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Utility engagement with payments for watershed services in the United States

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ABSTRACT

This research demonstrates the growing use of payments for watershed services (PWS) by drinking water, wastewater, and electric utilities in the USA to meet a variety of objectives and considers the potential these widespread and long established institutions hold in driving PWS implementation and mainstreaming ecosystem services approaches. We developed a working typology highlighting similarities and differences among 37 identified programs covering source water protection, fire risk mitigation, point source pollution offsets, voluntary customer offsets, and hydropower mitigation. We identified six distinct mechanisms for funding the identified programs. Sales taxes and bond measures generated the most annual funding per capita while voluntary ratepayer contributions and donated water conservation savings generated the least. A variety of actors were involved in the implementation of these different programs. Notably, nonprofit organizations were critical to each program type and often acted as important intermediaries, facilitating transactions among utilities and landowners. We found these initiatives face multiple challenges including the difficulty of demonstrating the business case for investments in ecosystem services and changes in the regulatory environment that can decrease ecosystem service demand and limit flexibility in pursuing PWS approaches.

1. Introduction

The ecosystem services concept broadens perspectives on nature to include not only intrinsic value but also the utilitarian value it provides to society (Costanza et al., 1997; Daily, 1997; MA, 2005). Viewing nature through this lens informs our understanding of how particular ecological processes benefit different actors. Additionally, it highlights the linkages between entities engaging in various management actions and the actors who benefit or suffer harm from the resulting outcomes. When more closely examining these linkages, connections can be made among actors previously viewed as separate and policies and institutions can be developed to formalize these interconnections (Daily and Matson, 2008; Daily et al., 2009).

The concept of payments for ecosystem services (PES) makes these linkages explicit by providing financial incentives for desired ecosystem management practices and is a rapidly growing approach to environmental conservation globally (Farley and Costanza, 2010; Muradian et al., 2010). In particular, PES focused on water related ecosystem services, referred to here as Payments for Watershed Services (PWS), has dramatically increased. According to a 2013 report from Forest Trends, there were at least 205 active PWS programs globally in 2011 and 76 programs were in development (Bennett et al., 2013). This is a significant rise from the 127 active programs reported in 2008 (Stanton et al., 2010).

Research on PWS initiatives is also on the rise and the peer-reviewed literature has placed significant attention on efforts in Latin America, Asia, and Africa (e.g., Ferraro, 2009; Southgate and Wunder, 2009; Huang et al., 2009; Brouwer et al., 2011). This research found that protecting drinking water supplies was a primary objective of PWS initiatives in these regions, including in 33 of 47 programs investigated by Brouwer et al. (2011), along with poverty alleviation (Ferraro, 2009; Huang et al., 2009). A lack of monitoring data is a major obstacle in linking PWS interventions in these regions with improved environmental conditions (Brouwer et al., 2011; Farley et al., 2011). Several studies also found that some of the assumptions of the economic theory underlying PES were often not met in practice. These include the failure to secure conditionality and evidence that opportunity costs can exceed the amount paid to sellers (Kosoy et al., 2007; Huang

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et al., 2009; Goldman-Benner et al., 2012). Although the gray literature on the subject is increasing (e.g., Stanton et al., 2010; Carpe Diem West, 2011; Majanen et al., 2011; Gartner et al., 2013), similar investigations of PWS schemes in the USA are particularly lacking in the peer-reviewed literature. This research represents an initial step towards filling this gap by reporting on utility engagement with PWS in the USA.

We focus on utilities since drinking water, wastewater, and electric utilities are institutions that may benefit from numerous ecosystem services as well as influence them through their normal course of business (Hanson et al., 2012). Utilities are uniquely positioned to invest in efforts to maintain or enhance the provision of ecosystem services that benefit their operations as well as mitigate or offset their negative ecological impacts by paying for ecosystem restoration. Utilities are dependent upon and affect a number of natural hydrologic services including those associated with water quantity, water quality, timing, and location of flows (Brauman et al., 2007). For example, drinking water utilities may benefit from and invest in actions that protect the natural filtration services provided by forested watersheds (Ernst, 2004; Postel and Thompson Jr., 2005). Electric utilities can mitigate impacts from hydropower infrastructure by funding stream restoration. Wastewater utilities may be able to offset the impacts of nutrient and temperature discharges by paying landowners upstream to plant forested riparian buffers (Cochran and Logue, 2011; Newburn and Woodward, 2012). Utilities are also uniquely positioned to pursue PWS initiatives because they have a direct relationship with a large number of potential buyers: their customers. Since utilities already have established financial relationships with customers, the infrastructure for collecting payments is already in place and there is a process for establishing funding mechanisms such as through rate increases or voluntary contributions on utility bills. Furthermore, utilities are often tightly connected to their surrounding watersheds and aware of their social and ecological conditions (Lurie et al., 2013). Because of these factors, utilities are intriguing institutions that deserve more attention for the potential role they can play in implementing ecosystem services schemes.

In recent years several drinking water, wastewater, and electric utilities in the USA have developed PWS programs to both offset impacts and maintain the provision of beneficial ecosystem services. In perhaps the best-known and one of the earliest examples, New York City was able to avoid building a filtration plant for the majority of its water supply by investing $1.5 billion in watershed conservation efforts beginning in 1997. Some of these funds were directed to PWS initiatives that compensated farmers and forest owners for changing management practices to reduce downstream pollution. Although the costs of these efforts were significant, New York City avoided the need to construct a filtration plant estimated at $6 billion with annual operational costs of $300 million (Postel and Thompson Jr., 2005). In 2004, Clean Water Services, a wastewater utility in Hillsboro, Oregon, developed another oft-cited program to meet regulatory requirements under the Clean Water Act (33 U.S.C. §§1251–1387). The program offsets the utility's thermal load to the Tualatin River by paying landowners upstream to plant trees in riparian areas that will eventually shade the river and reduce the warming effects from solar radiation (Cochran and Logue, 2011). This program is serving as a model for other wastewater utilities in Oregon exploring similar programs to meet regulatory obligations. A third example of the kinds of innovative PWS schemes that are emerging involves drinking water utilities in Santa Fe, New Mexico and Denver, Colorado that have partnered with the US Forest Service (USFS) since 2009 and 2010 respectively. In both places, utilities are using ratepayer funds for restoration activities that mitigate the risk of catastrophic wildfires that threaten drinking water supplies (Majanen et al., 2011). These examples highlight the various roles utilities can play in developing PWS initiatives to meet a variety of objectives.

Despite the increasing number of public utility PWS programs, there is a lack of information regarding how these programs work, their major drivers and challenges, how they are funded, and the main actors involved. According to Lurie et al. (2012, 7), "there is not yet a substantial body of literature regarding the role of utilities in PES programs". The topic is ripe for additional research and could serve to inform the development of other utility PES initiatives. In order to better understand the increasing trends of utility engagement with PES to protect water resources, we assess the current state of utility involvement with PWS by analyzing how these initiatives operate, describing their major drivers, examining how they are funded, identifying the primary actors involved, and considering some of the challenges faced. We present a working typology of different programmatic structures and describe their major characteristics. We also report on funding mechanisms and provide examples of the amount of funding generated. We conclude by briefly discussing several themes that emerged from the research that help frame how we view utility involvement with PWS and PES more broadly and how these initiatives fit within global trends.

2. Methods

To assess utility involvement with PWS in the USA, we developed a database of PWS programs by conducting an extensive inventory of these initiatives. To complete this inventory, we relied on gray literature (e.g., Carpe Diem West, 2011; Ernst, 2004; Majanen et al., 2011; Willamette Partnership, 2012), online databases and registries (e.g., The Conservation Registry[1] and Watershed Connect[2]), peer reviewed literature (e.g., Postel and Thompson Jr., 2005), and personal communication with experts in the field to identify programs. Once identified, information on each program was collected from project or utility websites and from the resources described above. This included information on the ecosystem services targeted, funding sources, buyers, sellers, other actors involved, and major drivers, among other data. Hundreds of documents and websites were reviewed during the compilation of this database.

We then conducted 33 semi-structured interviews with key informants involved with 37 initiatives included in the database. Interviewees were selected using purposive sampling (Bernard, 2006; Robson, 1993) with the goal of learning more about the variety of ways that utilities are involved with PWS. In each interview we asked about the history of the program, how the program functions, the primary motivation for the program, obstacles in implementation, and lessons learned, among several other topics. Interviewees included representatives of utilities, intermediaries, regulators, and government land management agencies. For each program type identified, we interviewed representatives of multiple utilities in order to understand the utilities' perspectives on these initiatives. Some of the interviewees (e.g., regulators and intermediaries) were involved with more than one program and interviews included questions about all the relevant programs with which they were involved. To better understand the more complex programs, we conducted interviews with multiple individuals. That is, in some cases we conducted interviews with utility representatives, intermediaries, and regulators, which provided insights from different perspectives. Interviews

[1] ⟨http://www.conservationregistry.org/⟩.
[2] ⟨http://www.watershedconnect.com/⟩.