cash payment could have on the motivations to care for the environment remains an open question. While past experience in Muellamues has shown that the risks of crowding out are well founded (cf. Section 4.2.2), in reality very little is currently being done with regard to environmental conservation, and so arguably the potential for harm in this specific case may be small. Nevertheless PES should be used with caution given the uncertain impacts they may have in this regard (Rode et al., 2015b).

Our results highlight the importance and value of co-designing PES programs with indigenous communities themselves. PES designs should recognize and respect indigenous peoples' perspectives, preferences and cognitive models underpinning their preferred relational

models with regard to nature (Muradian and Pascual, 2018). Reducing the emphasis on pecuniary motivations to participate in PES and instead focusing on peoples' relational values towards nature may be a way to reduce the risk of crowding out (Bremer et al., 2018). Despite recurring criticisms in the past that have accused PES as relying on the “asocial logic of neoclassical economics” (McAfee, 2012:105), the reality is that PES are flexible tools that rarely follow a strict market rationale (Muradian and Gómez-Baggethun, 2013). In Bolivia, for example, PES have been successfully reframed as “reciprocal agreements for water” (Bétrisey and Mager, 2014), thereby avoiding the market transaction framing and instead tapping into preexistent social norms of reciprocity. In Mexico, the idea of PES as “payments” has been rejected by farmers in favor of conceptualizing them as a “support” or “recognition” instead (Denham, 2017). In Australia, PES have also been reinterpreted and translated to fit more closely with indigenous narratives (Robinson et al., 2016), moving away from the framing of nature as a service provider and instead towards the circular relationship between humans and nature. Other proposals include articulating PES as “co-investment in environmental stewardship” (CIS) (Chan et al., 2017; van Noordwijk and Leimona, 2010), with an emphasis on social exchange rather than financial transactions. The results of the focus groups support that these types of alternative approaches to traditional PES framings are more likely to be aligned with indigenous peoples' world views.

4.6 Conclusions

With PES increasingly becoming part of the strategy to protect the environment not only in Colombia but also the rest of the world, it is crucial to find ways to adapt these policy instruments to the diversity of contexts and peoples that exist. Particularly in the case of indigenous communities, PES implementers need to find a way to tailor these programs so that they accommodate the full range of world views and ways of living of these groups. If not, two main risks exist: either that PES face widespread opposition by these communities for being incompatible with their culture and understanding of the natural world, or that PES is

implemented but leads to unintended consequences that could, for example, erode the communities' customs and cultural heritage (as happened in the two cases illustrated in Section 4.2.2).

We find that the deliberative valuation approach is a useful way to elicit preferences in an indigenous context. One of the advantages of adding a deliberative component to the choice experiment methodology is that it allowed us to extract information not only about what participants value, but also about why they value it (Lienhoop et al., 2015). The deliberation process helped individuals to carefully consider the importance of each of the attributes in question, not just for themselves but also with regard to how the implementation of a PES scheme would interact with their community more broadly (Kenter et al., 2016b). With sufficiently large samples, deliberative choice experiments can also be used for detailed comparisons of preferences between the two rounds.

Finally, and particular to the context of Muellamues (as well as many other Andean indigenous groups), the focus group discussion was based on a familiar format for participants (*mingas de pensamiento*, i.e., deliberative communal meetings) where individuals could voice and discuss their opinions freely in front of the group. While this approach worked well in the specific context of Muellamues, where deliberating openly is common when making decisions, care should be taken in contexts where local elites (or other individuals who are empowered by their class, social position, gender or education) are more apt to dominate meetings and therefore silence other individuals (Orchard-Webb et al., 2016).

Our study in the Muellamues reservation highlights the importance of allowing community members to meaningfully take part in the decision-making process. We also found evidence that adapting the language and framing of PES to fit with the jargon and concepts used by indigenous peoples can be useful to engage participants and help them find a place in their community for these types of conservation approaches. These could be important first steps to avoid PES being perceived as a neoliberal tool used to commodify nature in a way that often clashes with the values of these communities (Kosoy and Corbera, 2010). We have seen in the past how failure to do so has caused widespread rejection of programs such as REDD+ by indigenous peoples in Latin America (e.g. Reed, 2011), due in large part to a lack of prior

involvement of the communities and scarce efforts to adapt PES to different relational models (Muradian and Pascual, 2018). With more than a quarter of the world's land surface under indigenous control (Garnett et al., 2018), the importance of not only tailoring PES to fit with indigenous' worldviews, but also reimagining them in a way that allows indigenous groups to take ownership of them can hardly be overstated.

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Appendix A Full version of equity and outcome questions

1a. When the program was FIRST PROPOSED, what types of GOALS and OBJECTIVES did it have?

	1	2	3	4	5	6	7	
Initially, the program's main goals and objectives were environmental								Initially, the program's main goals and objectives were social

Comments or clarifications on Question 1a

1b . NOWADAYS, what type of GOALS and OBJECTIVES does the program have? (°O)

The midpoint between 1 and 7 would indicate a program where the environmental and social objectives were equally important

	1	2	3	4	5	6	7	
Nowadays, the program's main goals and objectives are environmental								Nowadays, the program's main goals and objectives are social

Comments or clarifications on Question 1

(°O) If your answers to questions 1a and 1b are different, please briefly describe the reasons that the programs objectives shifted

2. To what degree was the IMPACT that the program could have on the following groups of potentially vulnerable people CONSIDERED?

1 = Considering the impact of the project on this group was not a priority;

7 = Considering the impact of the project on this group was very important

	1	2	3	4	5	6	7	N/A
Poor farmers with land								
Landless workers								
Customary land user (farmers without formal land ownership)								
Women								
Indigenous communities								
Other marginalized or vulnerable individuals ("O")								

Comments or clarifications on Question 2

If you answered "Other marginalized or vulnerable individuals ("O)" please indicate what group you are referring to.

--

3. To what degree have MEASURES been taken to REDUCE or AVOID possible negative impacts on the following groups of people (ex. hiring as guards, training, alternative income opportunities, etc.)? ("O)

1 = No concrete measures were taken;

7 = Significant measures were taken to try to avoid any negative impacts

	1	2	3	4	5	6	7	N/A
Poor farmers with land								
Landless workers								
Customary land user (farmers without formal land ownership)								
Women								
Indigenous communities								
Other marginalized or vulnerable individuals ("O)								

Comments or clarifications on Question 3

("O) Please briefly state the types of measures taken. If you answered "Other marginalized or vulnerable individuals ("O)" please indicate what group you are referring to.

--

4. To what degree did LOCAL or TRADITIONAL NORMS, CUSTOMS and KNOWLEDGE influence the design and implementation of the program?

	1	2	3	4	5	6	7	
Not at all								Completely

Comments or clarifications on Question 4

5. Were traditional land-use rights (WITHOUT formal titles) recognized for ES providers that applied to the program?

	1	2	3	4	5	6	7	
No, only formal legal land ownership was recognized								Yes, procedures were set in place to facilitate as much as possible the recognition of traditional landuse rights

Comments or clarifications on Question 5

6a. Was free, prior and informed consent (FPIC) to implement the PES program in their region obtained from the affected communities?

Yes	
No	

6b. How was the FPIC documented?

If you answered "No" to the previous question please select "N/A"

Contract	
Meeting minutes	
Confirmed/signed attendance to a meeting	
Written notification	
N/A	
Other:	

Comments or clarifications on Question 6

--

7. What degree of PARTICIPATION did ES providers have in the decision-making process during the DESIGN of the project?

ES providers: Farmers or land owners that are undertaking the agreed upon actions to secure the provision of an Ecosystem Service

	1	2	3	4	5	6	7	
ES providers were not consulted and did not participate during the design of the program								All major decisions were taken jointly with the ES providers

Comments or clarifications on Question 7

--

8. Did ES providers have the necessary CAPABILITIES and training to meaningfully participate in the program DESIGN?

Meaningful participation means that ES providers have enough information, education, literacy and empowerment to effectively participate and impact the design of the program

	1	2	3	4	5	6	7	
No, ES providers' capabilities were severely limited and were not capable of meaningful participation								Yes, ES providers were well equipped with all the skills and knowledge necessary to meaningfully participate

Comments or clarifications on Question 8

--

9. How easy was it for ES providers to COMMUNICATE with the program implementers to obtain INFORMATION or share their concerns and suggestions?

Communication can include the use of many different means: telephone, email address, through a representative, through periodic informative meetings, etc.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

There was no practical way for ES providers to reach program designers & implementers										Many different means of communication were made available
---	--	--	--	--	--	--	--	--	--	---

Comments or clarifications on Question 9

10. To what degree were specific public participation mechanisms used to elicit PARTICIPATION from ES providers during the DESIGN and IMPLEMENTATION of the program?

Participation mechanisms: Focus groups, interviews, large-scale consultations, online discussion forums, etc.

	1	2	3	4	5	6	7	
No participation mechanisms were used								Multiple participation mechanisms were used to try and reach as many people as possible

Comments or clarifications on Question 10

11. To what degree were the following groups able to PARTICIPATE in the DESIGN process?

1 = No member of this group participated during the design process;

7 = This group participated very actively during the design process

	1	2	3	4	5	6	7	N/A
Poor farmers with land								
Landless workers								
Customary land user (farmers without formal land ownership)								
Women								
Indigenous communities								
Other marginalized or vulnerable individuals ("O")								

Comments or clarifications on Question 11

If you answered "Other marginalized or vulnerable individuals ("O)" please indicate what group you are referring to.

--

12. To what degree have the PROBLEMS and CONFLICTS that arose during the design and implementation of the program been addressed and resolved? ("O)

	1	2	3	4	5	6	7	
The problems and conflicts that came up proved to be completely unresolvable								Every single problem and conflict that came up was resolved to the complete satisfaction of all parties

Comments or clarifications on Question 12

("O) Please briefly expand on the type of conflict(s) that arose during the project and what was the outcome or resolution.

--

13. To what degree did ES providers decide the TYPE of payments or compensation they would receive?

Types of payment: Cash, in-kind, technical assistance, training, etc.

	1	2	3	4	5	6	7	
The type of payment was decided without consulting them								ES providers were the sole deciders of the type of payment

Comments or clarifications on Question 13

--

14. To what degree did ES providers decide HOW payments would be DISTRIBUTED among themselves?

Types of distribution: egalitarian (everyone is paid the same), merit-based (those who work harder get more), maxi-min (poor people get more compensation than the wealthy), etc.

	1	2	3	4	5	6	7	
The distribution of payments was decided without consulting them								ES providers were the sole deciders of how the payment would be distributed

Comments or clarifications on Question 14

15. To what extent have preexisting POWER DYNAMICS affected the design and implementation of the program? (°O)

	1	2	3	4	5	6	7	
One or a few powerful stakeholders managed to significantly steer the design of the project for their benefit								The program was designed so as to benefit all participants equally

Comments or clarifications on Question 15

(°O) Please briefly illustrate the power dynamics at play in the context of the PES program

16. To what extent were ES providers engaged in the MONITORING of the program?

	1	2	3	4	5	6	7	
ES providers were not involved in the monitoring of the program								All monitoring of the program was done by ES providers

Comments or clarifications on Question 16

17. Are there any mechanisms in place to SANCTION participants who do not comply with the PES agreement? (°O)

	1	2	3	4	5	6	7	
Payments were made in good faith rather than being truly contingent								ES providers that do not comply with the agreed upon actions are sanctioned

Comments or clarifications on Question 17

(°O) If sanctions of any kind were applied please briefly state what they consisted in (ex. a fine, expulsion from the program, returning past payments, etc.)

The program has benefited more wealthier ES providers or those with more land										The program has benefited more poorer ES providers or those with less land
---	--	--	--	--	--	--	--	--	--	--

Comments or clarifications on Question 20a

20b. What effect has the program had on social or economic EQUITY in the COMMUNITY or REGION between those who participated in the program and those who did not?

	1	2	3	4	5	6	7	
The program has increased inequality between participants and nonparticipants								The program has decreased inequality between participants and nonparticipants

Comments or clarifications on Question 20b

21a. How successful has the program been in providing the TARGETED ES?

1 = No improvement in the ES;

7 = Significant improvement in the ES

Water quality	
Water quantity	
Biodiversity	
Carbon sequestration	
Landscape beauty	
Other:	

Comments or clarifications on Question 21a

If you answered "Other ("O)" please indicate what ecosystem service you are referring to.

21b. Is your answer to the previous question based on PERCEIVED or VERIFIED/MEASURED impacts?

The environmental impacts were perceived	
The environmental impacts were verified/measured by a study	
Other: _____	

Comments or clarifications on Question 21b

If you answered "Other ("O)" please indicate what ecosystem service you are referring to.

22a. Overall, how well did the program meet its ENVIRONMENTAL goals and targets?

	1	2	3	4	5	6	7	
The program did not manage to meet any of its environmental goals and targets								The program fully met all of its environmental goals and targets

Comments or clarifications on Question 22a

22b. Overall, how well did the program meet its SOCIAL goals and targets?

Please leave blank if the program had no social goals or targets

	1	2	3	4	5	6	7	
The program did not manage to meet any of its social goals and targets								The program fully met all of its social goals and targets

Comments or clarifications on Question 22b

Appendix C Factor Analysis

The factor analysis served as a starting point to indicate equity variables that could be grouped. The authors then used their expert knowledge to decide the final grouping of variables so that they reflected the three dimensions of equity (procedural, recognition and distribution) and PES outcomes (environmental and social). Once included into a group items were given the same weight except in cases where the correlations between two items were greater than or equal to +0.7. In these cases, as explained in the main text, they were first averaged together to avoid double counting. In the table the items in bold represent those that were grouped together in the final analysis.

Loadings:	Procedural Factor1	Recognition Factor2	Outcomes Factor3	Distribution Factor4
X7	0.45	0.27	0.01	0.68
X9	0.53	0.15	0.14	0.25
X10	0.64	0.21	0.06	0.33
X12	0.64	0.12	0.24	0.27
X15	0.58	0.12	0.13	-0.01
X2	0.25	0.74	0.28	0.06
X3	0.17	0.82	0.26	0.08
X4	0.23	0.47	-0.14	0.03
X5	-0.08	0.42	0.17	0.24
X11	0.48	0.58	0.11	0.25
X19	0.5	0.46	0.45	0.12
X21a	0.17	0.2	0.77	0.21
X22a	0.35	0.08	0.82	-0.08
X22b	0.66	0.35	0.45	-0.09
X13	0.14	0.14	0.27	0.85
X14	0.1	0.04	-0.09	0.61
X18	0.39	-0.01	0.39	0.37
X20a	0.57	0.13	0.25	0.16
X20b	0.18	0.32	0.42	0.01
SS loadings	3.4	2.63	2.46	2.17
Proportion Var	0.18	0.14	0.13	0.11
Cumulative Var	0.18	0.32	0.45	0.56

Test of the hypothesis that 4 factors are sufficient.

The chi square statistic is 112.41 on 101 degrees of freedom.

The p-value is 0.206

Appendix D Cronbach's alpha

Cronbach's alpha is a measure of consistency of the items included in each group. A higher score can be interpreted as greater consistency (i.e. the items are all measuring the same thing). The highest alpha was found for "PES outcomes" ($\alpha=0.88$) and the lowest is for "Fair distribution of benefits" ($\alpha=0.67$). As a rule of thumb any alpha greater than 0.7 is considered good. However, we consider that given the few items included in our groupings, an alpha of 0.67 is acceptable for our purposes (as having few items in a group can artificially lower the score and the rule of thumb is generally applied to larger groups) (Ryff and Keyes, 1995).

Ryff, C. D., Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, 69, 4, 719-727.

D.1 Recognition of vulnerable groups

Reliability analysis

Call: alpha(x = DB_PES)

```
raw_alpha std.alpha G6(smc) average_r S/N ase mean sd median_r
0.79 0.8 0.79 0.44 3.9 0.046 4.2 1.5 0.36
```

```
lower alpha upper 95% confidence boundaries
0.69 0.79 0.88
```

Reliability if an item is dropped:

```
raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
X2 0.71 0.72 0.68 0.39 2.6 0.064 0.013 0.36
X3 0.69 0.70 0.67 0.37 2.3 0.068 0.018 0.33
X4 0.79 0.80 0.79 0.51 4.1 0.049 0.036 0.51
X5 0.80 0.80 0.79 0.51 4.1 0.045 0.036 0.50
X11 0.73 0.74 0.73 0.42 2.9 0.060 0.029 0.36
```

Item statistics

```
n raw.r std.r r.cor r.drop mean sd
X2 56 0.80 0.82 0.81 0.68 4.4 1.8
X3 53 0.84 0.85 0.85 0.73 4.6 1.9
X4 56 0.63 0.63 0.47 0.43 4.4 2.0
X5 55 0.68 0.63 0.47 0.42 3.7 2.4
X11 51 0.76 0.77 0.70 0.60 3.9 2.2
```

D.2 Fair procedures in decision-making

Reliability analysis

Call: alpha(x = DB_PES)

```
raw_alpha std.alpha G6(smc) average_r S/N ase mean sd median_r
0.81 0.82 0.8 0.47 4.5 0.039 4.9 1.3 0.48
```

lower alpha upper 95% confidence boundaries

```
0.74 0.81 0.89
```

Reliability if an item is dropped:

```
raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
X7 0.79 0.79 0.74 0.48 3.7 0.046 0.0057 0.47
X9 0.76 0.76 0.73 0.45 3.2 0.052 0.0136 0.46
X10 0.75 0.76 0.71 0.44 3.1 0.055 0.0101 0.46
X12 0.78 0.78 0.75 0.47 3.5 0.048 0.0154 0.46
X15 0.82 0.82 0.78 0.53 4.5 0.039 0.0029 0.52
```

Item statistics

```
n raw.r std.r r.cor r.drop mean sd
X7 56 0.77 0.75 0.67 0.59 4.4 2.0
X9 56 0.81 0.80 0.74 0.67 5.3 1.8
X10 54 0.83 0.82 0.77 0.70 5.0 1.8
X12 56 0.74 0.77 0.68 0.62 4.8 1.4
X15 56 0.65 0.67 0.53 0.47 5.3 1.6
```


D.3 Fair distribution of benefits

Reliability analysis

Call: alpha(x = DB_PES)

```
raw_alpha std.alpha G6(smc) average_r S/N ase mean sd median_r
0.67 0.68 0.71 0.3 2.1 0.065 4.2 1.2 0.32
```

```
lower alpha upper 95% confidence boundaries
0.54 0.67 0.79
```

Reliability if an item is dropped:

```
raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
X13 0.44 0.53 0.50 0.22 1.1 0.122 0.035 0.19
X14 0.68 0.71 0.66 0.37 2.4 0.063 0.009 0.37
X18 0.60 0.61 0.63 0.28 1.6 0.076 0.046 0.31
X20a 0.62 0.61 0.64 0.28 1.6 0.071 0.049 0.28
X20b 0.66 0.66 0.68 0.33 2.0 0.070 0.040 0.37
```

Item statistics

```
n raw.r std.r r.cor r.drop mean sd
X13 56 0.87 0.81 0.80 0.71 3.7 2.19
X14 54 0.67 0.52 0.39 0.32 4.1 2.18
X18 55 0.65 0.69 0.58 0.45 5.0 1.66
X20a 54 0.61 0.69 0.57 0.40 4.1 1.52
X20b 52 0.47 0.60 0.45 0.32 4.3 0.86
```

D.4 PES outcomes

Reliability analysis

Call: alpha(x = DB_PES)

```
raw_alpha std.alpha G6(smc) average_r S/N ase mean sd median_r
0.88 0.88 0.88 0.65 7.3 0.027 5 1.2 0.65
```

lower alpha upper 95% confidence boundaries

```
0.82 0.88 0.93
```

Reliability if an item is dropped:

```
raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
X19 0.84 0.85 0.81 0.65 5.6 0.038 0.0118 0.7
X21a 0.86 0.86 0.82 0.68 6.3 0.031 0.0069 0.7
X22a 0.83 0.83 0.79 0.63 5.0 0.038 0.0127 0.6
X22b 0.84 0.84 0.79 0.64 5.3 0.038 0.0055 0.6
```

Item statistics

```
n raw.r std.r r.cor r.drop mean sd
X19 52 0.87 0.86 0.80 0.75 4.9 1.5
X21a 54 0.83 0.83 0.76 0.69 5.1 1.3
X22a 56 0.87 0.88 0.83 0.77 5.1 1.3
X22b 50 0.87 0.87 0.82 0.76 4.7 1.6
```

Appendix E Latent Class Model Specification

We extend the classical latent class (LC) model (Hensher et al., 2015) in order to be able to compare the changes between rounds of two classes of participants. Our two-round latent class (2RLC) model estimates the differential effects between the stated preferences of participants before and after deliberating.

In random utility models (RUM), an individual n must choose an alternative j on t choice occasions. This choice is assumed to grant individual n a certain level of utility $U_{njt} = V_{njt} + \varepsilon_{njt}$, where V_{njt} is the representative (or observed) utility, and ε_{njt} is the unobserved error term that fulfils the classical assumptions. The term V_{njt} is assumed to be linear in parameters, $V_{njt} = x'_{njt} \delta$, where x_{njt} is a vector of variables (usually specific levels of the attributes) associated to alternative j , and δ is a vector of unknown coefficients.

LC models assume that individuals are implicitly sorted into a set of Q classes ($q = 1, 2, \dots, Q$). It is unknown to which class q individual n belongs. In our model the representative utility $V_{njtq} = x'_{njt} \delta_q$ corresponding to the n^{th} individual, j^{th} alternative, t^{th} choice occasion, and q^{th} class is

$$\begin{aligned}
 V_{njtq} = & ASC_{jq} + (\beta_{IMPLEMq} + \gamma_{IMPLEMq} ROUND2_{njt}) IMPLEM_{njt} + \\
 & (\beta_{PARTICIPq} + \gamma_{PARTICIPq} ROUND2_{njt}) PARTICIP_{njt} + \\
 & (\beta_{DPERCAPq} + \gamma_{DPERCAPq} ROUND2_{njt}) DPERCAP_{njt} + \\
 & (\beta_{DPEREFFq} + \gamma_{DPEREFFq} ROUND2_{njt}) DPEREFF_{njt} + \\
 & (\beta_{INCOMEq} + \gamma_{INCOMEq} ROUND2_{njt}) INCOME_{njt}
 \end{aligned}$$

for $n = 1, 2, \dots, N$, $j = 1, 2, 3$, $q = 1, 2, \dots, Q$ and $t = 1, 2, \dots, T$ choice occasions. As usual, the constant for the opt-out alternative ASC_{3q} is set to zero for identification purposes. Choices 1 to 8 represent the choices made in the first round of the deliberative choice experiment and 9 to 16 belong to the second. Therefore $ROUND2_{nit} = 1$ if $t \geq 9$, and 0 if $t < 9$. Setting $ROUND2_{nit} = 0$ across for all observations would yield a traditional (one-round) latent class model.

Given the standard assumptions of a RUM, the probability that individual n chooses alternative i_{nt} in choice occasion t is

$$P_{ni_{nt}t}(i_{nt}|q) = \frac{\exp(x'_{ni_{nt}t} \delta_q)}{\sum_{j=1}^J \exp(x'_{njt} \delta_q)}.$$

Thus, the probability that individual n chooses a given sequence of alternatives $\{i_{n1}, i_{n2}, \dots, i_{nT}\}$ is

$$P_n(i_{nt}|q) = \prod_{t=1}^T P_{ni_{nt}t}(i_{nt}|q) = \prod_{t=1}^T \left(\frac{\exp(x'_{ni_{nt}t} \delta_q)}{\sum_{j=1}^J \exp(x'_{njt} \delta_q)} \right).$$

Despite the fact that the class to which individuals belong is unknown, the probability that an individual n belongs to class q can be estimated using the class allocation function

$$\psi_{nq} = \frac{\exp(z'_n \theta_q)}{\sum_{q=1}^Q \exp(z'_n \theta_q)},$$

where z_n represents a set of observable demographic characteristics for individual n . The vector θ_q must be normalized to zero for one class to secure identification of the model. The likelihood for individual n is the expectation of the class-specific contributions for each class

$$P_n = \sum_{q=1}^Q \psi_{nq} \cdot P_n(i_{nt}|q) = \sum_{q=1}^Q \psi_{nq} \cdot \prod_{t=1}^T P_{ni_{nt}t}(i_{nt}|q).$$

Thus, the log likelihood (LL) for the sample is

$$LL(\beta) = \ln \left(\prod_{n=1}^N P_n \right) = \sum_{n=1}^N \ln \left[\sum_{q=1}^Q \psi_{nq} \cdot \prod_{t=1}^T P_{ni_{nt}t}(i_{nt}|q) \right].$$

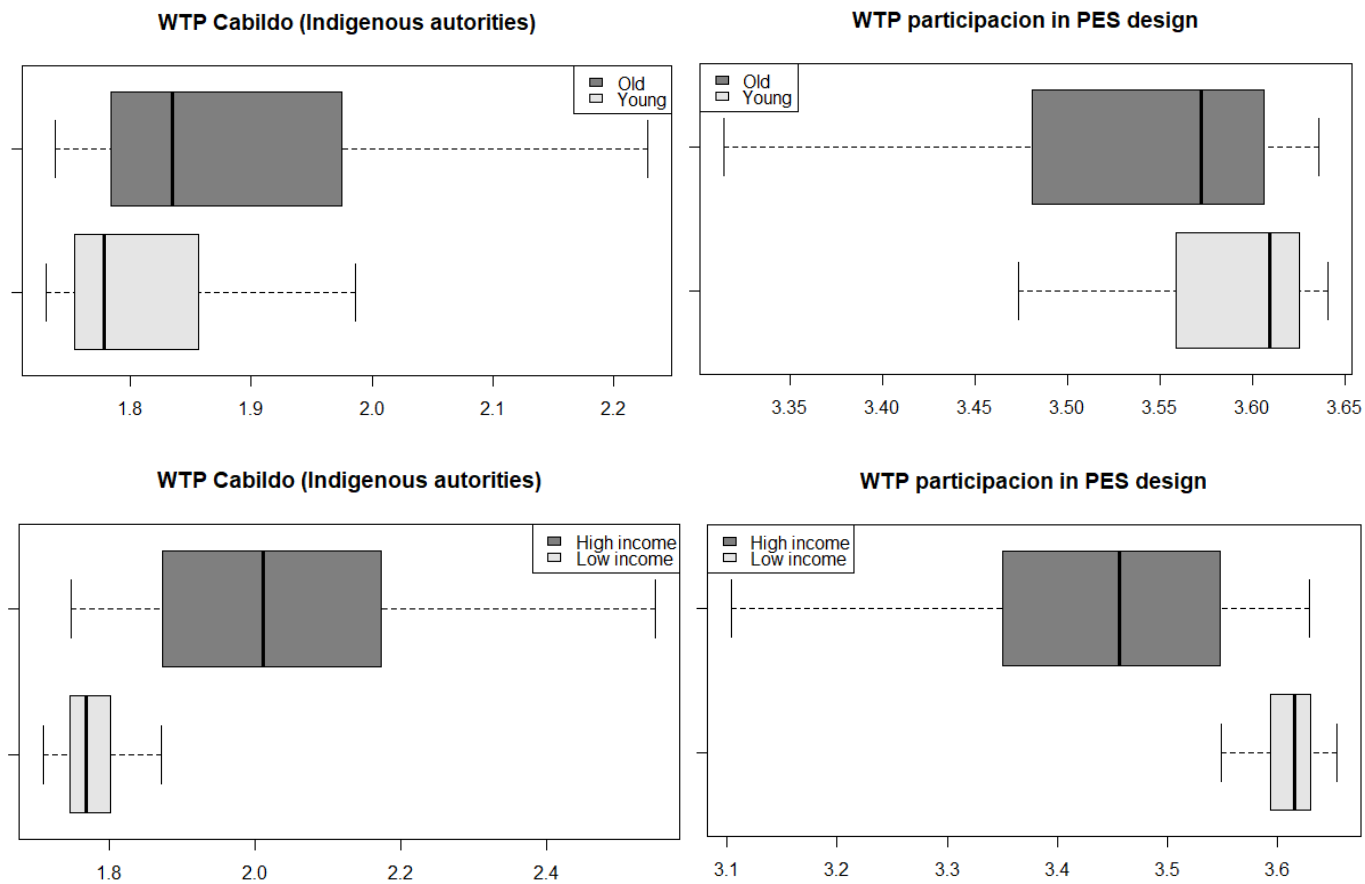
Maximizing the LL function leads to the maximum-likelihood estimation of the Q vectors δ_q which contain the coefficients of the utility functions and $Q - 1$ vectors θ_q of the class allocation function.

Appendix F Focus group guide for moderators

1. What did you think of the exercise? Easy? Hard? Was there anything you did not understand?
2. General PES questions
 - a. Who had heard about PES before today?
 - b. What is your opinion about PES?
 - i. General thoughts about PES
 - ii. What are some actions that could be done to improve the local environment?
 - c. Did someone pick the “No PES” option on any of the cards? Why?
 - d. Which of the four characteristics on the cards were the most important to you? Why?
3. PES IMPLEMENTER
 - a. What impact would this have on the PES?
 - b. What do you think about the Cabildo and Corponariño?
4. DEGREE OF PARTICIPATION IN PES DESIGN
 - a. What impact would this have?
 - b. Who has taken part of a participative process in the past?
 - c. Was it useful?
 - d. How would you like for the processes to be?
 - e. What would you hope they would accomplish with regards to a PES?
5. DISTRIBUTIVE RULE.
 - a. Which is the most/least fair? Why?
 - b. Which rule would cause the least problems?
 - c. Is there a better way to distribute the compensation?
6. MONTHLY PROFIT
 - a. Should people receive something in exchange for taking care of nature?
 - b. Were the amounts offered on the cards fair?
 - c. Where should the money come from / who should finance the PES?
 - d. Would you participate in a PES that only covered opportunity costs and nothing else (\$0)?
 - e. If you lost some money by participating, would it still be worth it if it improved the environment?
 - f. What if after some time a PES runs out of money? Would you stop the sustainable practices?
7. What would be the most important thing to include/ensure in a PES (even if we haven't mentioned it yet)?
8. What was the most important thing that was said today?
9. Ask the other moderator to summarize the focus group and ask any questions they may have to the group

Appendix G Willingness To Pay (WTP) estimates for the LC model

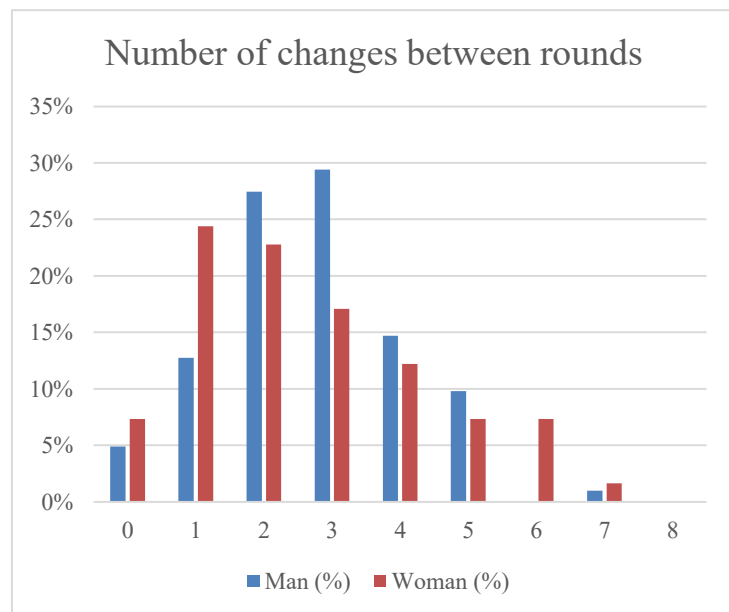
This appendix shows that the willingness to pay (WTP) for a PES that is implemented by the elected council of local leaders for older and wealthier participants is higher than for younger and less wealthy ones. By contrast, the younger and lower income participants have higher WTP estimates than do older and wealthier ones for a PES that allows a greater degree of community participation and input in its design.



Willingness to pay (in 10,000 COP) for a PES led by the *Cabildo* (top) and the degree of community participation in PES design (bottom). The groups shown are segmented according to the significant parameters of the class allocation functions and include the upper and lower quartile of participants for age and income, respectively.

Appendix H Number of changes according to gender

# Changes	Man (%)	Woman (%)
0	4.9%	7.3%
1	12.7%	24.4%
2	27.5%	22.8%
3	29.4%	17.1%
4	14.7%	12.2%
5	9.8%	7.3%
6	0.0%	7.3%
7	1.0%	1.6%
8	0.0%	0.0%
Total	100%	100%



Men change 2.69 choices on average

Women change 2.62 choices on average

Appendix I Random Parameter Logit (RPL) Model specification

The choice experiment framework is based on McFadden's (1974) Random Utility Theory. This assumes that the utility U for individual n from choosing alternative j in choice situation t is:

$$U_{njt} = V_{njt} + \varepsilon_{njt} = \beta' x_{njt} + \varepsilon_{njt}, \quad (1)$$

where V is the observable utility (also called representative utility), ε is the unobserved error term, β is a vector of unknown parameters, and x is a vector of K attribute levels. The multinomial logit model (MNL)—the most restrictive discrete choice model—describes the probability that the individual n chooses alternative i in choice card t as:

$$P_{nit} = \frac{\exp(x'_{nit} \beta)}{\sum_{j=1}^J \exp(x'_{njt} \beta)}. \quad (2)$$

However, random parameter logit (RPL) models are increasingly being used due to their flexibility. Mariel and Meyerhoff (2018) describe how, although being more computationally demanding, RPL models lead to better model fit and show higher precision of coefficients for dummy-coded attributes. The defining characteristic of RPL models is that the parameters β are assumed to be randomly distributed, thus accounting for preference heterogeneity among individuals. For an RPL model the utility U for individual n from choosing alternative j in choice situation t is:

$$U_{njt} = x'_{njt} \beta_n + \varepsilon_{njt}, \quad (3)$$

where ε_{njt} is independent and identically distributed (IID) over individuals, alternatives and choices. Coefficients β_n are distributed with density $f(\beta|\Omega)$ and can be rewritten as:

$$\beta_n = \beta + \Delta z_n + \Gamma v_n, \quad (4)$$

where β represents the fixed means of the random parameter distribution, z_n is the vector of observed respondent-specific characteristics that affect the mean of the random parameter distribution and Δ is the associated parameter matrix. The last term Γv_i is the unobserved heterogeneity, with an unknown lower triangular matrix of parameters Γ that must be estimated and random unobserved taste variation v_i . As is common in case studies with a limited number of observations, we assume uncorrelated random parameters such that:

$$\Gamma = \text{diag}(\gamma_{11}, \gamma_{22}, \dots, \gamma_{KK}). \quad (5)$$

The expected probabilities for RPL models are:

$$P_{ijt} = \int L_{ijt}(\beta) f(\beta|\Omega) d\beta, \quad (6)$$

where $f(\beta|\Omega)$ is the multivariate probability density function and $L_{ijt}(\beta)$ is the standard logit probability evaluated at β . According to formula (2), conditional on β_n , the probability that the individual n makes a sequence of choices $\{i_{n1}, i_{n2}, \dots, i_{nT}\}$ is:

$$L_{ni}(\beta) = \prod_{t=1}^T \left(\frac{\exp(x'_{ni_{nt}} \beta_n)}{\sum_{j=1}^J \exp(x'_{njt} \beta_n)} \right), \quad (7)$$

assuming that ε_{njt} are independent over time. The unconditional probability of the sequence of choices $\{i_{n1}, i_{n2}, \dots, i_{nT}\}$ is the mixed logit probability formula:

$$P_{ni} = \int L_{ni}(\beta) f(\beta) d\beta. \quad (8)$$

The log-likelihood function of the RPL is defined as:

$$LL(\Omega) = \sum_{n=1}^N \ln \left(\int \left(\prod_{t=1}^T \left(\frac{\exp(x'_{ni_{nt}} \beta_n)}{\sum_{j=1}^J \exp(x'_{njt} \beta_n)} \right) \right) f(\beta|\Omega) d\beta \right). \quad (9)$$

The maximum simulated likelihood estimator (MSLE) is the value of Ω that maximizes $SLL(\Omega)$.

Appendix J Themes and debates surfacing during the focus groups with quotes

This appendix describes the themes and debates surfacing during the focus groups with a selection of illustrative quotes for each:

Theme	Description	#	Illustrative quotes from focus groups
In favor of the Cabildo	They are the legitimate authority that represents the community's sovereignty and thus have more sway with locals. They are the holders of indigenous and local ecological knowledge. They are a "father" to the community. They are respected both inside and outside the community.	17	<i>"Since we are in an indigenous community the implementer should be the Cabildo. We've always worked with the Cabildo here. [...] Corponariño doesn't have a lot of knowledge about the local environment. That's why we need the Cabildo. They have more knowledge. For example, if we brought a technician from Corponariño he wouldn't know about our trees. He wouldn't know them."</i>
Against the Cabildo	They only look out for themselves and are involved in politicking. There have been instances of elite capture in the past. They have failed to protect the environment so far. They buy back plots of land under the pretext of conservation and then sell it to their supporters. A new Cabildo is elected yearly making it very hard for project continuity.	15	<i>"With the Cabildo it can't be done. For example, in this village there used to be some plots of land that were a protected natural reserve because they contained a spring. But then a new Cabildo was elected and they parceled it out. The Cabildo doesn't pay the least attention to environmental management."</i>
In favor of Corponariño	Much more interested in the environment than the Cabildo. Better track record as they have carried out environmental projects in the past. More technical expertise and resources. More capable of offering PES continuity.	12	<i>"I would prefer with Corponariño, because they are an entity that was created exactly for this purpose: for the country side, for the environment. They are the ones that protect it. That care for it. They implement the laws about water and natural resources. So they are the most knowledgeable."</i>
Against Corponariño	Lack of trust in them. They are only interested in taking control over the water of Muellamues and charging residents for it. Letting them run the PES would be selling off the territory. They don't possess local ecological knowledge and would thus be incapable of offering appropriate environmental solutions.	12	<i>"Corponariño is only interested in charging water fees. That's what they're interested in. Not in caring for the sources of water. On the other hand the Cabildo is interested our community because they see our needs up close."</i>
Collaboration	The Cabildo and Corponariño should collaborate to implement the PES together.	5	<i>"The Cabildo and Corponariño should knock on doors together. 'Come on let's go do this!' We shouldn't exclude anyone. The more entities are involved the better."</i>
Importance of community participation in PES design	Important because: It is not legitimate when the few decide for the many. The more people participate the more knowledge is shared and the better the outcome. Important to listen to all views and arrive at a consensus. Everyone relies on nature so everyone should be part of the solution. Participation reduces corruption and politicking. Participatory decision-making is the indigenous way.	16	<i>"Of course it's important when the community participates. That's how you convince people to make decisions and reach agreements. To take care of the needs of each of the villages. Even if there is a lot of work to do, the important thing is the people, which are the holders of knowledge."</i>
Distribution rules	In favor of per effort: Fairest rule. Hard work should be recognized. Would prevent free-riding.	22	<i>"I prefer to distribute per effort. Because otherwise we get spoiled, like children. We get used to receiving and receiving. But there comes a moment where we must also give back. We receive something but must give something in exchange. [...] Because sometimes the ones who work are not the ones that receive."</i>
Distribution rules	In favor of equal per capita: So there is no inequality. To reduce envy. To make everyone aware of the benefits of conservation. Because it reflects how traditional 'mingas' work.	10	<i>"I prefer to distribute per effort. Because otherwise we get spoiled, like children. We get used to receiving and receiving. But there comes a moment where we must also give back. We receive something but must give something in exchange. [...] Because sometimes the ones who work are not the ones that receive."</i>
Distribution rules	Against per unit of land: Not fair to offer more payments to the biggest land owners. Could cause problems (e.g. limits between neighbors are not always clear).	9	<i>"I prefer to distribute per effort. Because otherwise we get spoiled, like children. We get used to receiving and receiving. But there comes a moment where we must also give back. We receive something but must give something in exchange. [...] Because sometimes the ones who work are not the ones that receive."</i>

In favor of paying to conserve nature	People are poor and live from the land, so payment is necessary so they can keep making a living. Conservation is hard work that should be recognized. Payment will motivate many more people to conserve. Money is a necessary evil.	17	<i>"It would be like telling people 'you are going to care for the environment and we're going to pay you.' Even though we all know that this is the responsibility of all the beings that inhabit the environment. And people think, 'from now on I'm going to make a business of this.' And I'm not okay with that. [...] The future of our environment should not depend on money. We used to go out and plant trees in 'minga' and nobody would pay us. Because it was our duty. But with PES people will now think, 'wonderful, I'm going to get paid!' [...] In reality it should be the opposite. It should be obligatory. The environment is life."</i>
Against paying to conserve nature	Caring for the environment is a moral duty. Environmental benefits from conservation should be reason enough. Taking care of the environment should not be seen as a cost but rather as an investment. Money has made people lose their moral compass. Paying risks eroding traditional practices like the 'minga'. Paying for conservation will mean people do it for the wrong reason. Conservation should not become a business.	18	<i>"I think the community itself should be in charge of it. Here we shouldn't be talking about forest rangers, who get paid to care for the forest. We are talking about communities, about organizations responsible for caring. Maybe we could talk about 'incentives', but not about 'payments'. As indigenous people this is our duty. We must take care, protect and watch over our resources without needing payment."</i>
Linking PES with indigenous terminology and concepts	Participants would often use indigenous terminology and concepts to discuss PES, such as: 'territory', 'mingas', 'mother earth', 'mother nature', 'indigenous authority', 'indigenous identity', 'chagras' (indigenous medicinal gardens), 'duty', talking about 'help' or 'support' rather than 'payments'.	19	<i>"If we receive some help all the better. Because it would only be an additional incentive. It would be recognition for the years that we've been protecting nature, for what we will leave to our children. Because we are only passengers on this planet."</i>
Bequest value of nature	The environment must be protected for the children and for future generations to come.	11	
