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Researchers propose framework for designing PES programs that better deliver socioeconomic benefits

by Mike Gaworecki on 24 May 2018

- *The authors of a study recently published in the journal Science Advances developed a framework for examining the numerous ways Payments for Ecosystem Services (PES) programs affect socioeconomic outcomes by taking into account how PES programs are linked to various livelihood activities.*
- *The researchers applied their framework to two PES programs in China's Wolong Nature Reserve, both designed to reduce the degradation of panda habitat due to human activities like agricultural expansion, timber harvesting, and fuelwood collection.*
- *They found that households in Wolong Nature Reserve would have been better off financially had they not enrolled their land in either of these PES programs and instead continued to grow and sell crops.*
- *The researchers write that using their framework for understanding all of the underlying effects on local livelihoods, however, it is possible for conservation practitioners to anticipate obstacles and design management strategies for PES*

programs that improve their socioeconomic performance.

Payments for ecosystem services (PES) programs have been implemented around the world as a means of delivering environmental conservation outcomes while also allowing for socioeconomic development in communities that live in and rely on the landscapes being protected.

The basic idea behind PES is that beneficiaries of environmental services like the provision of clean water or the sequestration of carbon in forest biomass pay local communities forced to bear the "costs" of this conservation, such as foregoing the use of natural resources that they might rely on for their livelihood in the interest of preserving the landscape.

A good amount of scientific research has been devoted to determining whether PES is effective at delivering environmental and socioeconomic outcomes. A review of the literature on the effectiveness of PES (https://news.mongabay.com/2017/10/cash-for-conservation-do-payments-for-ecosystem-services-work/) by Mongabay, as part of our Conservation Effectiveness series (https://news.mongabay.com/series/conservation-effectiveness/), found that, while much of the

evidence was quite weak, more rigorously designed studies do show that PES programs can produce modest reductions in deforestation.

The majority of the evidence Mongabay reviewed suggested that the payments disbursed to participants of PES programs — i.e. the people who enrolled their land in the program — were often insufficient to adequately compensate them for the lost opportunity costs of other uses to which they might have put their land, such as growing crops.

The scientific evidence for the effectiveness of PES at delivering socioeconomic outcomes was even weaker than for environmental outcomes, however. One reason for this might be the complexity involved in studying how PES programs affect socioeconomic status of participating households. As the authors of a study recently published in the journal Science Advances (http://advances.sciencemag.org/content/4/3/eaao6652) write, "the underlying pathways (or processes) through which PES programs affect socioeconomic outcomes remain elusive, and existing literature provides little guidance to quantify them."

The authors of the study, led by Hongbo Yang of the Center for Systems Integration and Sustainability at Michigan State University (MSU) in the United States, developed a framework for examining the numerous ways PES programs affect socioeconomic outcomes

by taking into account those programs' links to various livelihood activities, like finding employment off their farms.

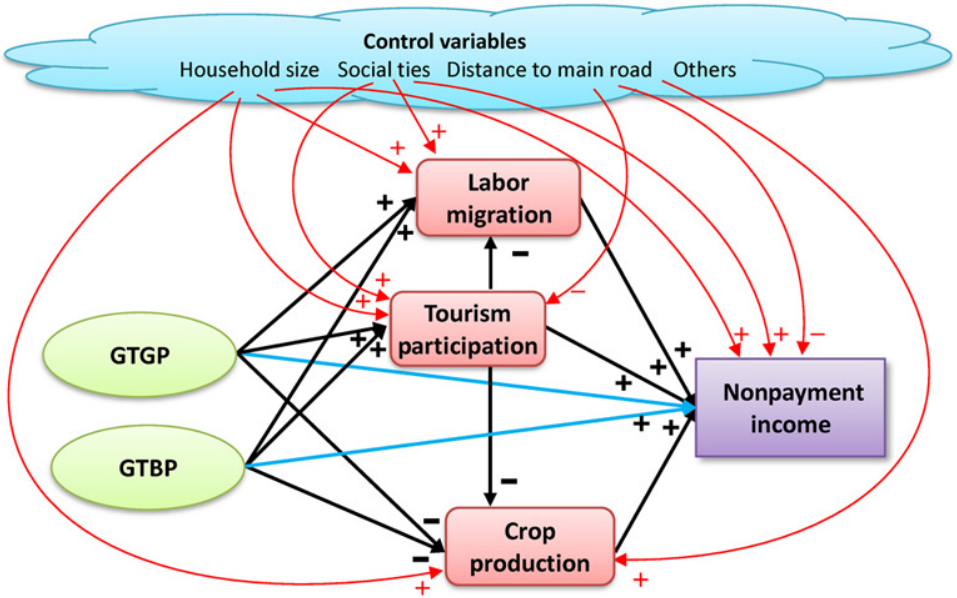

Illustration of hypothesized linkages among PES programs, livelihood activities, control variables, and nonpayment income. From Yang et al. (2018) doi:10.1126/sciadv.aao6652.

"Payments for ecosystems services is a powerful tool to engage local people in conservation," said Jianguo "Jack" Liu, a co-author of the study and director of MSU's Center for Systems Integration and Sustainability, said in a statement (https://phys.org/news/2018-03-higher-bargained.html). "But it also requires holistic examination, because so many factors weigh

on conservation success. This is particularly important for achieving the United Nations' Sustainable Development Goals.

The researchers applied their framework to two PES programs in China's Wolong Nature Reserve, both designed to reduce the degradation of panda habitat due to human activities like agricultural expansion, timber harvesting, and fuelwood collection.

The Grain-to-Green Program (GTGP), for instance, is one of the largest PES programs in the world. It was created in 2000 and, by 2010, had led to about 15 million hectares of farmland being turned back into forests or grasslands. The Grain-to-Bamboo Program (GTBP), meanwhile, was created in 2002 and pays farmers to grow bamboo on their cropland in order to feed pandas that are kept in captivity and in turn attract tourists who come to see the pandas. Under both programs, the Chinese government pays local households based on the amount of land they have enrolled.

The idea is that these payments will free residents of Wolong Nature Reserve to pursue other economic opportunities and thereby increase their overall income, such as working in tourism or migrating to an urban area where jobs in a number of different industries are available. But Yang and colleagues found that these new opportunities were generally

insufficient to make up for the gap between the payments disbursed through the PES program to local households and the associated opportunity costs of those households discontinuing their agricultural activities.

Income generated by tourism work and labor migration spurred by the Grain-to-Bamboo Program, the researchers discovered, offset only about 18.3 percent of the income households lost by forgoing crop production. The Grain-to-Green Program offset an even smaller portion of that lost income: 11 percent.

“From 2000 to 2003, households in Wolong enrolled a large portion (about 66% on average) of their cropland into these two programs," Yang and co-authors write in the study. “However, the price of agricultural products in China has increased markedly since 2004. Therefore, the strength of the pathway through which these programs negatively affect the income by reducing crop production was increased."

In other words, households in Wolong Nature Reserve would have been better off financially had they not enrolled their land in either of these PES programs and instead continued to grow and sell crops.

“Meanwhile, our results indicate that these programs' effects on prompting participating households to find off-farm employment in the

local tourism industry or in cities were small, although these livelihood activities can significantly increase household income," the authors add. "Therefore, the gap between the negative effect on income due to lost crop production and the positive effects on income through promoting off-farm employment increased after the implementation of the GTGP and GTBP." But the two PES programs disburse payments at fixed levels, meaning they cannot take into account changes in the opportunity costs borne by participating households. Thus, they failed to cover the growing cost of lost crop production, especially in the later years of the study.

"We can now see the payments were oversimplified in these cases," Yang said in a statement (https://phys.org/news/2018-03-higher-bargained.html). "It's a common issue in payment for ecosystem services programs, that the focus is on the current circumstances." He added that there are ways to address that issue in the design of PES programs: "We're showing that it's also important to consider opportunity costs at the beginning, and be prepared to monitor and reexamine all the costs and benefits over time."

Yang and colleagues write in the study that, using their framework for understanding all of the underlying effects on local livelihoods, it is possible for conservation practitioners to

anticipate obstacles and design management strategies for PES programs that improve their socioeconomic performance.

Another barrier to successfully delivering socioeconomic benefits via PES programs, for example, is that many labor migrants are unskilled and do not have equal access to educational opportunities. That can prevent members of participating households from being able to find work in cities in order to increase their income on top of the fixed payments received through the program.

"Therefore, management interventions that help overcome these barriers (for example, providing training to participating households to develop new skills and offering equal opportunities for migrant workers in urban areas) should be considered to increase the benefits participating households could obtain from these off-farm livelihoods and, ultimately, to improve the socioeconomic outcomes of these PES programs," they write. "Otherwise, higher payments should be offered to local households to cover the associated losses from participating in these programs, although it may put a heavier financial burden on governments."

The authors of the study suggest that their framework could be applied to PES programs similar to the GTGP and the GTBP that have been implemented around the world, such as

the Common Agricultural Policy in Europe, the Conservation Reserve Program in the U.S., the Pagos de Servicios Ambientales program in Costa Rica, and the Permanent Cover Program in Canada. They also suggest that it could be a way to start producing broader theories on how to implement PES programs around the world.

"One of the major goals of conservation research is to produce generalizable understanding of the effects of policy interventions. However, the effects of policies, including PES programs, often vary across different spatial and temporal contexts, which often make them not directly comparable," Yang and co-authors note in the study. "Uncovering the pathways underlying these effects will allow more specific explanations to why certain socioeconomic outcomes occur or fail to occur, thereby making different study results more comparable and facilitating the development of theories."

Though Yang and colleagues developed their framework specifically to analyze the socioeconomic outcomes of PES programs, they say it can easily be adapted for other conservation intervention types that also have complex socioeconomic impacts because they affect a variety of livelihood activities, like protected areas.

They write that, "Ultimately, to improve the socioeconomic outcomes of conservation policies, it is necessary to develop more elaborate theories to guide conservation practices that will enhance positive outcomes while mitigating negative ones."

A 7-month old panda cub in the Wolong Nature Reserve in Sichuan, China. Photo by Sheila Lau.

CITATION

• Yang, H., Yang, W., Zhang, J., Connor, T., & Liu, J. (2018). Revealing pathways from payments for ecosystem services to socioeconomic outcomes. Science Advances, 4(3), eaao6652. doi:10.1126/sciadv.aao6652 (http://advances.sciencemag.org/content/4/3/eaao6652)

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