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From theory to practice: what should we have in mind when building effective and sustainable Payments for Ecosystem Services (PES) schemes for Silvo-pastoral Systems? Evidence from Colombia

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Abstract

In most Latin American countries, payment for ecosystem services (PES) can be a useful strategy for restoration and conservation of the environment, increasing productivity and promoting sustainable development in rural areas. Despite these plausible benefits, PES implementation can be challenging due to the contextual framework in which it takes place (e.g. institutional weakness in the implementation and monitoring stages, limited connectivity among stakeholders, low adoption levels of agricultural technology). This study aims at evaluating PES schemes for silvo-pastoral systems in Colombia by considering six dimensions based on an extensive literature review: policy and governance; social context; environmental context; risks and challenges; dynamics; and monitoring and evaluation approaches. A literature meta-analysis and semi-structured interviews with decision makers were carried out. The results suggest that: 1) It is necessary to restructure PES schemes given their limited scope in developing countries; 2) A new approach towards successful PES schemes should be adopted, transitioning from temporary conservation-oriented PES to schemes focused on the articulation of value chains and thus, transmitting costs to the final consumers; 3) Although policies regarding PES have been increasing, governance systems and responsibility assignments remain unclear; and 4) PES are more likely to be efficient when accompanied by complementary strategies (e.g. technical assistance, mechanisms for market inclusion) and conservation strategies that last in time. This study revealed the difficulties in monitoring territories as well as the underlying dynamics of implementing PES schemes in farms with nettle aptitude to receive them (despite the willingness of the producers). It also highlights the importance of analyzing the cultural and economic dimensions of the producers to assess the assigned importance of nature conservation. This work enriches the debate and informs the dialogue among PES experiences in order to guide public and private strategies in developing countries.

Introduction

Payment for Ecosystem Services (PES) schemes have proven effective in counteracting deforestation and other factors that threaten the environment. In developing countries, PES schemes contribute to sustainability from multiple perspectives: they promote environmental integrity, enhance economic resilience, support food security, embody the principles of equity and justice, and, generally, are instruments that support a sustainable development model (FAO 2011). However, policy and decision makers, when planning PES schemes, embark on a journey that requires thoughtful steps. According to Pappagallo (2018), the establishment of successful PES schemes must be based on an analysis of several dimensions, encompassing contexts that are political and economic (e.g. governance, policies, land regimes), social (e.g. gender roles and youth) and environmental (e.g. types of ecosystem services that can be offered). As well, economic factors must be considered, such as an analysis of risks and challenges (e.g. financial sustainability), complementary solutions, and the identification of buyers, sellers, intermediaries and institutions with influence on the dynamics of a PES. These dimensions are understood as the starting point for PES schemes but do not necessarily represent a straightforward path to the end of the journey. What is sought over time is that the analyzed dimensions guarantee the achievement of three pillars, namely (i) greater benefits perceived by a PES scheme compared to other options, (ii) sustainability over time, and (iii) effectiveness in terms of meeting environmental objectives (Jack et al. 2008).

Thus, for an incentive to be successful in its purpose, during the design phase, reality must be observed with a dynamic lens that addresses different dimensions of analysis at different scales and at different moments in time, and thus, provides a framework for the control of those variables that could affect the process in different manifestations and magnitudes. The present study intends to overlap theory with practice, by establishing reflections and recommendations for the successful design of incentives focused on silvo-pastoral systems (SS) for the Colombian cattle sector and considering the particular contexts, situations and dynamics of the country's rurality. For the cattle sector, a particularly challenging panorama is observed: despite numerous important benefits perceived for sustainable production systems (SS), adoption continues to be low. Assessing the abovementioned dimensions contributes to closing this gap.

Methods and Study Site

A literature meta-analysis was carried out considering (i) the definitions and theoretical approaches on PES, (ii) experiences made with PES schemes for conservation, (bio)diversity, landscapes, carbon sequestration, and productive organizations in developing countries, and (iii) experiences made with specific PES schemes for SS in Colombia and other, similar initiatives for the transformation of the cattle sector. To complete this documentation, qualitative in-depth interviews were conducted with key actors from institutions that have participated in planning and execution of PES projects in Colombia and who provided information on the dynamics observed, as well as the identification of the risks and opportunities of PES schemes.

Results

Background. Although a large number of PES initiatives have been observed for Colombia, SS-related incentives have been limited to projects funded by international organizations (e.g., The World Bank and The Nature Conservancy) (Flores et al., 2018), and executed by NGOs (e.g. Center for Research in Sustainable Agricultural Production Systems, CIPAV) and the Colombian Cattle Producer Federation (Fedegán). In 2003, the planning and execution of PES projects for SS began under the Regional Integrated Silvo-pastoral Ecosystem Management (Enfoques Silvopastoriles Integrados para el Manejo de Ecosistemas (ESIME), 2003-2007) and Colombia Mainstreaming Sustainable Cattle Ranching (Ganadería Colombiana Sostenible (GCS), 2010-2019) projects. The latter benefited more than 4,000 livestock families in 87 municipalities of the country. However, the PES schemes have not been the only element that stands out from these projects but they accompany other initiatives, ranging from farm/pasture management trainings to establishing forage demo plots or protein banks.

Economic and political context. Legal frameworks play an important role in the development of PES schemes as they provide instruments for ensuring an adequate governance system (Bracer et al., 2007). An enabling legal environment can stimulate a more efficient use of financial resources and support the integration of different activities related to PES. Analyzing the governance schemes in the intervention territories is also important, since natural resource management is framed within the context of environmental services. Since 1979, payments for conservation have been facilitated, but it was only in the early 21st century that the concept of PES has acquired more robustness with specific laws and decrees. The legislation has been mainly oriented towards the conservation of water resources, leaving aside any other type of schemes (e.g., payments for the delimitation of the agricultural frontier), and thus, it is convenient that PES schemes with an emphasis on SS are associated with the conservation of water resources. Since 2017, the legislation has clarified the guidelines for the selection of properties and the way to perform the calculation to grant incentives, and although these rules only apply to public entities, they are of an indicative nature also for private initiatives.

Land tenure prefigures as a great limitation in PES projects. The unequal distribution of land, the violent and illegal appropriation of the same and the armed conflict in Colombia have hindered smooth project development. As a way to mitigate such effects, the beforementioned SS projects have designed mechanisms to include not only owners but also producers who have verbal lease contracts, properties with more than one owner, or even figures as holders of good faith and holders possessing property usufruct throughout life – however, in all cases based on the peaceful possession of the property for at least 10 years. Governance systems, on the other hand, are not clearly perceived: poor institutional articulation raises the costs of PES schemes since prior investments must be made to generate appropriate conditions for project implementation. These conditions are the missionary responsibility of other entities and sectors (DNP, 2016). The responsibility for the implementation of PES schemes falls on the territorial entities, which lack the capacities to implement such instruments. However, some favorable institutional conditions were also found that facilitate the implementation of PES schemes, such as decentralized environmental management with administrative and financial autonomy, the legal existence of national incentives and the legal inclusion of sector payments.

Social context. In general, the success of a particular PES is determined by the context in which it arises. Opportunities must be developed, nurtured and carefully controlled to ensure that those most in need reap the benefits. But despite the need to improve the income of the target population, it is unlikely that PES participants will be involved solely for economic reasons (Page and Bellotti, 2015). In fact, participation in PES is considered rarely profitable compared to alternative land uses (FAO, 2011; Jindall and Kerr, 2007), which makes it important to study the social context, too. The search for equality and equity can be fundamental for the participation and commitment of stakeholders. For this, it is necessary to know what incentives and cultural values characterize stakeholder decisions. Assessing the social context should allow the development of a set of tools that support the motivation and capacities of the producers who implement conservation technologies and practices. In other words, the types of social relations and their levels of intensity among stakeholders must be identified, as well as the social dynamics in the intervention territories. It is important to consider both structural matters (to identify strategies that mitigate constraints or take advantage of opportunities) and particular issues (to create measures that allow the context to be brought to a more desirable stage).

In Colombia, cattle farming is carried out under numerous productive systems and by different population groups (including indigenous and afro-descendant ethnic minorities). Recent studies identify a local trend that can be extrapolated to other Latin American countries. The cattle sector is in crisis due to a fragile generational transfer that occurred as a result of many factors, such as the systematic impoverishment of rural populations, waves of migration to the city and, in the Colombian case, an exodus from communities at risk due to the presence of illegal armed actors in their territories (Palacios, 1996; Vázquez, 2015). For this reason, the selection of territories for the Colombian PES projects considered these situations and regions where cattle farming predominated with less influence of such situations were chosen. In addition, facilities were established for the application of incentives (e.g. for land tenure). At a particular level, the GCS project considered the initial conditions and adjusted to the level of knowledge, socioeconomic conditions and cultural practices of the producers when establishing three types of PES schemes: (i) biodiversity, (ii) carbon sequestration and (iii) care of water resources. In this way, (i) payments were defined for an initial period to start the project, (ii) for intermediate interventions (e.g. in seeds or soil analysis), and (iii) ex-post payments for carbon sequestration (use of converted land).

Environmental conditions. According to Casasola et al. (2009), PES are successful when applied in clearly defined contexts, while an expansion to areas with different environmental characteristics function less efficiently. Hence, useful criteria for choosing a territory include biodiversity levels, proximity to strategic ecosystems or protected areas, potential for connectivity, livestock potential, security and public order, and opportunities to establish water-related PES. At the same time, a properly delimited area can easily decant suitable forage varieties, as well as identify potential threats that may affect those territories. In fact, at the population level, the very existence of a PES project in a certain area can reinforce or erode pre-existing intrinsic motivations towards conservation or the provision of environmental services (crowding or expulsion effects) (Börner et al., 2017). It is important to bear in mind that the more ecosystems there are in a landscape, the more services can be provided, and therefore, the implementation of a project in favor of an ecosystem service should not go against another. For example, poorly designed carbon sequestration projects could have a negative impact on both the basin and biodiversity if they lead to establishing large-scale monocultures (Waage et al., 2008). The GCS project was conducted in 5 regions of the country, characterized by high levels of biodiversity and they were close to strategic ecosystems (Uribe et al., 2011). In fact, about 14% of the area of the selected project farms were already conservation areas for forests, paramos and natural wetlands (TNC, 2020).

Risks and Challenges. One of the most common risks that affect the effectiveness of PES schemes is the existence of short-term incentives for unsustainable practices. These reduce the natural capital and limit options for the future (Waage et al., 2008). A lack in the coordination of governance systems can compromise the cost-efficiency of a PES scheme since this increases transaction and implementation costs. Similarly, neglecting issues of distributive equity (e.g. due to a focus on economic or environmental efficiency in project design) can undermine the legitimacy of a PES scheme as a whole, including its ecological results (Duong and de Groot, 2008; Pascual et al., 2014). The result can even be negative if the excluded actors take actions against the beneficiaries (To et al., 2012). Likewise, information asymmetry between actors can cause an unfair distribution of net income, and thus discourage service providers, since in many cases PES seek to link agricultural activities with markets. Inquiring about their structure becomes a useful resource to avoid such asymmetries. The identification of risks is also useful for the identification of opportunities. For example, the GCS project identified high input costs (e.g. of seeds) as

a structural barrier, and, based on that, one of the payment schemes for the carbon sequestration program was for providing seeds, fences, and poles, creating opportunities for the beneficiaries (TNC, 2020).

Dynamics between context and implementation

As environmental, socioeconomic and political contexts change, the signals created by incentive-based mechanisms also change (Jack et al., 2007). Possible future changes must be considered when designing PES schemes, since they can alter policy performance and influence financial sustainability, cost-efficiency and equity. For this reason, PES scheme design must consider a set of adjustments and responses to new scenarios. The Colombian experience with ex-ante payments exemplifies this situation. In the starting phase of the *GCS* project, a baseline payment was established to cover start-up costs. This payment was, in effect, a minor incentive compared to the benefits granted by national development credits and the start-up costs were higher than the initial payment. Despite strong campaigns to acquire credit, producers' risk aversion prevented them from taking better advantage of these incentives. As a consequence, in the second project phase, the first payment was adjusted towards assisting producers in activities such as preparing the land, providing adequate seeds, and installing live fences. By this, a higher success rate was ensured and this scheme was more effective than its predecessor, since the in-kind incentives eliminated the possibility of selecting inappropriate inputs. The adjustments also allowed for other, unexpected benefits such as increased interest from producers and rapid adaptation to the new technologies.

Monitoring and evaluation (M&E)

This phase of the project indicates if the agreement is achieving the proposed objectives. In addition, it provides information to promoters on how to improve the provision of ecosystem services (Waage et al., 2008). A correct M&E phase also allows for the development of the cattle sector as a whole. By establishing correct monitoring phases for sustainability and extending M&E to the different value chain links, it is possible to stimulate consumers in the purchase of differentiated products, and by this, financial sustainability can be assured over time and other producers/value chain actors can be encouraged to adopt sustainable practices. An adequate scheme must include different monitoring angles, such as changes in land use, biodiversity, production, sustainability indicators, or socioeconomic conditions of the population, so that at the end of the project, sufficient information can be collected for conducting an impact evaluation. For this to be successful, it is necessary to accompany and train technicians and extension workers in charge of collecting information and, prior to that, establish adequate field staff selection processes (TNC, 2020). According to Blanco et al. (2008), the PES implemented in Colombia present deficiencies in the M&E phase. For most cases the impact cannot be documented. Nevertheless, experiences made with the SS projects are perceived as positive. Blanco et al. (2008) state that the *ESIME* project, developed for supporting the adoption of SS, was able to document the effect of the incentive from a baseline of farms and to quantify changes in carbon sequestration and biodiversity. The *GCS* project developed a series of indicators for each of the monitoring angles, like e.g. an environmental services index, an analysis of changes at the farm and landscape levels, socio-economic surveys and participatory farm planning. The monitoring effectively evidenced the improvements resulting from the project interventions: (i) significant increase in hectares under SS, (ii) reduction of agricultural land use, (iii) reduction of degraded soils, (iv) increase of scattered trees, and (v) significant increases in milk production in all project regions (TNC, 2020).

Conclusions

PES schemes for SS are useful to change the behavior or practices of producers but should not be understood as stand-alone solution. They should be accompanied by technical assistance, the establishment of demonstration farms, and the provision of inputs for the establishment of SS. Likewise, payments should not only be monetary. The experiences made with PES for SS denote a marked preference of producers for technical assistance over monetary payments, as well as the provision of materials for adjusting their farms, highlighting that the payments made should not only be monetary but also in kind. Integrating e.g. the cultural value of cattle farming, dynamics of generational transfer, family and gender concepts, and changes experienced over time, into project planning, it becomes visible that economic stimuli alone cannot respond to the complexity of social relationships that generate those behaviors to be transformed by a project. The scarce documented information from the Colombian projects shows that there is a certain effect of the incentives on the change of practices of beneficiaries and, consequently, changes in biodiversity are observed as the areas under SS increase. The importance of establishing a good M&E system for the project regions is important, not only to make accurate payments for the converted areas but also for creating more incentives for donors to invest in further projects.

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