



Review

Payments for ecosystem services in China: Policy, practice, and progress



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ABSTRACT

The rapid emergence of payments for ecosystem services (PES) schemes in China has been reported widely. However, it seems that the relevant policies and PES practices have not been fully documented. In this study, we provide insights into the overall status of PES schemes in China. We start by introducing the concept of eco-compensation, the equivalent of PES in China, and we describe its initiation and development. We then explore the institutional context upon which PES schemes are based on and we develop a classification system to interpret the different schemes. We employ the concept of PES-like scheme to reconcile divergent views on the scope of PES among researchers and decision makers. Subsequently, we describe the objectives, relevant policies from national to local level, implementation characteristics, funding sources, coverage, payment criteria, and primary effects of the major PES schemes. Broad institutional gaps, scheme overlaps, sole funding source, and the lack of effective tools in monitoring ecological outcomes are identified as major challenges for existing PES schemes. We conclude by proposing to reshape China's PES frameworks and strengthen the market-based PES schemes, as well as scaling scale piloting PES schemes up to address pressing ecological issues in broader ecosystems and areas.

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1. Introduction

In China, “eco-compensation” (ecological compensation) is an equivalent term to “payment for ecosystem services” or “payments for environmental services” (PES) (Bennett, 2009; Yu and Xu, 2012; Zhang et al., 2010), although PES has been used extensively by researchers in discussing eco-compensation (Long et al., 2015; Zhen and Zhang, 2011; Yu and Xu, 2016). Some researchers define these terms as users give payment to providers for ecosystem (or environmental) services (Bennett and Gosnell, 2015; Xie et al., 2015; Wunder, 2015; Zhang, 2016), but others see the terms from a broader perspective (Liu et al., 2017; Pan et al., 2016; Tacconi, 2012). To avoid confusion, we employ the term PES to discuss the practice in China. The heavy floods in major river basins during 1998 (Zong and Chen, 2000) as a consequence of extensive logging and sloped land cultivation (Tao et al., 1998) warned the need to find a sustainable solution for maintaining ecosystem services. Then the fresh idea of PES at that time was adopted by the decision makers, resulting in the revision of the National Forest Law of China for proposing the establishment of a national fund to remunerate ecological benefits of forest. This is the institutional origin of PES in China. Though the Grain for Green project which was initiated in 1999 may have some extent of PES function (Yin et al., 2014), the first real PES scheme, payments for ecological benefits of non-commercial forest, was established two years later in 2001 (Lin and Liu, 2016b).

PES has attracted increasing attention from researchers and decision makers. The scope of PES research has expanded to all relevant fields including both theory and practice, and the number of related publications has increased exponentially during the last two decades (Liu et al., 2013a). In practice, following the Grain for Green project, other PES-like conservation programs (Yin et al., 2013) and pure PES schemes have been piloted, improved, and fully implemented regionally or nationwide (Bennett et al., 2010; Wu et al., 2013). Based on these practices, a range of policies were gradually developed at provincial and ministerial levels to guide the establishment of PES schemes.

Two policy documents on PES schemes were issued by the central government in 2016. One is the Guidelines on Improving Eco-compensation Mechanism. This document sets out the overall framework on PES schemes in China and targets to build schemes covering non-commercial forest, natural grassland, wetland, desert, marine conservation areas, major watershed, arable land, key eco-functional zones, and development prohibited zones by 2020 (OSC, 2016). Another document is the Guidelines for Facilitating Lateral Mechanism of Eco-compensation between Upper and Down Streams of Cross Province River. It specifies that the central government will provide financial support for PES schemes on cross-province watershed based on provincial agreements and contributions (MOF et al., 2016).

Some PES schemes have been well established and implemented nationwide in China. These schemes include fiscal transfer

payments for key national eco-functional zones¹ (Liu et al., 2013b; Fu et al., 2016), payments for ecological benefits of non-commercial forest (Ma, 2011; Zheng et al., 2016), the reward mechanism for grassland conservation (Yang, 2014; Hu et al., 2016), payment schemes for watershed conservation (Yang et al., 2013; Wang et al., 2016a, b), and funding the environmental restoration of mining sites (Wen, 2014; Wu, 2015). Other schemes are still in piloting at local levels.

Government provides payments for most of China's PES schemes. Public funding is a common feature of PES practice in many societies. Literature shows that majority PES schemes comply with Pigouvian conceptualization, only few published studies mentioned Coasean approaches (Schomers and Matzdorf, 2013). In particular, PES practices in developing countries are more likely relying on public funding. The planner intended to establish a self-regulating market for trading ecosystem services decades ago in Costa Rica, but it still heavily relies on state supports up to date (Fletcher and Breitling, 2012). The influential PES scheme in forest sector in Vietnam is also mainly funded by the state owned electricity (Mcelwee et al., 2014). These explain that governments have a big role to play in facilitating PES. Nevertheless, there is distinct difference in PES practices between China and developed countries. While major PES schemes in US and EU are designed to achieve net gains in terms of ecosystem services (Potter and Wolf, 2014; Zanten et al., 2014), many China's payment programs are primarily established to avoid further loss.

However, an overview of China's policy, practice, and progress in PES has not been conducted previously, although fragmented studies have been reported in Chinese and English academic circles. This has resulted in confusion and misunderstanding about PES schemes in China (Jeffery and Qi, 2012). Therefore, it is necessary to clarify the Chinese PES framework and share the emerging PES strategies employed in China with researchers worldwide, as well as invite solutions to address various challenges.

This study is aiming to present an overall picture on the PES framework in China. We proceed to propose a classification system to cover all of the PES schemes, complementing with a brief overview of the institutional context and the difference between PES schemes and conservation projects. After this, we describe holistic policies, practices, and progress on major PES schemes. On top of these, we discuss the challenges of further improving and implementing PES strategies in China. We conclude that payments from private sectors are vital to shape an effective PES framework, while governments have a role to play in facilitating PES scheme.

¹ The State Council of China approved the *National Plan for Development Priority Zones* in 2010, which groups areas of land with national importance into four development priority zones including optimal development zones, key development zones, restricted development zones, and the prohibited development zones. Among these, the restricted development zones are subdivided into the major agricultural zones and key national eco-functional zones. These national eco-functional zones are designated to protect and restore the ecological environment for ensuring the provision of public ecosystem services, while large scale industrialization and urbanization are strictly limited.

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