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Payments for Pioneers? Revisiting the Role of External Rewards for Sustainable Innovation under Heterogeneous Motivations

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ABSTRACT

Acknowledging the diversity of preferences, goals and motivations of individuals is key to promote the effectiveness of incentive-based conservation interventions. This paper analyses the heterogeneity of motivations to adopt silvopastoral practices, a social-ecological innovation for soil conservation and carbon emission reduction. We use Q methodology to identify smallholders' views with regard to these practices in a community in the forest frontier in Chiapas (Mexico). The analysis uncovers three main perspectives: self-sufficient pioneers, environmentally-conscious followers and payment-dependent conservatives. We discuss these perspectives around three topics: smallholders' predisposition to adopt silvopastoral practices, their views about needing external payments to sustain their livelihood and the diffusion of innovative sustainable practices. We relate these perspectives with livelihood characteristics and with observed adoption levels under a pilot programme to promote silvopasture. Our findings suggest that incentives other than payments may be more appropriate for those more likely to adopt, and that payments could encourage rent-seeking strategies and not necessarily promote permanent behavioural change. We suggest ways for designing more effective and adaptive environmental conservation programmes to foster adoption and continuation of social-ecological innovations.

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1. Introduction

When deciding whether to adopt pro-environmental practices, individuals confront trade-offs with multiple other activities in which to invest their resources and effort. In this process of decision-making, the profit-maximising rationale is intertwined with other motivational drivers of human behaviour (Calle et al., 2009; Noppers et al., 2014). Even an apparently homogeneous microcosm such as a small rural community in the frontier of a tropical forest is composed of individuals whose behaviour is driven by a high diversity of goals and values (Bathfield et al., 2013). People have diverse ways of interpreting the same phenomenon (Bennett, 2016) and, due to heterogeneous motivations, goals and preferences, the response of individuals to the same types of incentives can vary remarkably (Bolderdijk et al., 2012; van der Werff et al., 2013). This motivational diversity can partially explain the unpredictability or ineffectiveness of external interventions[1] for environment and development (Kline and Wichelns, 1998); it can induce highly variable behavioural responses and, plausibly, undesired outcomes of policy instruments.

Among different policy instruments to favour sustainable productive systems, policies based on economic incentives and market transactions are increasingly being promoted. However, the suitability and the superiority of market-based instruments over other types of incentives is heatedly contested, particularly when they are aimed at encouraging innovative activities (Kemp and Pontoglio, 2011) such as silvopasture (an agroforestry system that integrates cattle farming). In the case of Payments for Ecosystem Services (PES), key debates refer to their political legitimacy (Corbera and Adger, 2004), long-term effectiveness and efficiency (Muradian et al., 2013; Sierra and Russman, 2006; Wunder, 2006), potential interactions with social norms (Villamor and van Noordwijk, 2011), effects such as crowding intrinsic motivations for conservation (D'Adda, 2011; Midler et al., 2015; Narloch et al., 2012), and interwoven efficiency and equity impacts (Corbera and Pascual, 2012; Narloch et al., 2011; Pascual et al., 2010, 2014).

Remarkably, the theory underlying PES relies on an implicit major assumption of rationality associated with utility-maximising behaviour; it is assumed that agents predominantly act upon a simple cost-benefit rationale (Ferraro, 2001; Ferraro and Kiss, 2002). Such characterisation

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[1] Here we understand the notion of external programs as those designed and implemented by organisations outside of the recipient community.

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of human beings may be adequate to predict behaviour in contexts involving innovation that is more profitable financially, decisions driven by self-interest, and/or activities predominantly framed in a market economy (Heyman and Ariely, 2004). However, this model falls short when additional motivations or goals have a considerable role as drivers of behaviour (Edwards-Jones, 2007; Steg et al., 2014). Some examples of such additional motivations are giving higher importance to long-term benefits or to livelihood security, or having a strong social interest relative to self-interest (Gsottbauer and van Den Bergh, 2011).

Much effort and care are put into designing targeting approaches of PES to maximise environmental additionality under constrained program budgets (Alpizar et al., 2015; Wünscher and Engel, 2012). We argue that such a targeting effort may fail if the heterogeneity of participants' motivations towards pro-environmental behaviour is not adequately considered. This is especially the case if PES are to be adaptable to each stage of the diffusion process (Rogers, 1962), particularly in order for PES to stimulate what motivates early adopters, or so-called pioneers, innovators or visionaries of pro-environmental behaviour (Baumgart-Getz et al., 2012; Egmond et al., 2006). Yet a balance needs to be kept between the precision and the transaction costs of a policy.

While the importance of heterogeneous motivations has been long recognised in environmental policy (Kline and Wichelns, 1998), few studies use information about heterogeneity of motivations in order to explain behavioural decisions and adoption of sustainable agricultural innovation (with exceptions such as Blazy et al., 2011; Läpple and Kelley, 2013). This paper uncovers the diversity of motivations that influence active pro-environmental behaviour (as opposed to passive conservation) of smallholders that participate in a programme for sustainable land use through the adoption of silvopasture. The study is contextualised within a voluntary project for fodder tree cultivation in a community in the buffer area of a Biosphere Reserve in the state of Chiapas, in tropical Mexico.

In order to analyse the heterogeneity of perspectives regarding adoption of silvopasture, we use Q methodology, a systematic approach to understand subjective perspectives. Beyond the Q analysis, we also contrast these perspectives with observed data about livelihood strategies and with individuals' short-term adoption within the silvopastoral project. The results shed light on the potential for different forms of external rewards to cost-effectively incentivise those farmers that are more likely to adopt and continue silvopastoral practices. Our analysis of the diverse motivations for pro-environmental behaviour provides important insights for designing adaptive environmental conservation policy that promotes the adoption and continuation of social-ecological innovations.

2. Case Study

2.1. Silvopastoral Systems and their Adoption in the Tropics

Extensive overgrazing, including at small scales, is a threat to soil and forest conservation in the frontier of biodiversity-rich tropical forests (Geist and Lambin, 2001). Deforested land in mountainous areas degrades under strong rainfall in the wet season and compacts under grazing (Valdivieso-Pérez et al., 2012). This degradation affects ecosystem functions (including the system's capability to buffer primary forests) and increases the likelihood of severe perturbations such as floods and landslides (Richter, 2000).

Silvopasture is a type of agroforestry that involves fodder tree cultivation in pastureland. This approach has a double benefit: it rehabilitates the landscape and provides feed for cattle also during dry season, when the lack of pasture in some areas is critical. It is considered an adequate compromise between conservation objectives and livelihoods in social-ecological systems characterised by an important livestock component (Broom, 2013; Murgueitio et al., 2011). Its implementation requires preventing cattle from accessing the trees for a period that ranges between half to a few years, until the trees are strong enough to survive animal browsing.

Many decentralised projects to promote silvopasture have recently been implemented in tropical forest margins to rehabilitate landscapes while promoting sustainable livelihoods. A remarkable initiative has been RISEMP, a multi-site programme carried out by regional research institutions in three Latin American countries, funded by the World Bank and reported in various studies (e.g. Garbach et al., 2012; Montagnini and Finney, 2011; Van Hecken and Bastiaensen, 2010). Pagiola et al. (2008, 2007) find that the impact of PES in the adoption of silvopasture is complex, one reason being that the effect of PES in such systems may be different depending on recipients' motivations and interests.

Silvopasture has long been a successful management system in a number of traditional agroecosystems (e.g. Iberian *dehesas*) and it holds much promise for areas in which cattle farming is a more recent phenomena (such as recently colonised tropical forest frontiers). Nevertheless, its diffusion has been slower than envisaged in economic and environmental performance assessments (Cubbage et al., 2012; Gutiérrez et al., 2008), and this lack of adoption has received little attention in the literature.

The literature about factors affecting agroforestry adoption is mostly focused on explicitly measurable farm, household and personal characteristics, amenable to adoption probability analysis (Pattanayak et al., 2003), but not on stakeholders' perspectives. In addition, the literature is scant with regards to silvopasture adoption beyond observable characteristics (with the exception of Calle et al., 2009; Frey et al., 2012; Hayes, 2012). The relationship between cognitive variables and behavioural intention is abundantly addressed in social-psychology theory, yet its empirical application to agroforestry adoption and conservation practices in farming is scarce (Lokhorst et al., 2011; McGinty et al., 2008).

2.2. Encouraging Silvopasture in Chiapas

Chiapas had the largest total loss of forest per year among Mexican states in the 1990s (Céspedes-Flores and Moreno-Sánchez, 2010) and the second largest in the 2000s (Hansen et al., 2013). There is little evidence of a forest transition leading to forest recovery (García-Barrios et al., 2009; Vaca et al., 2012). The reasons for this continuing deforestation are epitomised in the case study explained below.

In the Pacific side of Chiapas, La Sepultura Biosphere Reserve lies on the mountain range that stems from the Andean spine (Fig. 1). In the buffer zone of the reserve (the area within the reserve limits but located outside of the core and the outstanding natural area), lower areas and south-oriented slopes are highly deforested. The landscape surrounding human settlements is highly anthropized and faces an increasing risk of soil erosion (Valdivieso-Pérez et al., 2012) due to unsustainable farming practices. Predominant livelihood activities in the buffer area include the production of the traditional Mexican *milpa* (based on maize and beans), livestock and shade-grown coffee farming, the latter ecologically restricted to only certain areas.

Among the various small communities (*ejidos*) in La Sepultura, Los Ángeles is a representative one with a population of over 800 people (Trujillo-Vázquez, 2009) distributed in approximately 200 households. The land property regime is a hybrid between the traditional *ejido* communal lands and customarily recognised private land. Since the community settled down in the 1960s, the surrounding forest was progressively cleared for maize first, and converted to cattle farming afterwards (Sanfiorenzo-Barnhard et al., 2009; Valdivieso-Pérez et al., 2012). Following the North American Free Trade Agreement, farming activities began to diversify. With the protection of the area in 1995, farming expansion was restricted. Cattle farming became a preferred livelihood option, mostly limited by financial capital and land ownership. Cattle farming is seen as less risky than cash-crop agriculture because the latter is highly dependent on rainfall and on the price of chemical inputs. However, this preference is also heavily influenced by variations in international market prices (García-Barrios et al., 2009).

As in the rest of Mexico, households in La Sepultura currently have access to a diverse range of external payments for different purposes, as well as to incentives from various sources in order to promote new

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