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The Economic and Employment Impacts of Forest and Watershed Restoration

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Abstract

Globally, ecological restoration activities are increasing in response to environmental, economic, and cultural trends that value ecological capital for the services provided by healthy functioning ecosystems. To ensure continued investment in ecological restoration, practitioners and researchers need to identify links to the benefits accrued to society from ecological restoration practice and policy. Nonetheless, a recent review of published literature on ecological restoration concludes that the policy and socioeconomic contributions of ecological restoration are often ignored. To help fill this gap, we describe the policy context of a sustained program of forest and watershed restoration in Oregon, U.S.A. and report on three related studies on the market structure and resulting economic impacts of this program of work in Oregon. The first study examines the experiences of watershed councils ($n = 52$) in mobilizing human resources for ecological restoration. The second focuses on the businesses and firms ($n = 190$) that participate in Oregon's restoration economy. The third analyzes the employment and economic impacts from a sample of Oregon Watershed Enhancement Board restoration grants ($n = 99$). We found that the sustained program of restoration work in Oregon has conferred significant benefits to Oregon's economy. These impacts largely accrue to rural areas in need of economic development opportunities due to declines in traditional resource management activities. In addition to approximately 16 jobs supported per million dollars invested in ecological restoration, a sustained investment in restoration has created both new local organizational capacity in watershed councils and other community-based partners and business opportunities especially in rural Oregon.

Key words: businesses, employment, IMPLAN, input–output modeling, The Oregon Plan, watershed councils.

Introduction

Governments, nonprofits, and others use ecological restoration programs to improve the services provided by ecosystems, avoid costs, respond to global and local policy commitments, and educate the public about environmental sustainability (Constanza 2000; MA 2005; Aronson et al. 2010). A growing number of community and economic development practitioners also support ecological restoration as a means of job and wealth creation in rural and underserved communities (Hibbard & Karle 2002).

Publically funded conservation and restoration initiatives are increasingly common across the United States and globally (Woodworth 2006; Clewell & Aronson 2007). Investments in stream restoration initiatives in the United States alone were estimated to average greater than $1 billion per year between 1990 and 2005 (Bernhardt et al. 2005). Since 1998, more than 1700 voter-approved initiatives raised over $57 billion for public conservation and ecological restoration initiatives in 43 of 50 states (Trust for Public Land 2011).

As the practice of ecological restoration has grown, so too has the need to quantify the outcomes (Ferraro & Pattanayak 2006). Recent meta-analyses have examined methods for monitoring restoration successes (Ruiz-Jaen & Aide 2005) and the socioeconomic outcomes of restoration (Aronson et al. 2010). For example, Rey Benayas et al. (2009) concluded that the ecological response from restoration of degraded ecosystems offers "the potential of a win–win solution in terms of combining biodiversity objectives with socioeconomic development objectives" (p. 1124). However, Aronson et al. (2010) concluded that, "the most tangible and concrete socioeconomic contributions of restoration to society are underemphasized, or often ignored altogether" (p. 151).

The impacts of ecological restoration on market structures and local economies are not well quantified. Few studies have focused on understanding the institutional capacities, professional skills, or transactional mechanisms needed for governments, organizations, businesses, and workers to organize, develop, finance, and implement a program of restoration work (Hibbard & Lurie 2006). In addition, although research on the distributive and economic consequences of extractive natural resource policy has a long history (Waggener 1977; Force et al. 1993; Moseley & Reyes 2007), there has been virtually no systematic empirical research to quantify the economic

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impacts of ecological restoration policy. In many local communities traditional resource utilization activities have declined substantially (Haynes 2002; Nelson 2002) and ecological restoration offers an alternative economic opportunity.

In this article, we present the results from three interconnected studies from Oregon, U.S.A. to examine the market structure that has emerged to develop, finance, and implement restoration projects and the economic impacts that result from investments in forest and watershed restoration (for more information see http://ewp.uoregon.edu/economy). Specifically, we examine that part of the restoration economy funded by the Oregon Watershed Enhancement Board (OWEB), the US Forest Service, the Bureau of Land Management, and the US Fish and Wildlife Service. We asked three questions:

1. How have the organizations, businesses, and practitioners involved in forest and watershed restoration changed over the past decade?
2. What types of firms benefit from investments in forest and watershed restoration?
3. What are the impacts from forest and watershed restoration to employment, wages, and economic activity at the state and county levels?

Policy Context

The adoption of the Northwest Forest Plan in 1994 began to shift the US Forest Service away from timber management to ecosystem management and restoration (Yaffee 1994). The Plan's Northwest Economic Adjustment Initiative sought to "retool" the labor force, industry, and communities toward a focus on ecological restoration with programs such as Jobs in the Woods and the Rural Community Assistance program (Daniels et al. 2000; Dillingham 2006). These new programs focused on conservation of endangered species habitat, water quality improvements, noxious weed abatement, and fire hazard reduction (Vaughn & Cortner 2005), and were promoted as a strategy to create jobs performing restoration work (Spencer 1999). Subsequent policies such as the National Fire Plan's Economic Action Program (Becker et al. 2009) and the Collaborative Forest Landscape Restoration Program further emphasized the importance of combining ecological and socioeconomic outcomes in national forest restoration.

In the early 1990s, the state of Oregon began promoting watershed councils to promote voluntary restoration of rivers and salmon habitat. The Oregon Legislature formally recognized watershed councils in 1993 and gave two guidelines for their creation: (1) the creation of watershed councils would be the voluntary responsibility of local stakeholders and (2) watershed council membership must represent a balance of affected interests within the watershed (Soscia 1997; Hibbard & Lurie 2006). By limiting watershed council to these two tenets, the Oregon legislature allowed local stakeholders to create the watershed council structure and accountability mechanisms that best fit their community. By 2001, 154 watershed councils existed across Oregon (Smith & Gilden 2002), with a variety of different organizational structures and at different developmental stages. One commonality, however, is that watershed council missions generally support both ecological and socioeconomic watershed health.

In response to listing considerations for several species of salmon under the Endangered Species Act, the State of Oregon launched the Oregon Plan for Salmon and Watersheds (or the Oregon Plan) to focus on salmon and steelhead recovery as well as watershed restoration and water quality. The Oregon Plan relied on (1) investing in community-based solutions; (2) coordinating federal, state, and other stakeholders; and (3) monitoring and adaptation (Coe-Juell 2005). Oregon voters then passed a ballot measure in 1998 that dedicated 7.5% of lottery proceeds for 15 years to watershed restoration. To coordinate the implementation of the Oregon Plan, the Oregon legislature created OWEB, which oversees grant funds for watershed restoration, monitoring, education, and watershed council capacity. Lottery funding generated approximately $169 million in competitive restoration grants between 1995 and 2007, and over $500 million in Oregon Plan activities was recorded when coupled with funding from federal land management agencies and the National Marine Fisheries Service (OWEB 2009). In 2010, Oregonians permanently reauthorized the lottery funding for the Oregon Plan.

Watershed councils and soil and water conservation districts continue to be the primary community-based partners for the Oregon Plan. Watershed councils and other community-based organizations hire staff and contractors to undertake outreach and planning, develop restoration projects, and obtain funding from state, federal, and philanthropic sources. In turn, contractors hire employees to do labor-, technical-, and equipment-intensive work. This focus on ecological restoration by both Oregon and federal forest management has fostered a new type of economic opportunity and led to the creation and growth of a restoration economy (Fig. 1). We aim to provide insights from Oregon's experience useful for examining publically funded conservation and ecological restoration programs across the globe.

Methods

We report on the results of three independent, but related studies. The three studies collected data from the three primary sectors involved in ecological restoration: government entities, non-governmental conservation organizations, and private sector businesses. We focused on the organizational and market structures and economic impacts that have emerged from interactions among these three sectors.

Qualitative Interviews of Watershed Council Staff

We invited the coordinators and directors from the 64 watershed councils that received operational support from OWEB in 2009 to participate in semi-structured interviews, and conducted 52 interviews during the summer of 2009. Participants were asked to discuss their experiences hiring

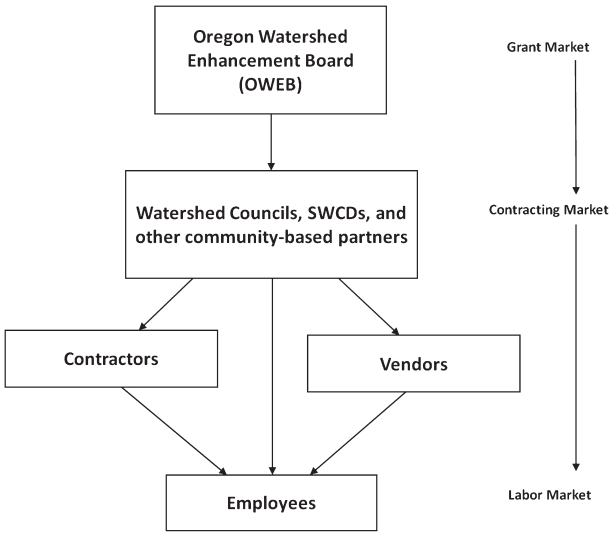

Figure 1. Conceptual diagram of the ecological restoration sector stemming from the Oregon Plan.

staff and contractors. Interviews were recorded and notes were transcribed and analyzed with an emphasis on identifying themes related to changes in the availability of skilled restoration practitioners over time. We report on the main findings from the interviews and provide selected quotations from the participants as evidence to support those findings.

Survey of Forest and Watershed Restoration Contractors

The second study was a multi-mode survey of restoration contractors that allowed participants to respond by telephone, mail, or Internet and followed a modified Dillman (2000) method for each mode. The questionnaire asked contractors about their business characteristics, their expenditures when doing restoration work, and their experiences working in the field of ecological restoration. All respondents were prescreened to ensure their businesses had recently worked on ecological restoration projects. For expenditures, we asked respondents to report costs associated with labor, equipment and other capital, material and supplies, overhead, and other expenditures. The labor and materials/supplies categories were further broken down into six and seven specific subcategories, respectively. Respondents were also queried about whether the equipment they use for restoration work is typically owned (fixed cost) or leased (variable cost).

We developed two sampling frames for identifying contractors. First, we developed a random sample of 220 businesses that had worked for the US Forest Service, Bureau of Land Management, or the US Fish and Wildlife Service performing forestry and natural resource-related services in Oregon between 2002 and 2008. Second, we selected all 198 contractors who performed services for a randomly sampled set of 99 OWEB restoration grants. We received responses from 101 contractors from the federal sample, 83 contractors from OWEB sample, and 6 contractors who appeared in both sampling frames for response rates of 49 and 45%, respectively. On the basis of responses to the survey, we classified whether or not firms were primarily a federal contractor. We report results of the survey by each firm type and examined differences in firm characteristics using Chi-square tests.

Financial Data from OWEB Grants

The third study conducted an economic impact analysis of OWEB investments by analyzing the financial records of a random sample of OWEB restoration grants for which OWEB paid more than half the projects' costs. Restoration grants were stratified by project type (i.e. in-stream, riparian, wetland, fish passage, upland, and other), and between 14 and 20 grants were randomly selected per category. Paper financial archives were examined and all invoices for each grant digitized. The vendor establishment for each invoice was classified using the six-digit 2007 North American Industrial Classification System (US Census Bureau 2010*a*), the IMPLAN 440 sectoring scheme (Minnesota IMPLAN Group 2010), and the vendor's business location. Vendors located outside of the county where the project occurred were defined as non-local. Nearly 3000 invoices from more than 700 vendors representing approximately $7.5 million in grant expenditures were recorded and classified.

We used IMPLAN 3.0 (Minnesota IMPLAN Group 2010) to estimate the economic impacts of OWEB investments on Oregon's economy and at the county level, differentiating between project types and metropolitan and non-metropolitan counties. We used the expenditure profiles developed from the contractor survey rather than the defaults provided by IMPLAN for invoices from vendors classified as support activities for forestry, logging, construction, or environmental consulting services. This approach allowed us to generate IMPLAN models with empirically based components for the major restoration contracting areas. In doing so, we explicitly recognized that the labor, skills, equipment, and materials required by contractors performing restoration activities may be different than when they perform non-restoration activities.

We report impacts in terms of jobs, wages, overall economic activity, and multipliers produced per $1 million in investments in ecological restoration. Multipliers reflect the additional jobs, wages, and economic activity created as the investment cycles through the local economy. Expenditures by local grantees with non-local vendors reduce the overall impact of restoration investments on the local economy by creating initial economic leakage, defined as the proportion of a restoration investment that is spent outside of the local economy.

Results

An Emerging Forest and Watershed Restoration Sector

Our analysis of the 52 interviews with watershed council coordinators and executive directors in Oregon revealed: (1) watershed council capacity is increasing as more councils recognize the need for a diverse professional staff, and

(2) contractors are increasingly developing specialized skills for ecological restoration practices.

Building Internal Capacity. Watershed council coordinators described themselves at the center of local institutions for natural resource management with growing capacity to develop, plan, and coordinate the implementation of restoration projects. Although most watershed councils were originally conceived as stakeholder groups to be facilitated by a single coordinator (and a number remain as such), most of the coordinators we interviewed represented councils that had decided that to achieve their goals a larger organization and division of labor was required:

> The council recognized that it was impossible to get meaningful work done at any meaningful scale with just one person because of the amount of work that needs to be done and the nature of watershed work, requiring a bunch of different types of skill sets—project management people, fiscal people, technical, communication people, big picture people. You can't get all of these skill sets in one person and expect them to be excellent in all of these categories.

While management and leadership skills were a common focus of building capacity there was not consistent agreement among interviewees about the need to build the technical skills of council staff. Many coordinators remarked that sufficient technical skills already existed in their communities that could be accessed through in-kind agreements with federal and state agencies, or could be contracted through the private sector. Over 80% of interviewees reported receiving in-kind technical assistance from state or federal agencies. Others indicated that technical work such as watershed assessments, designs, and engineering was typically contracted. One interviewee suggested that contracting out technical work, "frees up staff to use their time to build relationships, management, leadership, partnership building, and things that you can't contract out." Commonly referred to contracted restoration work included activities such as forest thinning, riparian planting, in-stream habitat restoration, fish passage, and upgrades to water delivery systems.

Contractor Specialization in Ecological Restoration. Watershed council coordinators also described increased knowledge and skills for ecological restoration among contractors. A number of coordinators described a co-evolution of the complexity of the council's restoration projects and the need for skilled contractors. And as their complexity and budgets have grown, many coordinators described the recognition from contractors that ecological restoration work is valuable work:

> [We] used to have to beg to get contractors to go on site tours, and now contractors are recognizing that [we] have money, and that restoration work can be a real source of revenue for them. [We're] not just greeny environmentalists now, but real people with money.

While not the case in every interview, many coordinators suggested that an increasing number of contractors were creating a market niche in ecological restoration work: "I see a lot more contractors now specializing in restoration; they have references from watershed council work that they are advertising." And, while exclusive specialization may not be the norm, a growing number in the workforce are using ecological restoration work to even out their workload across the year, "...folks do restoration work in the summer and then work for municipalities during the remainder of the year."

Although a few interviewees described experiences with unprepared or inexperienced contractors, most described their business partners as well prepared to do the restoration work they demand. Interviewees stressed the importance of good experience, qualifications, and training in their contracting decisions:

> The council is trying to be very clear that qualifications matter on projects, they are not going to just take the lowest bid; they want contractors that have experience doing this work before they actually give out the contract.

One coordinator summarized his experience working with contractors over the past decade by saying:

> There is enough watershed work to be done that the industry has hit a critical mass where people can build business around it rather than just being a novelty.

Firms Involved in Ecological Restoration

We classified 180 of 190 responses from the business owner and manager survey (10 were omitted for missing data) as contractors that primarily work for federal clients (52 or 29%), contractors that primarily work for non-federal clients (85 or 47%), and those that work about equally for federal and non-federal clients (43 or 24%); we report these mixed-client responses with the non-federal group as their responses did not significantly differ from each other.

Small, Family-owned, Seasonal Businesses. All but two of the businesses we interviewed fit the Small Business Administration's definition of small business (USSBA 2010). A total of 125 (69%) businesses reported an average of less than $1 million in annual revenues over the past 3 years, while 62 (34%) reported annual revenues less than $250,000. Only seven (4%) reported annual revenues greater than $7 million. The business owners and managers of 135 (75%) businesses considered their firms family-owned; 126 were incorporated (70%), while 51 (28%) were sole proprietorships. Seasonality was common among the participating firms. Of those that responded, 154 (86%) experienced seasonal fluctuations in employment and workload. The median winter employment was two employees and median summer employment was seven employees.

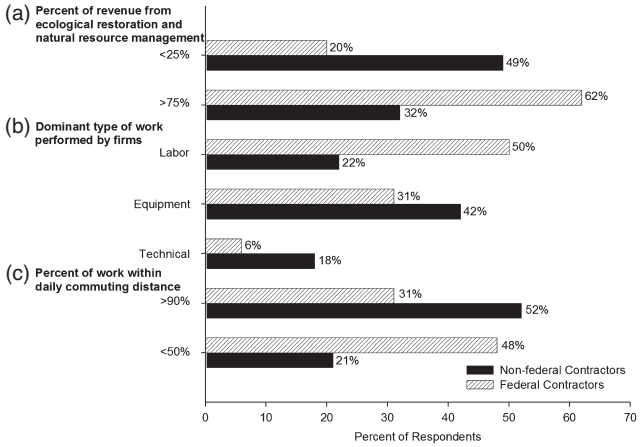

Figure 2. Key business strategies of firms that contract primarily with the federal government and firms that do not. Chi-square (χ^2) tests are all significant at the $\alpha = 0.01$ level ($n = 180$).

Differentiated Business Strategies. Business strategies varied significantly between those firms that worked primarily for the federal government and those that do not (Chi-square tests significant at $\alpha = 0.01$; Fig. 2). Nearly two-thirds of those firms that contract primarily with the federal government earned more than three-quarters of their annual revenue from ecological restoration or natural resource management work. In contrast, about half of the remaining firms earned less than one-quarter of annual revenues from this type of work. Also, a greater proportion of federal contractors did labor-intensive work such as manual hazardous fuels reduction or riparian planting, whereas those firms that did not contract primarily with the federal government tended to be more involved in heavy equipment or technical work like design and engineering. Firms that contracted primarily with the federal government reported a range between 19 and 45 employees compared with 8 to 20 employees for all other firms. Finally, nearly half of firms that contract primarily for the federal government work outside of their daily commuting distance more than half the time, while over half the remaining firms tend to work 90% or more of the time near home.

Business Experiences with Ecological Restoration Over the Past Decade

Of the firms that contracted primarily with the federal government, 14 (28%) reported an increase in forest and watershed work opportunities, whereas 23 (46%) thought that their opportunities had decreased; the remaining quarter reported no change in opportunities. In contrast, the pattern was reversed for the remaining firms. Thirty-nine (52%) reported an increase in their work opportunities for forest and watershed work over the past decade, while only 27 (36%) reported a decrease; 9 (12%) reported no change. Although most firms that reported a decline in work opportunities attributed the change to the federal forest policy, many respondents noted a shift in the focus of their work to forest and watershed restoration. Nearly, all respondents discussed their needs to diversify their businesses to remain relevant:

> A little over two years ago, there was a conscious decision to go after this work. It takes a lot of work to do this, paper work and tracking jobs... and a lot of people won't spend the time it takes to get in the program. The stewardship work is hard to switch over from real logging. And we are not wholly proficient at it yet, but we are seeing the writing on the wall...

One owner of a former logging business stated bluntly that, "the restoration work has allowed our business to continue to function."

The Economic Impacts of Forest and Watershed Restoration

To quantify the economic effects of ecological restoration, we used spending patterns from OWEB restoration grants to model economic and employment impacts in Oregon.

Grant Expenditure Profile. Although variable across different project types, we found that on average 45% of the grant funds were contracted directly to private sector firms to perform on-the-ground services related to the project (69% of wetland, 67% of fish passage, and 20% of riparian project expenses were contracted directly to private sector firms). Construction and heavy equipment contractors were the most common private sector firms hired. Grant recipients used the remaining funds primarily to purchase materials and supplies and pay wages. Grant recipients procured 90% of goods and services from Oregon vendors (Table 1). At the county level, initial leakage (i.e. grant expenditures that occurred outside of the local economy) was greatest in metropolitan counties and least in non-metropolitan counties. Leakage was driven by construction and heavy equipment contracting, which constituted over half of both metropolitan and non-metropolitan county expenditure profiles, but for which only 3% was spent locally in metropolitan counties compared to 30% in non-metropolitan

Table 1. Local expenditure proportions in major expenditure categories for OWEB restoration grants at the statewide and county levels.

	Statewide	*Metro Counties*	*Non-Metro Counties*
Construction and Equipment Contractors	0.33	0.03	0.30
Wholesale and Retail Trade	0.14	0.11	0.06
Non-profit organizations	0.12	0.05	0.05
Logging and Forestry Operations	0.07	0.03	0.07
Local government	0.03	0.06	0.07
Technical Service Providers	0.03	0.04	0.02
Others	0.18	0.02	0.05
Initial Leakage[a]	0.10	0.66	0.38

[a] Initial leakage is defined as the expenditures made by local grantees to vendors located outside of the local economy (Oregon or the relevant county).

Table 2. Total employment, wages, and economic output and multipliers per million dollars of OWEB restoration grants for Oregon and metropolitan/non-metropolitan counties in Oregon.

	Project Types (number of grants)	*Employment (jobs)*		*Economic Output ($)*		*Wages ($)*	
		Total	*Multiplier*[a]	*Total*	*Multiplier*[a]	*Total*	*Average*[b]
Oregon							
	In-stream ($n = 19$)	14.7	2.3–3.2	2,203,851	1.7–2.2	535,000	36,400
	Riparian ($n = 18$)	23.1	2.4–3.1	2,310,128	1.7–2.4	725,000	31,000
	Wetland ($n = 11$)	17.6	2.4–3.4	2,259,422	1.8–2.4	630,000	35,800
	Fish passage ($n = 19$)	15.2	2.3–3.3	2,240,281	1.8–2.3	573,000	37,700
	Upland ($n = 20$)	15.0	2.9–4.0	2,476,290	2.0–2.6	616,000	41,000
	Other ($n = 12$)	14.7	2.4–3.4	2,270,862	1.8–2.3	560,000	38,100
	All ($n = 99$)	16.3	2.7–3.8	2,311,468	1.9–2.4	589,000	36,135
Counties							
Metropolitan	All projects ($n = 25$)	7.1	1.6–2.1	431,000	1.2–2.1	265,000	37,886
Non-metropolitan	All projects ($n = 74$)	12.5	1.5–1.7	558,000	1.1–1.5	424,000	33,852

[a] Multipliers reflect the additional jobs, wages, and overall economic activity created as the investment cycles through the local economy, and are reported as the range of Type I and Type SAM multipliers. The Type I multiplier is calculated as the sum of the direct and indirect effects divided by the direct effects. Type SAM multipliers include all effects including those from employees spending wages.

[b] Average wages are calculated as the total wages generated divided by the number of jobs.

counties. Projects in non-metropolitan counties spent 62% of expenditures locally. In contrast, only 34% of expenditures for projects in metropolitan counties were spent locally.

Employment and Economic Impacts. We found that on average 16.3 jobs were supported in Oregon per million grant dollars, generating $589,000 in total wages and $2.3 million in overall economic activity (Table 2). At the county level, projects in non-metropolitan counties supported nearly 40% more jobs per grant dollar and about 60% more total wages, and 30% more economic activity than did projects in metropolitan counties. Riparian projects, which tend to involve labor-intensive plantings and fencing, supported the most jobs and wages, while upland projects supported the most overall economic activity. Equipment-intensive projects such as fish passage and upland work produced the highest average wages per worker (about $38,000 to $41,000 per job, respectively). Labor-intensive projects like riparian projects produced the lowest average wage per worker (about $31,000 per job).

Discussion

A sustained program of ecological restoration requires a network of interactions among government, community-based, and business actors (Wolf 2011). Engaging the energy, enthusiasm, and support of local collaboratives was a deliberate strategy of policymakers who designed the Oregon Plan (Coe-Juell 2005). This emergence of new community-based institutions has not only helped to build the social agreement among stakeholders needed to make forest and watershed restoration possible, it has also strengthened local community capacity to mobilize human resources to solve a diversity of complex natural resource management problems. Across the globe similar results have been reported for collaborative and community-based approaches to natural resource management (Charnley & Poe 2007).

Although the restoration economy in Oregon has grown in scope and complexity over the past two decades, forest and watershed restoration remains a fraction of the economic activity in natural resource sectors. Payroll for forestry, fishing, agriculture, and supporting activities in 2007 alone was nearly $450 million (US Census Bureau 2010*b*), while restoration investments in Oregon between 1995 and 2007 were slightly greater than $500 million (OWEB 2009). Nevertheless, our models suggest that OWEB's investment in competitive restoration grants alone (approximately $168.5 million) resulted in nearly 2700 jobs and $400 million in total economic activity over a period when traditional natural resource sectors were in decline. We reflect on lessons from Oregon's policy-driven approach as a means for sustaining a program of ecological restoration and providing new economic development.

Oregon's watershed councils have emerged as local agents for coordinating landowners, government agencies, and businesses to accomplish ecological restoration goals. Watershed councils have adopted a variety of approaches for mobilizing human resources needed to carry out their work. Most of the watershed councils we examined had grown their staff in an effort to create a division of labor and increased capacity for developing and managing increasingly complex projects. Contracting was another common strategy for mobilizing human resources, often in recognition that the scale and complexity of much of the restoration work that watershed councils are coordinating has increased beyond the capacity of staff and volunteers.

To adapt to the changing opportunities and policy context for natural resource management, many contractors discussed their needs to diversify their skills to work in this new business environment. In addition, there are an increasing number of contractors coming from non-natural resource sectors to take advantage of opportunities working for watershed councils and other community-based organizations. Businesses that are well-equipped or have adapted by diversifying their skills

and services tended to capture a broader range of work and capitalize on new opportunities. Failing to adapt to the increasing needs for a diversity of ecological restoration skills and technical capabilities may limit new opportunities for contractors as increased competition puts some work out of reach for some firms.

Our results show that although overall firms have experienced an increase in work opportunities, federal contractors most commonly reported a decrease in opportunities. The majority of federal contractors performed labor- or technically intensive work, and operated a business model that required travel to find work opportunities. Increased competitiveness for technical skills may explain why many of these firms reported a decrease in work opportunities as the regional labor-intensive business model may leave less opportunities for market differentiation among firms (Moseley & Reyes 2008). Furthermore, the business model pursued most commonly by federal contractors—seeking work across the Pacific Northwest—will likely lead to lower local economic impacts as wages, equipment purchases, supplies, and other expenses are mostly spent in the location where the contractor and employees are based. Workforce training programs—which are used globally to build local capacity and improve environmental conditions (Woodworth 2006; Blignaut & van Aarde 2007)—and monitoring the local capture of federal contracts in areas where restoration is growing may help to encourage more economic development and sustainable rural communities.

Contracting directly between business and government is the norm in the federal land management (Moseley & Reyes 2008) and the economic impacts are similar to the impacts we report here (Nielsen-Pincus & Moseley 2010). However, much of the work associated with project management, restoration design, and other technical work is completed by federal employees, whose value is not reflected in the value of a contract for restoration services. Therefore, comparisons between direct government contracting and project implementation facilitated by community-based organizations, as represented in the Oregon Plan model, may be confounded. While direct government contracting for restoration is and will continue to be an important part of the regional restoration economy, it typically has not contributed to the network of non-governmental capacity so important for restoration, especially on private or communal lands (Charnley & Poe 2007).

Watershed council coordinators discussed prioritizing local contractors for all kinds of restoration tasks. This was consistent with the grant fiscal data we analyzed—60% of expenditures on restoration projects occurred in the county where the work occurred—and supports the claim that an increasing number of contractors are developing specialized skills to support ecological restoration work. Nonetheless, significant non-local grant spending does occur, reducing the local economic impact through initial leakage. Metropolitan counties had higher rates of initial leakage than non-metropolitan counties likely because the equipment contractors providing restoration services tended to be located in non-metropolitan areas. Non-metropolitan counties had greater overall employment, wage, and economic impacts because a greater proportion of restoration investments are spent locally, especially in key sectors like equipment-intensive work. In contrast, although less money is spent locally in metropolitan counties, the larger multipliers observed for metropolitan counties indicate that local spending in those counties circulates longer in the local economy.

The sustained program of restoration work in Oregon has conferred significant benefits to Oregon's economy and produces ecosystem services from which the public benefits. These impacts largely accrue to rural areas in need of economic development opportunities and are similar to other public investments in "green" infrastructure (Heintz et al. 2009). In addition to jobs, the sustained investment in forest and watershed restoration has created both new local organizational capacity (e.g. watershed councils) and business opportunities especially in rural Oregon. These findings are not unique to Oregon, forested settings, or watershed restoration, but rather are the result of a policy framework that supports the development of community capacity to plan and implement a program of ecological restoration. This policy framework, construed through the lens of ecosystem services, may provide a conceptual hook for examining how the any restoration economy affects the sustainability of the people, ranches, farms, and forests that create the foundation of rural communities.

Implications for Practice

- Policymakers should consider how ecological restoration programs designed to rely on direct government contracting may differ in their potential for local economic and business development from programs oriented toward building local non-governmental institutions for ecological restoration.
- Local institutions for ecological restoration can help to create a broad base of public support for ecological restoration by building local constituencies of practitioners, businesses, and citizens.
- Workforce training programs, which are broadly applied as policy measures in emerging fields (e.g. health care, high-tech, etc.), can assist contractors in diversifying their skills to work in the increasingly complex and technical environment of ecological restoration.
- Collecting, analyzing, and reporting social and economic data relevant to ecological restoration is a critical part of understanding the limitations and opportunities presented by ecological restoration policy.

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