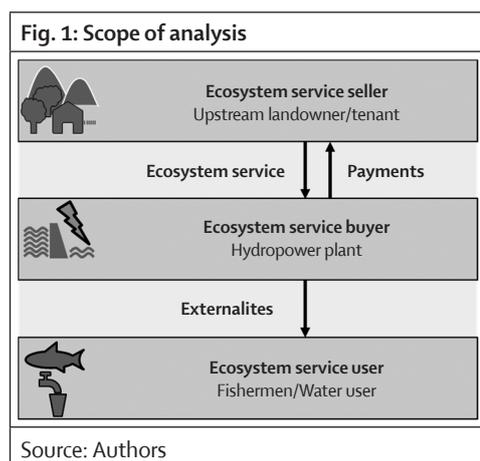


Payments for Ecosystem Services and the Water-Energy-Food Nexus

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The nexus issue

Payments for ecosystem services (PES) are an established instrument for addressing externality problems among different natural resource users. In a nut shell, PES consist of cash or in kind payments by downstream users of ecosystem services (henceforth “buyers”) to upstream land users (sellers of ecosystem services, henceforth “sellers”) to ensure the adoption or maintenance of land uses likely to improve the provision of ecosystem services. In the context of the water-energy-food nexus. PES has especially been used to direct private and public investment into ecosystems and watersheds that underpin drinking water provision but also energy and food production.



In connection with the nexus debate, PES, thanks to its potential use as a tool for cross-actor and cross-sector coordination (Hoff, 2001), is being presented as an instrument which embodies the nexus approach.

Research goals

The goal of this study is to critically analyse the extent to which PES can integrate sectors and

therefore the nexus perspective. The subject of our research includes externalities caused by both upstream land users (sellers) and buyers (Fig. 1). To this end, a PES programme was analysed in Colombia in which the Sogamoso hydropower plant (Hidrosogamoso) pays for the provision of ecosystem services in the water catchment area.

ISAGEN/ Hidrosogamoso (the buyer), based along the Sogamoso River in north-east Colombia, has strong backing from the national and regional government, as its 820 megawatt installed capacity provides eight percent of Colombia’s total energy production.

Since 2015, Hidrosogamoso has been involved in a PES programme and pays land users to protect forests in the catchment area of the hydropower plant. Hidrosogamoso’s participation in the water catchment area reduces sedimentation and ensures the discharge of water into the reservoir.

The PES programme currently provides payments to 27 families in the El Ramo catchment area in return for them maintaining the natural forests. Reimbursement rates are set at USD 65/ hectare/month for families with up to three hectares and USD 195/month for families with more than three hectares.

Results

Our results show that PES implementation may help to internalise or balance externalities generated by ecosystem service sellers to ecosystem service buyers. However, it is important to consider that conservation restrictions -designed to improve water provision- on land use may pose food security problems and other social impacts on ecosystem service sellers located upstream of a watershed (see for example, Rodríguez-de-Francisco & Boelens,

PES implementation does not necessarily mean that externalities produced by ecosystem service buyers are internalised.

2014). Another important lesson that we derive from our analysis is that PES implementation does not necessarily mean that externalities produced by ecosystem service buyers (i.e. externalities stemming from energy production) are internalised. In this sense, it is necessary to consider the existence of other stakeholders further downstream with respect to ecosystem service buyers. In the Hidrosogamoso case, downstream externalities from ecosystem service buyers include the following:

- impacts on water supply (from river diversion, changes in the flow regime) and water quality (from cement, chemicals, debris),
- reduced fish population due to blocked fish passages and temperature differentials between the dam and the river affect food security and biodiversity,
- unpleasant odours and CO₂ emissions from the release of methane as a result of the decomposition of submerged biomass,
- social impacts on communities' resource base, water control practices, and broader livelihood strategies (e.g. fishermen communities and local-tourist operators) (Duarte-Abadía, Boelens, & Roa-Avendaño, 2015).

Despite the above mentioned impacts, the Colombian government categorises Hidrosogamoso energy generation and conservation engagement as very successful. This suggests that governments are not always neutral actors advocating for a balance of externalities between the water, energy and food sectors. This is illustrated by the government prioritising energy security over the food and

water security of the communities living in the vicinity of the dam.

Recommendations

Based on our research, we can issue the following recommendations for international development cooperation organisations and decision-makers:

- Since the implementation of PES does not necessarily mean an internalisation of externalities, PES should be combined with other environmental policy instruments: e.g. with benefit sharing agreements, water pollution charges, and especially environmental impact assessments, which can also systematically record all impacts arising downstream. But environmental control is contingent on the government's political will to balance economic growth and environmental protection.
- Environmental protection agencies should not ignore or downplay serious social and environmental impacts in the face of pressure to prioritise economic growth.
- It is necessary to analyse food and social impacts created by conservation projects such as PES on ecosystem service buyers.
- Conservation projects can be strategically used by stakeholders to green-wash their socio-environmental impacts.
- When analysing externalities caused by specific activities, it is useful to jump scales back and forth in order to identify unaddressed externalities or missing stakeholders.

References

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Power asymmetries among actors are the determining factor for envisaging whether nexus governance can be implemented or externalities and costs are pushed onto marginal societal sectors.

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