

UTILITIES AND CORPORATIONS AS ECOSYSTEM SERVICES BUYERS: INNOVATIVE OPPORTUNITIES FOR SMALL AND MEDIUM-SIZED FARMS AND RURAL COMMUNITIES

INTRODUCTION

“Payment for ecosystem services” (PES), a market-based approach to protecting and restoring the environment, is gaining growing attention from scholars, practitioners, and the conservation community. The interest is not just for its potential to enhance the services nature provides for society, but also for its potential to enhance the economic prosperity of the suppliers of those services, including agricultural landowners. There are a number of challenges associated with institutionalizing PES schemes, however, many of which have to do with the demand side of the equation. In particular, who will pay landowners for their stewardship? To date, most PES schemes have relied on government funding, with a small amount developed through market-like trading schemes. However, the questionable results of ad hoc mitigation and in-lieu-fee mitigation programs¹ to date, plus lack of analysis of ecological outcomes associated with such efforts, all leave strategic and tactical openings for both corporations and public utilities (Davis 2005). The proposed project will thus explore two innovative approaches to funding PES schemes involving corporations and public utilities. We suggest that each of these approaches holds real potential for leveraging current incentive programs and generating hybrid models for further motivating land stewardship; neither has received significant attention in the scholarly literature to date.

More specifically, the two approaches are: (1) the involvement of public utilities in providing incentive programs targeting small and medium-sized farms through various PES opportunities, and (2) the attraction of corporate funding to drive a certification system based on the ecosystem services provided by small and medium-sized farms pursuing restoration activities as a revenue source. Both offer potential economic benefits for landowners, public utilities, and corporations, and ecological benefits for watersheds. We anticipate that the integration of the two approaches could open up additional emerging/hybrid revenue opportunities for small and medium-sized landowners.

GOALS AND OBJECTIVES

The goal of the proposed project is to investigate how public utilities and corporations might provide sufficient funding and incentives to help make payments for ecosystem services (ES) a viable additional source of revenue and employment for the long-term sustainability of small and medium-sized farms and rural communities; and explore the feasibility of instituting these models at different scales.

Primary objectives to support this goal are:

1. To explore the pathways through which public utilities could adopt PES-based incentive programs targeting small and medium-sized farms. Despite the growing drumbeat indicating the need to improve both their source water protection and their energy

¹ In-lieu-fee mitigation programs (often associated with the Clean Water Act) involve agreements between a regulatory agency and a sponsor (e.g. a public agency or NGO) stating that the sponsor will carry out the mitigation required of a regulated permittee, in lieu of charging the permittee a fee.
http://www.eli.org/Program_Areas/wmb/StateFedb.cfm, accessed 11 July 2010.

conservation strategies, public utilities have not yet been reframed as potential intermediaries between the customer base demanding cleaner energy and more accountability from the utilities; and the landowners in the utilities' service areas (often rural in nature) that could supply the ecosystem services increasingly valued by society. Public utilities that provide both electricity *and* water are particularly well-positioned to develop stewardship incentive programs due to the greater number of ecosystem services at stake in their service areas and their broader financial flexibility. Utilities that own land, for example, might use the ES provided by that land to offset their energy-production carbon footprints, which can be considerable; and/or they might enroll area farmers in a PES program through which they allow their customers the opportunity to offset personal footprints through their billing system.² The Eugene Water and Electric Board (EWEB), which serves the Oregon cities of Eugene and Springfield, is currently experimenting with a number of PES incentive programs and it provides an excellent case study upon which to develop principles that could be transferable to other utilities around the country. EWEB's service area is located in the McKenzie River Basin, a rural landscape comprised primarily of small and medium-sized farms in the West Central Cascades.

2. To explore the pathways through which corporations could adopt a certification system based on the ecosystem services provided by small and medium-sized farms. Certification schemes provide pathways for concerned corporations to gain "eco-status" by committing to pay for a certain quantity of ES to be produced from a specific geography.³ Few involve small and medium-sized agricultural landowners, however, and at the same time, it is unclear how economically viable existing schemes have been for either corporations or the landowners providing the services. Oregon, like most states, is currently underutilizing the ES assets of its natural resources by not offering a system whereby ES suppliers including those in rural communities, can monetize the services they provide. Cities like Eugene, Corvallis, and Portland are starting to invest in green infrastructure to perform basic services; but smaller communities need a means of financing such investments in order to "scale up" the benefits of this state-wide transition both spatially and temporally. Adopting a system to encourage in-state ecological investments by corporations could attract that financing. This concept is currently under development as OREGON GREEN by participants in Oregon's Senate Bill 513 Working Group, which is tasked with developing policies that enhance the overall ecosystem service marketplace in the state. The program aims to include a process by which credits and infrastructure generated as part of a voluntary market could transfer into the world of compliance-based markets as the program is proven. We propose that the nascent OREGON GREEN program could provide a testing ground to build the necessary standards, practices, and policies for a regulatory market in the future.

3. To evaluate factors that may contribute to the feasibility of operating such funding/incentive systems at local, regional, and national scales. In the Pacific Northwest, innovation and experimentation for developing market-based mechanisms for ES is more advanced than in many other areas of the country; thus it is a good place to grapple with the many obstacles confronting the implementation of PES schemes that could benefit small and

² See, for example, Pacific Power's Blue Sky Program: <http://www.pacificpower.net/bluesky>

³ See, for example, the Forest Stewardship Council certification scheme, aimed at timber producers: http://www.fscus.org/about_us/

medium-sized farm operations, with the goal of applying lessons learned here at larger scales. The broad vision is one in which – anywhere in the U.S. – revenues derived from the growing ecosystem restoration economy are progressively integrated with improvements in traditional primary production activities, leading to productive and sustainable economies for rural communities. Recognizing and acting on the economic value of these ecosystem linkages between urban well-being and rural well-being is central to the ongoing development and transition, and can help transform the urban-rural relationship from one of extraction and disconnection to one of mutual support. It is expected that new institutions to support these goals will be developed across different scales, from the local watershed, to the river basin and even to the global scale, as in the emerging carbon economy. Considerable work needs to be done to understand the scale and transferability issues, and we propose to begin that work.

4. To analyze how such PES funding streams and incentives might (1) change the trajectory of urban-based investment in rural communities, and (2) significantly affect agricultural production. The growing recognition of the importance of ecosystem services, and potential ecosystem service markets, has brought new attention to the role rural areas might play in coming decades in restoring those ecosystem services to more productive levels (Butler 2008; Knight and White 2009; Robertson and Swinton 2005). Recognizing and acting on the economic value of the ecosystem linkages between urban and rural well-being can help transform the urban-rural relationship from one of extraction and disconnection to one of mutual support, which might help move the concept of payments for ecosystem services toward social acceptability (Propst et al. 2009). The potential for increased urban investment under various PES schemes is unclear, however, as are the potential effects on traditional agricultural production. Such effects could range from significant advances in sustainable management practices, to concerns about curtailing quantity and quality of production. The need to begin tracking costs and benefits of various PES schemes, and both intended and unintended consequences, will inform our analysis.

RESEARCH NEED

In the last few decades, diverse structural shifts in forestry and agricultural economies have depressed many rural communities across the country, as traditional resource dependent industries have closed or moved to lower levels of productivity and competitiveness (Power and Barrett 2001, Nelson 2002, Buttel 2003, Liffman et al. 2003, Torrel et al. 2005). This phenomenon is particularly prominent in the Pacific Northwest (PNW) where growing environmental concerns and actions to protect endangered species have had direct effect on forestry and hydropower production. These trends have had implications for agriculture as well, raising costs of production to abide by new regulations, reducing acreage to provide area for wetlands and other restored ecosystems, and moving water from irrigated agriculture to fish and wildlife uses. Also significant for agriculture in the PNW has been the continued population influx to rural and exurban areas. Amenity migrants moving to these areas for higher quality of life have contributed to land use change, as farms become towns and as large commercial farms are partitioned into smaller “hobby” farms (Fortman and Kusel 1990; Jones et al. 2003; Yung et al. 2003; Gosnell et al. 2006, 2007; Saint Onge et al. 2007).

Concurrent with these trends, small and medium-sized agricultural producers have been increasingly shut out of an evolving commodity production model that is shifting business

from local and regional markets to national and global markets with associated production control. This has often been at the expense of economic, social and environmental well-being for rural communities and for small and medium-sized farms, or the ‘ag of the middle’ (e.g., Kirschenmann et al. 2008). These typically independent operations comprise the overwhelming majority of U.S. farms and play an important role in rural communities’ well being in terms of tax bases, jobs and general community welfare. They are, however, in increasing danger of disappearing because of their inability to participate in, or compete with, national and transnational commodity production networks. Many rural residents continue to experience a lower quality of life than many urban residents (Forest Trends 2008). Rural poverty persists as a pressing and seemingly intractable social problem.

Payments for ecosystem services hold the potential to add new revenue streams for producers while restoring ecosystem functions in a positive feedback loop if appropriate institutions and incentives exist (Zhang et al. 2007; Parkhurst et al. 2002; Goldman, Thompson, and Daily 2007). Along these lines, there are a number of federal and state policies and programs—e.g., USDA Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), and Environmental Quality Incentives Program (EQIP)—that encourage producers to adopt ecologically beneficial practices on agricultural lands (Bernstein, Cooper, and Claassen 2004; Wu and Lin 2010). Various criticisms of these programs (limited payments, favoring of large commercial farms, wetlands effects) suggest that additional effort is required to address the well-aligned needs of small and mid-sized farms and ecological restoration.

This dynamic backdrop is part of a much larger picture, in which America’s energy and environmental future demands massive investment and change for interrelated reasons of national security and global climate change. The transformation of the environmental movement reflects this new reality, as evidenced by its growing openness to more pragmatic and collaborative forms of enterprise (Daniels and Walker 2001; Wondolleck and Yaffee 2000). The trend, then, is towards an economy based not just on traditional agricultural production economics, but increasingly on long-term sustainability of ecosystem services.

Finding ways to help small and medium-sized agricultural producers participate in the evolving ecosystem services marketplace can help individual producers and can, in turn, help rural communities through the multiplier effect. Treating natural resources as long-term assets and protecting their integrity as a part of agricultural production through payments for restoration and stewardship may help build community resilience: the ability to absorb disturbances and still maintain essential structures, functions and identities (Magis 2010). This may be a more practicable approach for communities than the traditional productivist model of striving for stability. As the past several decades have shown in both the agricultural and forestry sectors, economic stability and concomitant community stability is difficult to achieve and maintain. A multifunctional approach that includes restoration and stewardship as complements to traditional production provides an alternative that may enhance both ecosystem and community resilience.

The opportunities for small and medium-sized farms and rural communities to participate in these momentous changes concerning ecosystem services are constrained by a number of factors. First, the beneficiaries of the ecosystem services provided by agricultural landscapes

(often urbanites) historically have not had to pay for the provision of those services, thus raising legitimate concerns about the social acceptability of PES schemes. Second, many people – rural and urban – remain either unfamiliar with the concept of ecosystem services, or opposed to their “commoditization” in any kind of marketplace. Current work by co-PIs Gosnell, Moseley, and Nielsen-Pincus, is investigating the knowledge needs of family forest and ranch owners in the Interior Northwest to help them participate in PES (AFRI/NIFA/USDA Award #2009-85211-06102). Preliminary data from this research will inform our investigations about willingness of landowners to participate in PES. Third, the tools, metrics, and standards for measuring ecosystem services in a way that allows for their being sold or rewarded in any marketplace – or being used in a regulatory compliance framework – remain fraught with technical and practical problems that may take decades to resolve (Kline et al. 2009). PI Duncan has been involved with the Willamette Partnership’s efforts to develop a tool for “counting” ecosystem services, called Counting on the Environment (funded by a NRCS CIG grant), and is currently overseeing a collaborative review of selected tools on Oregon State University’s Institute for Natural Resources (INR)’s Ecosystem Commons. Fourth, current policy affecting restoration and mitigation is so deeply fragmented across so many federal, state, and local jurisdictions that any process of streamlining, rationalization, or unification may similarly take years or require Congressional action to become a reality. This finding has been underlined by deliberations of the Working Group for Senate Bill 513 (establishing policy regarding ecosystem services in Oregon), convened to recommend policy adjustments to support the larger ecosystem services marketplace. INR co-PIs Duncan and Lurie play key roles on the project management team and by conducting frontline research. The Working Group’s preliminary conclusions suggest the need for cross-agency collaboration as an essential first step in ramping up regulatory drivers for an ES marketplace. Voluntary drivers, however, such as growing public demand for greater environmental accountability from corporations and public utilities, face no such explicit/policy obstacles, and the Working Group is likely to recommend that *voluntary* ES “market” opportunities be used as a means to generate interest, funding, and lessons from which to move forward.

Despite this suite of interacting obstacles, we suggest that the opportunities for small and medium-sized farms to operate within an innovative framework of payments for ecosystem services are considerable. They will, however, require a combination of reframing existing institutions and programs, building trust in existing and new funding opportunities, and taking risks in experimenting with new approaches. Recently completed work by INR, funded by the Bullitt Foundation (http://inr.oregonstate.edu/download/2010_Bullitt_Phase2.pdf), supports this idea, and strongly suggests that at least for the short- and possibly medium-term, payments for ecosystem services may best be framed at the local and regional levels. In addition, the Bullitt project finds that while fundamental concepts may hold true across multiple geographic and social contexts, a variety of models for instituting successful PES systems will be needed and perhaps should be encouraged due to regional variation.

The urgent need for thoughtful responses to economic, demographic and technological changes in rural communities dovetails powerfully with the similarly urgent need for continued or increased attention to environmental restoration across large swaths of most agricultural landscapes. Indeed, most small and medium-sized landowners continue to face

challenges finding the time to take advantage of existing programs. A more focused approach to getting restoration dollars into projects on the ground on such farms could bring large influxes of cash to rural communities via PES through programs initiated by corporations and public utilities responding to their consumers' willingness to support environmental stewardship. The establishment of such programs would be expected to increase the resilience of both the economic and environmental elements of rural communities.

Informing the corporate component of our analysis, new opportunities are arising for corporations to play a larger role in directing revenues towards restoration projects. On the supply side, for example, INR and EWEB submitted a proposal to NRCS-CIG to explore the concept of "landscape labeling" (combining PES and eco-labeling), whereby landowners within small watersheds can band together to commit to pursuing PES in return for restoration activities, thereby improving the overall sustainability and health of their watershed (eg. Boesch et al. 2008; Ghazoul et al. 2009). Once a certain landbase within a watershed is subscribed to restoration that generates improved ES function, the watershed can be marketed as "sustainable," with the potential to claim a premium for any products coming off that watershed, including the ecosystem services themselves if appropriate. Important opportunities exist within this kind of scenario for developing relationships with local, regional, or national buyers of food and other crops, with the promise of a steady, sustainably-grown crop menu, in return for the premium price. The OREGON GREEN certification scheme we propose exploring here fulfills the demand side, delivering corporate motivation for investing in restoration. The existing social capacity developed by EWEB with local and regional retailers will provide an important starting point for this research.

A number of local firms are already engaged in pioneering environmental market work that contributes to Oregon's economy, so some of the needed infrastructure has already been identified and is either in practice or developing. Pioneering public utilities such as EWEB are exploring new ES-related approaches to providing infrastructure and stimulating sustainable practices while protecting their source waters. For example, EWEB has a preliminary version of a concept underway that combines both public utility engagement and a form of corporate underwriting, in the "Oregon Brewsheds Project." The project is a collaborative effort between the National Forest Foundation (NFF), Eugene Water and Electric Board (EWEB) the US Forest Service (USFS), the Oregon Brewer's Guild, and the Oregon Association of Resource Conservation & Development Councils. This partnership has multiple goals: the project will promote enhanced watershed health on Oregon's National Forests by providing a mechanism for investments in on-the-ground stewardship and restoration, which will contribute to rural prosperity; Oregon brewers will have an opportunity to transition to more energy efficient practices in the breweries' operations; and brewers and their suppliers will be able to participate in water conservation programs both internally and on the agricultural lands that supply them. Enabling Oregon breweries to become more energy efficient in the production of their beer will simultaneously enhance public understanding of Oregon's craft beer industry as leaders in conservation and watershed stewardship, and increase public awareness about water and watersheds as they relate to the production of top quality craft beer. The social marketing potential in this particular example combines the best of socially responsible investing with the concept of PES.

Most importantly, the Brewsheds Project provides a working example of how hybrid ideas might emerge from the simultaneous engagement of both public utilities and corporations in PES.

RATIONALE AND SIGNIFICANCE

The *rationale* for this project is fourfold. First, it will contribute to better understanding of the potential for public utilities to participate in PES schemes, which is currently a little-explored subject in the scholarly literature, and in practice is only barely beginning to be investigated by isolated utilities around the country. Public utilities represent a powerful untapped intermediary between small and medium-sized landowners producing and sustaining ecosystem services, and the rural communities and urban areas that benefit from those services. Public utilities have previously been conceived, understood, and managed as businesses that need to provide utility service in the most efficient ways possible. Indeed, they are designed around the fundamental self-interest of producing as much power as cheaply as possible; this context is changing, however, as efforts to develop conservation both internally and through their customer base changes the focus, particularly in public utilities (Davis 2005).

Urban water (and electricity) management will increasingly need to demonstrate an understanding of how integrated socio-technical systems work. The way is open for shifts towards more distributed control of energy sources and new management schemes, with social issues and systems becoming integrated with the utility's management objectives. Working with stakeholders, and adopting decentralized technologies and other approaches could become the norm, in settings where public utilities are re-conceiving their business models (Pahl-Wostl, C. 2004). The cultivation of appropriate institutions and incentives would likely induce landowner cooperation in new restoration and conservation activities (Goldman et al. 2008).

Small and medium-sized farms could benefit significantly by these means if an intermediary such as a public utility could provide the administrative (clerical, accounting, permit tracking, etc.) services. In turn, the increase in required auxiliary services and businesses would benefit the surrounding rural community: PES, at scale, would need the services of landscape/ES project design consulting firms, ES assessment and quantification teams, verification specialists, permitting brokers, monitoring design and data analysis firms, earth movers/machine operators/fencing crews as appropriate for projects, all of which would be best served by locating locally. Other rural locales such as nurseries to fill orders for plants and trees could also benefit.

Second, the proposed project will enhance understanding of the potential for an ES-based certification scheme to motivate corporate investment in production of ecosystem services. Because Oregon has spent decades building its brand of sustainability and stewardship, the time is opportune for testing the ability of the proposed OREGON GREEN brand to attract new private investment into rural areas to protect and enhance ecosystem services while creating new jobs. Our proposed research would contribute directly to the groundwork for a state-endorsed OREGON GREEN label, which would promote and reward stewardship. The integrity of the label would depend on third-party verification and would ideally be

Project Narrative

administered by a public-private partnership between a suitable state agency, Oregon-based non-governmental organizations, and the Oregon business community.

Authorizing a type of “market” in which Oregon’s farmers and forestland owners could sell the increased services that their environmental restoration projects provide would support jobs in rural areas. Rural landowner participation in PES programs will be rewarded by payments for the ecosystem services their properties provide. Keeping small and mid-size farms in operation, and expanding activities for managing and enhancing ES, supports the individuals and businesses in rural areas traditionally associated with the agriculture sector. With the establishment of PES programs, it is likely that rural institutions (e.g., local watershed councils and conservation districts) will face increased need to source and manage projects. In addition to the economic activity constrained to rural areas, financial brokerages will be needed to match corporations with ES suppliers and build partnership networks, and ecologists will be in demand to verify outcomes and monitor progress. Finally, Oregon’s information technology sector, already quite active in this emerging field, will be called on to provide the technical infrastructure required to maintain protocols, register projects, and track outcomes, and could conceivably operate from rural locations collaboratively with local landowners.

Third, the proposed project will provide new information about hybrid approaches suggested by integrating learned outcomes from the public utility and corporate investment models. The nascent developments in Oregon noted in the Research Need section above suggest multiple possibilities for working with public utilities as intermediaries, and also for repurposing the certification concept already developed and in use nationally and internationally for multiple products in many economic sectors. The EWEB Brewsheds Project illustrates this leveraging principle.

And finally, the proposed project will provide a detailed analysis of the potential for broader applications of these approaches, both by exploring how they might apply at different scales, and by examining their potential effects on larger trends in rural investment and agricultural production.

The investigation we propose here will thus generate knowledge that contributes to the following outcomes listed in the RFA: (i) increase the value of agricultural products (including ecosystem services) sold per farm by small and medium-sized farms through the adoption of environmentally sustainable practices; (ii) enhance sustainability of small and medium-sized farms and rural communities through appropriate entrepreneurship and small business development; and (iii) enhance the efficiency and equity of public and private investment in agriculture and rural communities.

Specifically, the proposed project addresses two NIFA program area priorities: #1, Develop (and test) new multidisciplinary tools/approaches to facilitate the adoption of new agricultural production and conservation practices; and #3, Promote the sustainability of small and medium-sized farms and rural communities, by enhancing knowledge of appropriate entrepreneurship and small business development strategies, particularly including local and regional partnerships, entrepreneurial networks, and workforce development.

The proposed project is *significant* for several key reasons. First, across a rural area with multiple small and medium-sized farms and forests, the two approaches we explore in this proposal could offer the following *on-the-ground* benefits:

- An additional source or sources of revenue for small and medium-sized farms and forests;
- The opportunity to mix and combine products and services available to market from so-called “farms of the future”⁴;
- The potential for providing a steadier income for farms and forests that are on the verge of losing economic viability, and thus
- An important economic boost to the small and medium-sized farm base that makes up 92% of US agriculture;
- The potential for improving ecological resilience and robustness of rural watersheds significantly enough to reduce the need for chemical inputs in agriculture, and reduce the demand for hard engineering infrastructure to provide development services;
- The opportunity to provide a direct and explicit investment link between urban and rural areas;
- The possibility of creating an insurance pool for farms engaged in generating ecosystem services to provide some level of financial support if new management strategies employed by these farms fail to generate an economic return;
- The advantage of using sense of place to entice individuals and corporations to contribute to the funding pool;
- A testing ground for innovative ES-based transactions that can help regulatory agencies test alternative compliance and mitigation mechanisms;
- A potential boost to the energy-conserving concepts of local/regional food systems; and
- The opportunity to develop new entrepreneurial employment located in rural areas, that both directly sustain agricultural production on small and medium-sized farms and forest, and indirectly support the surrounding rural communities.

Second, the project will contribute to *scholarly literature* in a number of specialty areas, including drivers of demographic and economic change in rural communities; the role of PES in persistent “ag of the middle” challenges; shifting trends in productivist models of agriculture toward new natural resources economies; the emerging nature of an ecosystem services-based economy and its effects on urban-rural relationships; aspects of sustainability studies; and diffusion of innovation studies. Specific studies of the role of corporate and public utility engagement in environmental restoration will emerge from the proposed project.

⁴ The USDA Office of Environmental Market recently instituted a “Farm of the Future Project”. http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=6908§ion=home, accessed 11 July 2010.

APPROACH

STUDY AREA AND CASE ANALYSIS

Our research will be focused intensively in Lane County, Oregon (Figure 1). Lane County (12,230km²) stretches from the Pacific coast to the crest of the West Central Cascade Mountains and contains the headwaters of the Willamette River, Oregon's most agriculturally productive basin. Although the majority of the county is in rural agricultural and forested uses, Lane County contains the second largest urban area in Oregon centered on the cities of Eugene and Springfield. As described above there is growing interest in identifying means of strengthening the urban-to-rural connection in Oregon and Lane County. We will work at the county scale to address Objectives 2 and 4 as described below.

The Eugene Water and Electric Board (EWEB) case study and service area falls entirely within Lane County. Although EWEB's combined water and electric service districts primarily serve the city of Eugene, the institution's electrical service extends westward to include a rural portion of the upper-mid McKenzie River watershed on the western slope of the Cascade Mountains (see Figure 1 below). The McKenzie River is the sole source of drinking water for the city of Eugene and several dams serve for hydropower production. A large proportion of the McKenzie Valley is contained within the Willamette National Forest (NF). The valley also contains several small rural communities (e.g., Leaburg, Vida, Blue River, and Belknap Springs, among others) that provide services for recreation visits to the local portion of the Willamette NF; many of these visits focus on the McKenzie River itself and associated reservoirs. We will work at the scale of the EWEB service and source water areas to address Objectives 1 and 3 as described below.

We have selected EWEB as the focus of the public utility portion of our study because it is already challenging its traditional business model through a number of projects that question how public utilities best engage with their customer base and the natural resources within their geographic service district. The project examples with key related objectives noted below illustrate the reach of this public utility's innovation, and will provide points of integration for our project as it develops.

(1) The INR-EWEB Forest Project will develop recommendations for (i) scientifically rigorous methods for characterizing, quantifying, valuing and monitoring multiple ecosystem services in the McKenzie Basin; (ii) conceptual models for creating bundled portfolios of ecosystem services, and dissemination of these models to government agencies, businesses, private landowners and the scientific community; and (iii) outreach and education strategies for interested landowners.

(2) The McKenzie Basin Demonstration Farm (for which EWEB shares ownership and management) will demonstrate how (i) crops can be sold to local markets (including school districts) via the Food Hub online tool (www.food-hub.org); (ii) agricultural land can coexist with and enhance riparian, floodplain and upland habitat (a preferable land use to houses) and how active agricultural and conservation easements can be used to protect land from future development; and (iii) energy efficiency and renewable energy can be developed on a farm to reduce operation costs and help increase the economic viability of farming. The Farm will

Project Narrative

also incorporate soil and water conservation projects and provide K-16 educational and research opportunities.

(3) The National Fish and Wildlife Foundation funded-EWEB Healthy Farms Clean Water Project will provide access to local markets that tend to pay more for crops; and encourage growers to participate in programs designed to increase energy efficiency, incorporate renewable energy, reduce water consumption and protect and/or restore riparian habitat.

Another EWEB innovation is that electricity users have the opportunity to purchase wind-produced electricity offsets (<http://www.eweb.org/greenpower/resources>). Current EWEB projects are located on the Washington-Oregon border (outside of the local area), however. Enhancing the feasibility of *local* landowner participation in this scheme is relevant to the scalar investigation in this proposal.

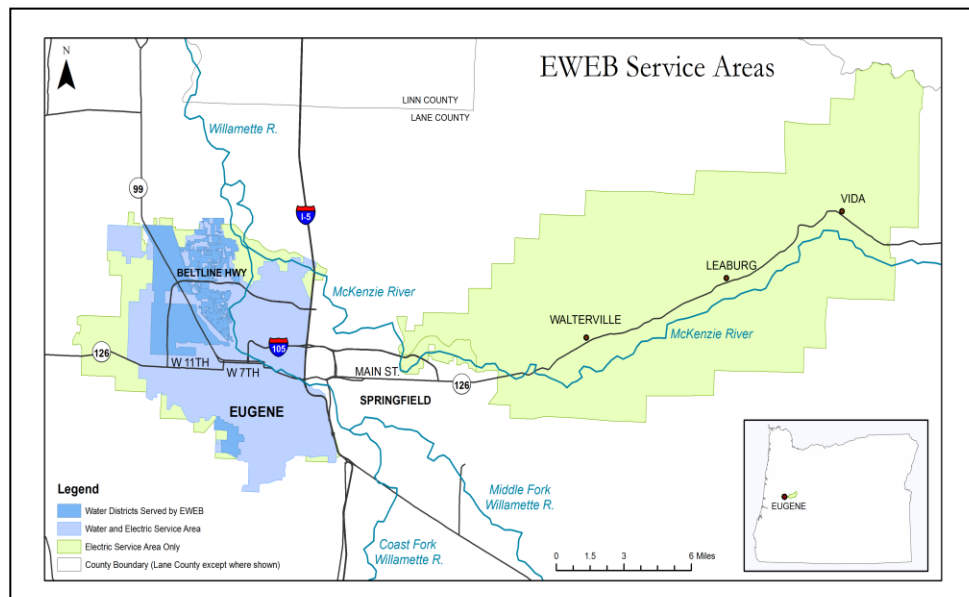


Figure 1. EWEB service area.

ACTIVITIES AND METHODS

Objective 1: *To explore the pathways through which public utilities could adopt PES-based incentive programs targeting small and medium-sized farms.*

a. Inventory of PNW public utilities involved in PES schemes

Drawing primarily on gray literature, the internet, and telephone inquiries, we will develop a comprehensive database of public utilities in the Pacific Northwest that currently offer customers the opportunity to supplement their utility bills with payments for local or regional conservation and stewardship; then create a typology to characterize the different institutional models and approaches they represent. There are approximately 20 public utilities servicing customers in Oregon and Washington, including EWEB.⁵ While EWEB will be our main case study, it will be important to evaluate EWEB's approach within a broader context.

⁵ Oregon - Columbia River PUD, Eugene Water & Electric Board, PacifiCorp (Pacific Power), Portland General Electric, West Oregon Electric Cooperative, Canby Electric, Salem Electric, Emerald PUD, Tillamook PUD, Ashland Electric, Wasco Electric; Washington - PacifiCorp (Pacific Power), Puget Sound Energy, Seattle City

b. EWEB case study/analysis

Using EWEB as a case study of opportunities, we will analyze the PES-related schemes in which it is engaged, those in the planning stages, and others under consideration. We will evaluate successes to date, and potential ecological and economic impacts on the utility and its customer base.

c. Interviews with key informants

We will conduct semi-structured interviews with key informants within and beyond the EWEB service area, including representatives from the utilities in the database described above. Interviewees will be selected through purposive sampling (Robson 1993, Bernard 2006) with the goal of learning more about the PES schemes various public utilities may be involved in or considering, especially the key challenges and barriers they face, as well as their thoughts on prospects for the future. We will sample to the point of saturation, which we anticipate to be 20-25 interviews. Interviews will last from one to three hours and will be conducted primarily in person, with some telephone interviews where necessary. Interviews will be recorded and transcribed and detailed field notes will be written following each interview. Analysis will rely on a grounded theory approach, wherein we will identify categories and concepts that emerge from the qualitative data and then link the concepts together into a plausible, substantive theory (Bernard 2006, Patton 2002, Glaser and Strauss 1967, Strauss and Corbin 1990). Our analysis will involve reading through the interview transcripts and field notes, identifying potential themes and their interconnections, and using NVivo software to organize these insights into theoretical models grounded in the data.

d. Survey of Lane County stakeholders

Drawing on findings from activities (a), (b), and (c); and on findings from Objective 2, we will use the Dillman (2000) tailored design method to survey a stratified random sample of potential buyers and sellers of ecosystem services emanating from small and medium-sized farms. Goals of the survey will be to (1) determine the types of ecosystem services that are of most value and interest to the public; (2) determine the willingness of Lane County citizens to participate in PES schemes involving public utilities; (3) determine the public's willingness to support corporations participating in a certification scheme that would benefit small and medium-sized landowners (see Objective 2); and (4) determine the mechanisms through which small and medium-sized landowners could benefit from a PES-based system associated with public utilities and/or corporations. The latter part of the survey will include sections focused on land management motivations and psychology related to PES programs, landowner willingness to accept PES payments relative to program requirements and mechanics, and landowner demographics. See Objective 3, Task b for more details about the survey approach, which will include a choice experiment. We will analyze survey data using OLS regression and ANOVA techniques to focus on the determinants of landowner and customer interest in participating in PES programs.

e. Synthesis

Drawing on the quantitative and qualitative data we collect, we will identify transferable and/or common strategies for public utilities seeking to act as brokers of urban-rural linkages. We will also analyze the potential for EWEB to increase its capacity for further investment in its service district community, identifying which program elements or specific projects are most feasible and of most interest to customers and landowners.

Objective 2: *To explore the pathways through which corporations could adopt a certification system based on the ecosystem services provided by small and medium-sized farms.*

a. Literature review

We will conduct a literature search to ascertain knowledge of successes and failures, and opportunities and barriers for commercial certification schemes. Our search will focus on certification schemes at global, national, regional, and local scales from across sectors to increase our capacity for comparison and adaptation of best practices to our study.

b. Corporate assessment

We will conduct interviews with key informants from local corporations to determine business perspectives on a potential PES-based certification system (Patton 2000), using OREGON GREEN as our first test model. We will target key informants from 10-15 local businesses in three categories of corporations (total of 30-45 interviews): those that provide goods and services to agricultural producers (e.g., local seed, farm supply, and irrigation businesses); those that source local agricultural products (e.g., local breweries, grocers, and landscaping materials businesses); and those that present themselves as sustainable or “green” businesses (e.g., local professional services, construction, and retail businesses). Interviews and thematic analysis will focus on key informants’ perspectives on the functional strengths and weaknesses of the proposed OREGON GREEN approach, knowledge gaps, motivations to participate, knowledge gaps, motivations to participate or not, emergent barriers, and mechanisms to get certification premiums to PES projects on the ground.

c. Landowner assessment

We will rely on the survey described under Objective 1 to identify the mechanisms through which landowners could best benefit from a corporate certification system such as OREGON GREEN.

d. Develop a conceptual PES-based certification model

We will develop a conceptual PES-based certification model based on best practices and lessons learned from the literature review and our learning from our corporate and landowner assessments, using OREGON GREEN as the test case. The conceptual model will provide a narrative description of the model program, a geographic focus for the model (e.g., a local watershed or landscape), and components focused on program administration, potential market value of certification label, supply chain of certification funds to small and medium sized ES producers, and verification of ES production among program recipients. We will prepare a draft report and presentation to explain the conceptual model to potential corporate participants, ES funds supply chain participants, and small and medium sized ES producers.

e. Test the validity of the conceptual model and revise

We will use the model in a series of focus groups with potential corporate participants, potential ES funds supply chain participants, and potential small and medium-sized ES producers to evaluate the validity of the model to the different sectors of the potential PES-based certification marketplace (Macnaghten and Myers 2004). Each focus group will be scheduled for 2 hours and include 6-10 participants. Focus groups will begin with the 15 to 20 minute conceptual model presentation developed in the previous activity and will be followed with a researcher-facilitated discussion. Focus groups will be audio recorded and transcribed for analysis to evaluate the viability (both strength and weaknesses) of the

conceptual model and opportunities for improvement. The conceptual model report and presentation will be revised and finalized following analysis of the focus group outcomes.

Objective 3: *To evaluate factors that may contribute to the feasibility of operating such funding/incentive systems at local, regional, and national scales.*

a. Landscape analysis to evaluate land use base and market opportunity (local scale)

We will focus on the rural Eugene outskirts and McKenzie Valley portions of the EWEB service area. For feasibility within the project timeline, we will focus on two locally important ES categories linked to public utilities: 1) recreation (clean water for boating and angling; forests for hiking, camping, and hunting) and income derived from recreation activities; and 2) management actions to improve carbon sequestration (which also may include wildlife habitat) on small and mid-size farms. To provide spatial context for findings from Objectives 1 and 2, and the integrative analysis required for Objective 4, land use data will be used to identify and spatially understand the local land use base, including knowledge of landowners' goals (e.g., cropping systems, woodlots), as well as available resources (e.g., boat ramps, campgrounds), and service providers (e.g., angler suppliers). Spatial information will be used to evaluate distribution and contiguity of selected land use types; to identify PES opportunities based on land use distribution; and to identify and map water- and carbon-related ES indicators (Boyd and Wainger 2003). Management for ES and "use" of the ES (e.g., recreation, carbon sequestration) are expected to have positive economic impacts as money moves between people and businesses within local communities. In addition, we will use the economic model IMPLAN (2010) to quantify the economic linkages between the rural portions of the EWEB service area; the economic activity associated with potential management for ES on small and mid-size farm operations; and expenditures by recreation resource users. These data will be targeted particularly towards integrative analysis in Objective 4.

b. Choice experiment to determine preferred scale of PES projects (regional scale)

Collaborating through design of the survey described under Objective 1, a choice experiment (Alpizar et al. 2001) will be used to assess consumer preference of functionality of PES programs. Subjects will be presented with a series of possible funding opportunities at local and regional scales, or non-preference (e.g. beyond regional scale, such as national). We will also investigate subjects' current participation in EWEB's opportunity to purchase electricity offsets, which will be used as an indicator of revealed behavior when given the option of contributing to "green" activities. Additionally, information about subject participation in McKenzie Valley recreational opportunities will be used to assess whether personal relationship with the McKenzie River or the services it provides is a factor among rural landowners and EWEB consumers (sense of place) in their individual preferences for PES program focus. These data may also provide a foundation for future research on managing recreation resources and related ES benefits on the Willamette National Forest, and subsequently on national forests nationwide.

c. Land use analysis to determine potential magnitude of PES opportunities for small and mid-size farms in proximity to hydropower structures (national scale)

Although hydropower is the primary source of electricity in the Pacific Northwest, hydropower facilities exist nationwide. This analysis will provide a starting point for future research quantifying the full extent of potential for agriculture and forestry lands to be

enrolled in PES programs that could be integrated with the utilities sector. For this task, we will assume that utility companies drawing on hydropower might support funding/incentives for ES derived from management actions that influence resource conditions near their hydropower stations and the rivers they affect. Drawing upon the regional findings from Objective 1, Task a (inventory/typology), we will use the typology to help identify counties around the country containing both significant acreages of small and mid-sized farms and forests that also are adjacent to major hydropower-relevant rivers used for recreation. These are likely to include the Snake River, Platte River, and closely-located Kentucky-Tennessee River complex. Locations of major dams will be identified using existing spatial data from the U.S. Corps of Engineers. Also available at the county level, National Land Cover Data (USGS) will be used to quantify rural agriculture and forestry lands and their uses in areas near dams and agriculture census data will be used to identify the number of small and mid-size farms, and cropped, pastured, and idled land. These data will allow us to evaluate potential suitability for agriculture management changes (e.g., tillage and fertilization changes, tree planting) that may qualify for PES (as discussed in description of local scale evaluation). Recreation resources (parks, trails, boat ramps, etc.) located near the hydropower dams will be identified as an indicator of the potential magnitude of recreation opportunities (and potential importance of that ES) around hydropower dams. As in the local analysis, we will use IMPLAN to quantify the economic linkages in the counties adjacent to the hydropower dams and the economic activity associated with management activities that would qualify for PES. Results will be compared with the local analyses as an indicator of whether PES investment around hydropower locations is a concept that is transferable outside of the local region.

Objective 4: *To analyze how such PES funding streams and incentives might (1) change the trajectory of urban-based investment in rural communities, and (2) significantly affect agricultural production.*

a. Synthesis of potential effects to the urban-to-rural investment climate

Using data from Objectives 1, 2, and 3, with relevant rurally-focused economic data (e.g. from Oregon Department of Agriculture, Oregon Economic Development Department, Lane County, and commercial lending institutions), researchers will analyze effects of increasing “urban” (corporate and utility) investment in rurally-based economic outcomes. This data integration and analysis will help us to understand how multiple factors, such as landowner and corporate psychology, PES model design, social capacity developed by public utilities, and others, interact to help actively reconnect rural landscapes with the urban centers they support and which support them. We recognize that such “reconnection” will not constitute a new economic trend as urban and rural landscapes are already connected in multiple ways, but our aim is to measure the degree to which the direct funding mechanisms we will explore contribute to an overall change in the urban-to-rural investment climate.

b. Synthesis of tradeoffs and synergies between agricultural and ES production

Using data from Objectives 1, 2, and 3, with relevant agricultural production data (e.g. from the Agricultural Research Service), researchers will analyze potential shifts in agricultural production outcomes of corporate and public utility investment programs. This analysis will consider possible rates of adoption of new funding models, and potential production trends for both traditional agricultural and ES products based on increasing investment levels. Our goal

in this activity is to identify the potential synergies and tradeoffs between the economic contributions of sustainable food and fiber production and the production of ecosystem services.

c. Synthesis of potential mutualisms between corporate and public utility PES programs

Using findings from steps a and b immediately above, as well as Objective 3, we will analyze the potential for corporate funding and public utility investment programs to mutually enhance each other's funding initiatives. Our goal is to identify the potential for corporate and public utility programs to leverage each other through unusual public/private partnerships.

EXPECTED OUTCOMES

All outcomes marked (M) will be the result of both qualitative and quantitative analysis and thus will be regarded as measurable on selected metrics. Those marked (P) are regarded as preliminary findings to inform additional research.

- Analysis of challenges and opportunities offered by two innovative approaches for creating additional sources of revenue for small and medium-sized farms and forests (M);
- Analysis of the specific challenges and opportunities available to public utilities and corporations interested in PES enterprises (M);
- Preliminary understanding of how selected market-based instruments might ultimately improve ecological resilience and economic robustness of rural watersheds (P);
- Clearer understanding of the effects of providing explicitly ecological investment links between urban and rural areas (M);
- Clearer understanding of whether a sense of place entices individuals and/or corporations to invest in local or regional ecosystem service production (P);
- Clearer understanding about how support for and PES distribution may vary across different scales and landscape contexts (P);
- A test case for innovative ES-based transactions that can help regulatory agencies test alternative compliance and mitigation mechanisms (M); and
- The opportunity to use findings to help develop new entrepreneurial employment located in rural areas (P).

DELIVERABLES

- I. A report on the feasibility of public utility engagement in PES schemes to improve revenue flows for small and medium-sized farms, and its transferability to other geographies and social contexts.
- II. A report on the feasibility of the proposed certification scheme (OREGON GREEN), or an adapted version of it, and its transferability to other geographies and social contexts.
- III. A GIS-based analysis to generate projections of watershed-scale economic and ecological effects of each of the approaches.
- IV. A synthesis report that integrates findings from Deliverables I through III to determine interactive effects of combining the two approaches, and incorporates broader findings about effects on urban-to-rural investment, and on overall agricultural (food and fiber) production.

HOW RESULTS WILL BE USED

Results will be used to:

- a. Produce deliverables as listed;
- b. Provide data for presentations by PIs and co-PIs at national, regional, and international conferences and professional meetings, as appropriate;
- c. Inform national associations of public utilities of opportunities to attract investment, engage with customers, and further support landowners in the rural communities of their service areas;
- d. Inform networks of corporate CEOs and managers about regional and local opportunities nationwide to improve their green ratings, further engage with potential customers, and commit to sustainable practices in a demonstrable way;
- e. Inform regulatory agencies of innovative opportunities for testing alternative compliance and mitigation opportunities in a voluntary setting; and
- f. Provide material for outreach and engagement of small and medium-sized landowners by relevant Extension faculty and associations of rural intermediaries.

POTENTIAL PITFALLS AND LIMITATIONS

As described in the methods sections above, we will build upon cases of innovation among public utilities. While we know of many such cases in the realm of energy conservation, there are very few, if any, that directly integrate payments for ecosystem services. In observing and helping to develop a new approach as the Eugene Water and Electric Board moves ahead with pioneering ideas already underway, we are fully aware that we are, in this area, breaking new ground. However, we could not feel more strongly that not only are public utilities in a critical leadership position for many aspects of innovative rural development, being a strategically-placed form of “connective tissue” for urban-to-rural community-building, but also that our very worst outcome is a series of important learning opportunities. Likewise, for the corporate certification scheme, we propose to build upon prior experience, lessons learned, and best practices in different sectors with certification systems and various forms of corporate sponsorship, but we are aware that we are creating a new approach out of a variety of contexts, and thus cannot attest to its proven value. Again, the learning and engagement potential of our activities far outweighs the potential downside of finding insufficient early adopters on either the supply or demand side for ecosystem services restoration and conservation. The GIS analysis will focus on a subset of all available ecosystem services

Table 1: Objectives, Milestones & Deliverables

OBJECTIVES		MONTH OF YEAR 1:											
		1	2	3	4	5	6	7	8	9	10	11	12
* Team building & project integration meeting 1A Inventory of PNW public utilities involved in PES schemes 1B Eugene Water and Electric Board case study/analysis 1C Interviews with key informants 1D Survey of Lane County stakeholders 1E Synthesis	1	■ preparation	■ fieldwork	■ analysis	■ analysis	■ analysis	■ interviews	■ preparation	■ preparation	■ analysis	■ survey	■ data integration	
	R												
	A	■ search	■ analysis						■ preparation	■ preparation	■ survey		
	E												
	Y	■ preparation					■ preparation	■ analysis					
MONTH OF YEAR 2:		1	2	3	4	5	6	7	8	9	10	11	12
* Preliminary data integration 1D Survey of Lane County stakeholders 1E Synthesis * DELIVERABLE I	1	■ analysis	■ analysis					UTIL/ PES REPORT					
	R												
	A	■ interviews	■ analysis	■ analysis	■ analysis	■ model development	■ report & presentation	■ focus groups				OREGON GREEN REPORT	
	E												
	Y	■ preparation											
* DELIVERABLE II 2B Corporate assessment 2C Landowner assessment 2D Develop certification model 2E Test validity of model	1												
	R												
	A												
	E												
	Y	■ reporting, presenting, & submitting to peer review	■ analysis	■ reporting, presenting, & submitting to peer review	■ reporting, presenting, & submitting to peer review	■ reporting, presenting, & submitting to peer review	■ reporting, presenting, & submitting to peer review						
* DELIVERABLE III 3A Land use base/market opportunity landscape analysis (local scale) 3B Preferred scale of PES projects choice experiment (regional scale) 3C PES opportunities for farms near hydropower analysis (natl scale)	1												
	R												
	A												
	E												
	Y	■ design process	■ data integration	■ analysis	■ analysis	■ analysis	■ analysis						
* DELIVERABLE IV 4A Synthesize effects of urban-to-rural investment climate 4B Synthesize tradeoffs & synergies between ag & ES production 4C Synthesize mutualisms - corporate/public utility PES programs * DELIVERABLE IV	1												
	R												
	A												
	E												
	Y	■ design process	■ data integration	■ data integration	■ data integration	■ data integration	■ data integration						SYNTHESIS REPORT