Reformulating China's ecological restoration policies: What can be learned from comparing Chinese and American experiences?

Ping Liu[a], Runsheng Yin[b,c], Minjuan Zhao[d,*]

[a] College of Management, Tianjin Normal University, Tianjin 300387, China
[b] College of Economics and Management, Zhejiang A&F University, Lin'an, China
[c] Department of Forestry, Michigan State University, East Lansing, MI 48824, USA
[d] College of Economics and Management, Northwest A&F University, Yangling 712100, China

ABSTRACT

Payments for ecosystem services (PES) have attracted broad attention as a novel approach for using economic incentives to provide ecosystem services more sustainably. However, there have been inadequate efforts addressing the basic question of how to design and execute PES at the program level. By comparing and contrasting the experiences of restoring degraded cropland to forest and grass covers in China and the U.S., this paper aims to tackle that question and provide some valuable and timely policy insights that can inform China and other countries of how to improve the performance of their PES programs in terms of effectiveness, efficiency, and/or equity. Our analysis will unfold through examining such specific question as: What are the socioeconomic and environmental backgrounds for one country to launch a large PES program? How was it designed initially and has evolved over time? How has its performance been evaluated and what are the main outcomes? How likely is it for the enrolled land to be reconverted or for the contract to be expired? What are the primary challenges to its long-term success? Finally, this study calls for a more practical and focused approach to PES design, implementation, and evaluation that will lead to improved outcomes of forest and grassland ecosystem restoration and biodiversity conservation.

1. Introduction

There has been great international enthusiasm surrounding payments for ecosystem services (PES) programs as a novel, incentive-based approach to providing ecosystem services (ES) (MA, 2005; Arriagada and Perrings, 2011; Alix-Garcia and Wolff, 2014). Accordingly, there have been a large number of studies, including several journal Special Issues (or Sections), that advance alternative perspectives of and approaches to PES (Wunder et al., 2008a; Pascual et al., 2010); explore the linkages between ES theory and implementation (Daily and Matson, 2008a), between PES and poverty reduction (Bulte et al., 2008), and between conservation and development (Tallis et al., 2008); and examine ways on how to scale up PES from local to global level (Farley and Costanza, 2010).

Meanwhile, however, there remains a dearth of concrete and practical analyses on how to govern PES programs properly, particularly on how to adopt market-based mechanisms and means in conserving, restoring, and managing ecosystems (Wunder et al., 2008a,b, Pascual et al., 2010, Banerjee et al., 2013). Our study is thus motivated to address this issue by carefully comparing the experiences of China and the United States in restoring marginal cropland and other degraded fields to forest and grass covers and constructively exploring potential solutions to the major challenges that the SLCP has encountered.

It is widely recognized that carrying out PES initiatives, especially those large ones, entails complex, long-term interactions of various components of the underlying social-ecological systems and lead to multiple, often mixed, and uncertain outcomes (Ostrom, 2007; Muradian et al., 2010; Yin and Zhao, 2012). Therefore, commodification of ES may not be realistic in many situations, and without innovative institutional and organizational designs market may not emerge or simply is inadequate under certain circumstances. Other mechanisms and means, such as hierarchy and local collective action, are also necessary (Vatn, 2010; Muradian and Rival, 2012; Tacconi, 2012), and different types of institutions and organizations can be used together to complement one another (Vatn, 2014; Mann et al., 2015).

Therefore, there is a long way to go before we have gained a clear understanding of the multi-faceted, intricate nature of PES and thus a capability of prescribing more appropriate, better suited mechanisms and means for their execution (Jack et al., 2008; Arriagada and Perrings, 2011; Miteva et al., 2012). This is despite the fact that this

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kind of knowledge and capability is urgently needed for the wide-ranging adoption and long-term success of PES in enhancing ES and human wellbeing (Pascual et al., 2010; Arriagada and Perrings, 2011; Pattanayak, 2010). In contrast, the limited empirical insights on this subject have come mainly from small private-sector experiments and small country cases in Latin America.[1] In the words of Gregersen et al. (2010), "most of the available literature [on PES in general and REDD + in particular[2]] does not get into the subject of governance improvement in depth, particularly not at the country level."

Further, while project-level issues like conditionality and additionality have received wide attention (Wunder et al., 2008a; Farley et al., 2010), it seems equally appropriate and relevant to consider PES governance at the program level (Biermann et al., 2010; Yin, 2009). A program, made up of multiple, specific projects with clearly defined targets and means and mechanisms to achieve them, tends to be more complicated in content, larger in space, longer in time, greater in investment, and thus more closely linked to external socioecological settings (Yin and Zhao, 2012; Blomquist et al., 2010). As the biggest PES program in the developing world, China's Sloping Land Conversion Program (SLCP) has been in place for almost two decades—sufficiently long for its impacts, as well as its challenges, to be manifest and identified (Yin et al., 2014; Chen et al., 2015). In this paper, we will analyze the crucial aspects of governing the complex processes of interactions and outcomes involved in the SLCP by comparing it to the U.S. Conservation Reserve Program (CRP), which is the largest PES program in the developed world (Bennett, 2008). Emerging from this nuanced analysis will be important lessons regarding how to govern the SLCP and other large PES programs more effectively, efficiently, and equitably.

Certainly, China's expanding portfolio of ecological restoration efforts can benefit from this kind of work (Grumbine and Xu, 2013; Chen et al., 2015). Similarly, as more PES programs are launched worldwide (Daily and Matson, 2008a; Porras et al., 2008), this study can shed light on how to improve PES design and implementation in many other countries. Indeed, a priority outcome of the 2012 United Nations Rio + 20 Conference on Sustainable Development was the target to restore 350 million ha of degraded land globally by 2030 (IUCN, 2012). To accomplish this huge task and to make headways in carrying out REDD +, however, it is imperative for the international community to assess and synthesize the current PES experience and evidence around the world, including those of the American CRP and the Chinese SLCP.

The paper is organized as follows. In the next section, we outline our research methodology—a comparative study based on information and data that have been accumulated, and concepts and principles that have been articulated in the governance literature. In Sections 3 and 4, we highlight the U.S. CRP and the Chinese SLCP experiences and effects, respectively. In Section 5, we examine potential solutions to the major challenges that the SLCP has faced. Finally, some closing remarks are made in Section 6.

2. Methodology

We will use a combination of qualitative and quantitative analyses in comparing the experiences of restoring degraded cropland in the U.S. and China, and exploring solutions to the challenges that the SLCP has faced. As such, we will look into the various facets of program design, implementation, and evaluation by drawing information from Stubbs

(2014) and Hellerstein (2017) for the American experience and from studies of Yin and his colleagues for the Chinese experience, including Yin (2009) and Yin et al. (2014).[3] Our analysis will unfold around a set of similar, if not common, questions that include but are not limited to: What are the socioeconomic and environmental backgrounds for one country to launch such a PES program? How was the program designed initially and how has it evolved over time? How has it performed in terms of efficiency, effectiveness, and equity? How likely is it for the enrolled land to be reconverted or for the contract to be expired? What are the main challenges to its long-term success?

In addressing these questions, we will try to apply concepts and principles that have been articulated in the recent environmental governance literature (Ostrom, 2007; Biermann et al., 2010). Ostrom (2007) stated that "we need to recognize and understand the complexity to develop diagnostic methods to identify combinations of variables that affect the incentives and actions of actors under diverse governance systems. To do this we need to examine the nested attributes of a resource system and the resource units generated by that system that jointly affect the incentives of users within a set of rules crafted by local, distal, or nested governance systems to affect interactions and outcomes over time.... Furthermore, we need to enable resource users and their officials to experiment with adaptive policies so as to gain feedback from a changing SES before a severe transformation adversely overcomes them" (p. 15181). Similarly, Biermann et al. (2010) defined an earth system governance (ESG) as the interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels of human society that are set up to steer societies toward preventing, mitigating, and adapting to global and local environmental change and, in particular, earth system transformation, within the normative context of sustainable development. Thus, the ESG can be organized around such analytical problems as architecture, agents, adaptation, access, and accountability.

Moreover, our assessment of the SLCP performance and challenges will take advantage of a large dataset available to the authors. The dataset, covering over 1000 households for the period of 1999–2008, was built from successive surveys in six counties (Nanbu, Nanjiang, Mabian, and Muchuan in Sichuan, and Zhen'an and Yanchang in Shaanxi), based on a stratified random sampling strategy (Yin et al., 2014). These counties, selected according to the geographic coverage of the program, their general regional conditions, and the distribution of farmers' income, among other factors, represent some primary sites of the SLCP piloting and implementation. The dataset contains information on land enrollment status and land-use dynamics, subsidy payment, family demographics, on- and off-farm production and employment activities as well as expenses and revenues for both participants and non-participants. The nominal price, cost, and revenue information has been properly converted to real value terms.

3. American experience

Land retirement has been a mainstay of U.S. agri-environmental policy. Ever since the 1930s, the U.S. has relied primarily on voluntary payment programs to encourage soil conservation and other improvements in agri-environmental performance (Claassen et al., 2008). The CRP is the largest federal, private-land retirement program in the U.S., which provides financial compensation for an extended period of duration (typically 10–15 years) for the benefit of soil and water quality improvement and wildlife habitat. The program, first authorized in the Food Security Act of 1985, is administered by the Farm Service Agency (FSA) of the U.S. Department of Agriculture (USDA), with technical support from the Natural Resources Conservation Service and other

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[1] Examples of the former contain agreements negotiated by the water-bottling firm Vittel with French farmers in the catchment feeding its spring source, while those of the latter include the purchase contacts of avoided deforestation and forest degradation for hydrological services by the governments of Costa Rica and Mexico (Wunder et al., 2008a,b; Farley et al., 2010, Alix-Garcia and Wolff, 2014).

[2] REDD + means reducing emissions from avoided deforestation and forest degradation and enhancing carbon stock through reforestation and forest management (Corbera and Schroeder, 2011).

[3] Readers interested in the socioeconomic and environmental background information of these two programs are advised to look through the cited articles themselves.