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Pricing biodiversity protection: Payments for environmental services schemes in Lao PDR

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ABSTRACT

A failure of markets to coordinate demand with supply indicates that the transaction costs of an exchange outweigh the benefits that buyers and suppliers expect to gain from trade. As a result, some goods and services are not traded in markets, despite potential demand and prospective supply. This is the case for some environmental services that exhibit the public good and common pool resource characteristic of non-excludability caused by the prohibitive transaction costs associated with defining, defending, and trading property rights over them. Payment for Environmental Services (PES) schemes are being used in an attempt to facilitate the operation of markets. However, few PES schemes involve the 'negotiation' of prices based on comparable estimates of demand and supply. This paper reports on two applications of a PES scheme design that mimics market processes for traded goods and services to an extent beyond existing attempts. It demonstrates how 'efficient' prices for biodiversity protection can be 'negotiated' through agent intervention and discusses the challenges encountered in the process.

1. Introduction

A failure of markets to coordinate demand with supply indicates that the transaction cost of engaging in an exchange outweigh the benefits that buyers and suppliers expect to gain from trade. This reasoning follows Coase (1960) who analysed the role of transaction costs in market transactions.[1] As a result, some goods and services are not traded in markets, despite potential demand and prospective supply. This is the case for some environmental services[2] given that the transaction costs associated with defining, defending and trading property rights mean that they display the non-excludability characteristic of a public good or a common pool resource. Payment for Environmental Services (PES) schemes are being used around the world in an attempt to facilitate the operation of markets where they otherwise have not developed.

A PES scheme is a mechanism that establishes and sustains a financial link (monetary and in-kind payments) between potential buyers and prospective suppliers of environmental services that markets fail to provide; this is achieved by lowering the transaction costs borne by buyers and sellers through the involvement of one or more agents (Scheufele, 2016).[3] Following this rationale, PES scheme design and implementation can be seen as an attempt to mimic market processes such that an exchange of environmental services becomes beneficial for both buyers and suppliers (Scheufele and Bennett, 2017a). In some cases, transaction costs can be lowered sufficiently to facilitate direct negotiations between both parties regarding the pricing of ecosystem service supply. Otherwise, pricing needs to be 'negotiated' through an agent. This may be the case if, for example, a large number of suppliers face a large number of buyers. Ideally, agents, on behalf of buyers and suppliers, 'negotiate' efficient pricing based on estimates of demand and supply that use comparable units of measurement. Efficient pricing, defined as that which equates supply and demand, facilitates PES schemes in their capacity to generate a net social benefit.

However, few PES schemes incorporate 'negotiated' prices based on comparable estimates of demand and supply. Alternative approaches include setting prices independently of demand and supply, relying on incomparable estimates of demand and supply (often involving an environmental benefit index), and using one of either demand or supply. None of these approaches enables the 'negotiation' of efficient pricing. A detailed discussion on this issue is provided by Scheufele and Bennett

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[1] Transaction costs are defined as "the resources used to define, establish, maintain and transfer property rights" (McCann et al. 2005, 530).

[2] The term *environmental services* is defined as "the benefits people obtain from ecosystems []" (MEA, 2005, 27). A discussion of suggested differences between the terms "ecosystem services" and "environmental services" is provided by Wunder (2015).

[3] For a discussion of PES definitions see, for example, Wunder (2015).

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(2013). Examples are discussed by Brimont and Karsenty (2015); Eigenraam et al. (2005); Guerra (2016); de Leeuw et al. (2014); Pagiola (2008), and Nguyen (2011). Examples of approaches that 'negotiate' pricing based on comparable estimates of demand and supply include the extension of the Conversion of Cropland to Forests and Grassland Program (CCFGP) in the Sichuan Province, China (Wang et al., 2012) and the provision of Mediterranean forests (Górriz-Mifsud et al., 2016). Górriz-Mifsud et al. (2016) estimated 'price boundaries' by estimating the marginal costs to private forest owners of supplying environmental services through a change in management practises as changes in profitability. The marginal benefits of those services to potential buyers were estimated using discrete choice experiments. However, the study does not provide guidance on how a price should be set within the estimated boundaries. Wang et al. (2012) applied perfect price discrimination through a 'paid-as-bid' conservation auction, with the number of suppliers capped by demand. However, perfect price discrimination prevents suppliers from extracting the type of net returns (producers' surplus) that are enjoyed by suppliers in competitive markets for traded goods and services. The net returns are secured entirely by the buyers (or their agents).

This paper reports on the application of a PES scheme design (Scheufele and Bennett, 2017a) that aims to mimic market processes for traded goods and services to an extent beyond existing attempts. It demonstrates how efficient prices can be 'negotiated' through agent intervention and discusses the challenges and limitations encountered in the process. The application of the innovative process involves two pilot PES schemes that aim to reduce biodiversity loss through the supply of wildlife protection actions in the Lao People's Democratic Republic (Lao PDR). Both schemes were initiated in December 2017.

2. Application context

The first pilot PES scheme (PES-1) has been established in the Phou Chomvoy Provincial Protected Area (PCPPA). The PCPPA is part of the Northern Annamite Ranges on the border between Lao PDR and Vietnam. The mainly mountainous area is located within Bolikhamxay Province and covers about 22,300 ha. The use of wildlife resources within the PCPPA is restricted by Lao PDR statutory legislation and customary laws. However, law enforcement against poaching is known to be largely ineffective. PES-1 aims to reduce biodiversity loss (output) through the supply of wildlife protection actions (inputs). The scheme focusses on the protection of 19 wildlife species that are classified as Endangered or Critically Endangered (IUCN, 2016). The suppliers of wildlife protection are inhabitants of eight villages located in close proximity to the protected area. The suppliers are mainly subsistence farmers with limited income and employment opportunities outside the agricultural sector.

The second pilot PES scheme (PES-2) focussed on the Green Peafowl Species Conservation Zone (GPSCZ) covering about 8,000 ha. It is part of the Phou Khao Khaouy National Protected Area located within Vientiane Capital Province. As in the PCPPA, the Lao PDR statutory and customary laws restrict the use of wildlife resources within the GPSCZ. The effectiveness of the law enforcement effort is limited. PES-2 aims to reduce biodiversity loss (output) through the supply of wildlife protection actions (inputs). Unlike the PCPPA scheme that covers a range of wildlife species, this scheme focusses on only one species, the Green Peafowl (*Pavo muticus*), which is classified as Critically Endangered (IUCN, 2016). The suppliers are inhabitants of six villages located at the south-western boundary of the GPSCZ. As in PES-1, the suppliers' livelihoods are mainly based on subsistence farming augmented with some income secured through employment outside the agricultural sector.

Supplier engagement is voluntary in both schemes. Teams of individual villagers as well as the villages as a whole are engaged. Teams are contracted within the PES schemes to perform anti-poaching patrols that involve law enforcement and wildlife monitoring tasks. Team engagement is formalised through patrol contracts, whereas village engagement is formalised through conservation action plans and community conservation agreements. The contracts, plans and agreements, negotiated through several stages of community consultation, are based on the 'guidelines on free, prior and informed consent' (UN-REDD, 2013). Models that predict the cause-effect relationship between inputs and outputs facilitate an assessment of supply additionality of output by monitoring supply additionality of input (Hay et al., 2017; Renton et al., 2017). The supplier incentive structure includes monetary and in-kind payments, recognitions, and penalties for non-compliance (Scheufele et al., 2016a; Scheufele et al., 2016b). Penalties for non-compliance ensure the conditionality of payments. The villages are incentivised through recognitions and payments made to their village development funds in return for supporting the anti-poaching patrolling scheme and the protection of wildlife. Dissemination of information on current legal restrictions in the use of wildlife resources within protected areas aims to reduce poaching as a result of ignorance. An impartial, accessible and fair mechanism for grievance, conflict resolution and redress (UN-REDD, 2013) is an integral part of both schemes.

In both schemes, the buyers enjoy the benefits from knowing that wildlife species are protected (existence and bequest values). The buyers are the population of the urban districts (Chanthabuly, Sikottabong (partially), Xaysrtha, and Sisattanak) of the Lao PDR Capital, Vientiane City and international tourists visiting Lao PDR. "International tourists are tourists who enter Laos with a valid passport and visa obtained from a Lao embassy or consulate abroad, or a visa obtained on arrival at an international border checkpoint" (TDD, 2016, p.2). Foreign visitors who may be exempt from a visa requirements but are not regional tourists are included in this definition. "Regional tourists are foreign visitors from neighbouring countries such as: Thailand, China, Myanmar, Vietnam and Cambodia, which share borders with Laos. They enter Laos with valid border passes or passports." TDD, 2016, 2). The demand estimates are based on the results of a Discrete Choice Experiment involving international tourists and urban residents of Vientiane City. However, the financial link between buyers and suppliers has not yet been established. Until this link is in place, the funding comes from the 'international community' provided by the WorldBank as a loan to the Lao PDR Government.

Agents establish and sustain the links between the suppliers and the buyers. They act as 'brokers' with the capability of reducing transaction costs of the exchange. Drivers of prohibitively high transaction costs are associated with defining, defending and trading property rights and include free-riding (benefiting without bearing any cost of supply) due to the public good character of biodiversity[4]; lack of trust between buyers (regarding the delivery of biodiversity) and suppliers (regarding the receipt of payment); limited knowledge of the cause-effect relationships between inputs (anti-poaching patrols) and outputs (biodiversity); a large number of buyers facing a large number of suppliers; and non-viable payment transfer options. In both pilot schemes, the agents are research bodies, the Government of Lao PDR (on the national, provincial and district levels), local authorities (village heads and village committees), and wildlife conservation organisations (international and local).[5]

3. Methods

In both schemes, pricing was 'negotiated' through agents by matching comparable estimates of demand with supply.

[4] Public goods are characterized by non-excludability and indivisibility: "Non-excludability refers to a circumstance where, once the resource is provided, even those who fail to pay for it cannot be excluded from enjoying the benefits it confers. Consumption is said to be indivisible when one person's consumption of a good does not diminish the amount available to others" (Tietenberg and Lewis 2009, 76).

[5] The two pilot PES schemes were developed within the research project 'Effective Implementation of Payments for Environmental Services in Lao PDR' funded by ACIAR involving the Australian National University, the National University of Laos, the University of Western Australia, the Ministry of Natural Resources and Environment (Lao PDR), and the Department of Forestry within the Ministry of Agriculture and Forestry (Lao PDR). The ongoing operation of the schemes is being overseen by the National University of Laos and the Environmental Protection Fund (Lao PDR).