

# Rural America

## The Rise of New Natural Resource Economies in the Intermountain West



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Michael Hibbard, and Robert Parker for their mentorship and guidance throughout this research project.

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## Abstract

With many western rural communities facing declining populations, services, and a lack of employment opportunities, this study highlights a more sustainable approach to rural economic development. Leaving behind the industrial, automated, and commodity production which rural communities historically relied upon, this research focuses on firms that are part of the New Natural Resource Economy (NNRE). This sector is multifunctional and includes various businesses that are tied into tourism, ecosystem services, natural resource management, and sustainable agriculture. With site visits and interviews conducted throughout Montana, Colorado, and Oregon, this research provides the current state of the NNRE, and the strategies that can help promote its growth.



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# Chapter One

Problem Statement

## Introduction

With the decline of natural resource based economies throughout the western United States, communities are re-envisioning the way they promote job growth and development. Historically, rural communities thrived from the post-Civil War era into the 1980s. The west became an investment arena for Western Europe and the Eastern United States as railroads, timber, mineral extraction, cattle and other agricultural enterprises attracted settlers and finance capitalists. Although the production of these resources depended on the west, most capital generated left rural regions, flowing into the major metropolitan centers located in the eastern United States.<sup>17</sup>

Historically, rural communities depended on these industries as they comprised the economic base of the rural west. As the 20th century progressed, the increasing automation, standardization, and specialization of these industries continued to fuel the divide between the urban and rural west. Although less employment opportunities and increasing migration to urban centers caused rural populations to see little growth since the 1920s, small towns continued to thrive into the 1980s.<sup>9</sup>

After this period, the small towns that depended on natural-resource extraction industries quickly succumbed to globalized markets and the regulatory environment. Although some amenity-rich communities stayed viable through this transition, they depended largely on healthy ecosystems. Communities with environmental attractions including rivers, lakes, or natural scenery created an economy focused on tourism, recreation, and retirement. Those that pivoted in this direction experienced unprecedented growth, as service sector job opportunities, local wealth, and populations increased.<sup>4</sup>

Unfortunately, many rural communities didn't have attractive recreational qualities and thus, did not experience this growth as primary production industries continued to struggle. With the exception of oil and gas booms in certain rural regions, most of the western rural economy has struggled to survive.<sup>4</sup>

In recent years, a new natural resource economy (NNRE) is emerging. Focusing on environmentally sustainable agriculture and extraction processes, these new industries are striving to promote a holistic approach to rural economic development. Industries including environmental restoration, eco/agritourism, and sustainable food/forest products are slowly becoming viable options in promoting growth back into rural communities. This new sector is striving to transform the Intermountain West, with rural towns beginning to invest in an economic base that is both productive and environmentally sustainable.<sup>4</sup>

This study analyzes these new natural resource economies, focusing on the organizations and businesses that have taken the lead in the transformation of the Intermountain West. With interviews, site visits, and case studies from Colorado, Montana, and Oregon, this research analyzes the policies, programs, and tools being provided by organizations to promote the growth and expansion of the NNRE.



## Background

Historically, the western expansion of the U.S. began with the capital investments which provided necessary regional improvements and infrastructure. Investments in rail line expansion, coincided with efforts to control and confine Native Americans in these regions, were the beginning stages of this expansion. During this period, the wholesale slaughter of bison, along with the end of the Native American pastoral and communitarian modes of existence, helped to open millions of acres of western land to the free market. Ultimately, the combination of forced treaties and the genocide of natives and their means of living, began the commodification of land and resources in the rural west. Identifying the value of these amenities, the federal government continued to expand its efforts. By creating legal policies and tools that assisted in the commodification and distribution of land, private property was distributed in the form of grants and incentives to settlers, railroad, and mining companies.<sup>17</sup>

For the last 30 years of the 19th century and the beginning of the 20th, the relationship between the rural west and the eastern United States was crucial. The west expanded rapidly as eastern U.S. and western European capital flooded the region. The west was considered the great U.S. natural-resource reservoir, and the extraction of these resources rapidly expanded and industrialized the global economy. With a large focus on the extraction and exploitation of natural resources, these economies were linked to centers of manufacturing and industry in a distinctly dependent way. Thus, the great accumulation of wealth gained from the advances in production from the industrial economy of the Eastern U.S., depended heavily on the resources pulled from the American West.<sup>17</sup>

In the early 20th century, the greatly overbuilt rail system, indebted by the American controlled manufacturing sector, became the basis for the regional underdevelopment and metropolitan dominance of the west. Resource decisions made in urban centers continued to exploit rural communities and contributed to the underdevelopment of the surrounding regions. Beginning in the 1930s, improvements in technology and more efficient farming techniques forced the migration of rural Americans into urban centers. In addition, the *New Deal Resettlement Administration*<sup>14</sup> removed thousands of settlers from rural regions, and contributed to the large scale population migration of the 1930s and 1940s. While urban areas continued to grow, efficiencies and automation in farming, logging, and other extraction industries began to form disparities of opportunity, with business owners increasing the scale of their production at the expense of others. An increasing focus on education further compounded the migration to metropolitan regions, as the lack of local schooling made distance and travel time to academic centers long and costly. As the economy of the American west continued to diversify with the expansion of industrial and technological systems, the drive towards lower labor costs, automation, and mechanization created unintended social and environmental consequences.<sup>17</sup>

After World War II, the west emerged with a bustling manufacturing complex, a strong service sector, and a diverse array of electronics, aerospace, and science oriented industries that helped shape the postindustrial economy. Although new metropolitan centered industries were emerging, the rural population continued to suffer as the transition to industrial mechanization in



the mid-twentieth century took hold. The mechanization and automation of the resource extraction sector eroded the economic and social support system in rural communities, accelerating the depopulation of the countryside, and with it, the ideals and values associated with the pre-industrial natural resource era.<sup>17</sup>

Throughout the mid-twentieth century, the strong relationship between an exploiting capital-rich east, and an exploited resource-rich west diminished, while a new discrepancy between urban and rural took hold. With the large demand of goods and services brought upon by WWII, the west continued its growth as an urban oasis society in the unstoppable course of specialization, centralization, and urbanization.<sup>6</sup>

While communities continued to exist in the rural Intermountain West throughout the 1950s and 1960s, similar trends in the mechanization of agricultural, forestry, and mining sectors slowly bled the remaining population that existed in these rural regions. Following the depression of the early 1980s, the late 1980s brought record timber harvests, yet fewer mills and employees were needed to operate the increase in production. Those that tied into the global economy, were able to take advantage of new markets. While other industries like mining continued to decline as copper, silver, and gold extraction were no longer viable economic drivers.<sup>19</sup>

After the late 1980s, resource extraction communities continued to decline, while non-metropolitan counties rich in natural amenities and recreational opportunities began to experience population growth. This shift expanded amenity-based industries, and shed new light onto activities and products surrounding tourism, ecosystem services, natural resource management, and sustainable agriculture. With advances in technology, new products and innovative uses for old products continues to be a driving force in re-populating, and re-establishing the economies of the Intermountain West.<sup>19</sup>

## Problem Situation

While rural decline is a major challenge throughout the west, this study focuses on the rural regions of the Intermountain West, specifically in the states of Colorado, Montana, and Oregon. In these states, only the regions geographically characterized as being part of the Intermountain West were studied. In Colorado, this included the Rocky Mountain range and everything to the west of it. Montana, which shares a similar geography, possessed a similar study area and included everything to the west of the plains. While Oregon's study area, included everything to the east of the Cascade Range. These regions and states were chosen to show similarities and differences in the Intermountain region, and to produce data that can be utilized throughout the targeted study areas.

In Oregon, international competition and the centralization of processing and manufacturing disassembled rural mining, agricultural, and timber towns. Although timber production peaked in the late 1980s, the amount of people employed by this industry diminished. As mechanization and centralized production increased, the ranching, farming, and timber workforce declined. Recent developments in rural economies have worked towards bringing back some form of the timber industry, focusing instead on NNRE businesses that produce bio-mass or more sustainable (small-diameter) timber.<sup>5</sup>

In Montana, where rural communities relied on copper, petroleum, coal, and timber, the same was evident. Wild market fluctuations and unstable employment led to the slow shift of an economy that once relied on natural resource extraction, to one that became service-based. While the challenges of variable weather patterns, international markets, and a declining workforce tested the agricultural sector, this economic base continues to be one of Montana's primary industries.<sup>11</sup>

In the rural communities of Colorado, mining, gas, and oil played a large role in development. Although coal use and production increased throughout most of the 20th century, the increase in mechanization required a smaller workforce for higher levels of productivity. The oil and gas industry suffered from highly volatile markets, ultimately based on the global supply and demand of energy commodities. In the early 1980s, Colorado's western slope collapsed following the exit of Exxon and the end of the *Colony Shale Oil Project*<sup>3</sup>. In 1986 crude oil collapsed, and the rapid drop in oil prices made most of the production that was brought online in the 78-80 crisis uneconomical. In this five-year time period, Colorado's western slope lost approximately 24,000 people and \$85 million in annual payroll.<sup>3</sup>

Overall, all three of these states share similar historical context in the types of rural economies they once relied upon. The rural communities of Oregon, Colorado, and Montana all relied on either timber, mining, farming, or ranching to spur development and growth. As market forces, automation, and regulations grew in the latter half of the 20th century, the ability for these sectors to employ large amounts of rural residents diminished.



## Purpose of Study

With many western rural communities facing declining populations, services, and an overall lack of employment opportunities, this study aims to highlight a more sustainable approach to rural economic development. Leaving behind the industrial, automated, and commodity production which rural communities once relied upon, this study focuses on firms that are part of the New Natural Resource Economy. The document will provide data, highlighting the tools available to NNRE firms throughout Colorado, Montana, and Oregon. It will provide the current status of NNRE businesses in the rural west, discussing any discrepancies between the policies, programs, and tools provided by local governments and economic development managers, with those that are needed by NNRE firms.

Ultimately, this study outlines the programs and tools currently being provided for new natural resource economies, those that NNRE firms are currently utilizing, and those that are needed to promote growth in the NNRE sector. With this information, the document will provide recommendations for local governments and economic development managers to promote NNRE sector growth in rural regions of the Intermountain West.

## Research Question

What are the challenges facing NNRE firms, the resources available to help them succeed, and the effectiveness of those resources? Case studies from the Intermountain West – Oregon, Colorado, and Montana.

## Methods

Data was collected by interviewing a sample of rural community leaders throughout the western portions of Colorado, Montana; and the central/eastern region of Oregon. A telephone interview was administered to various local governments, non-profits, and economic development leaders throughout the target area. The interviews were administered between January and February of 2017, and included questions about the history of rural economic development, current resources available, and the current NNRE firms present in these regions.

Throughout the interview, public and non-profit rural community leaders were asked a series of questions including: how the economy changed in the past 25 years, the types of industries which declined or experienced growth, and any new or innovative ways natural resources were being utilized. Community leaders were asked to provide the city, county, or region that they served, and were asked about their opinion of the areas overall economic health. During the conclusion of each interview, respondents were asked to provide local NNRE firms in the area to understand and capture the location and types of these businesses.

As these interviews were conducted, a list of NNRE firms in each state was compiled, contacting business owners to schedule in-person interviews/tours of their facilities in March of 2017. NNRE interviews were informal, but included set questions focused on the resources businesses were aware of, those that were useful to them, and those they still needed to succeed.

The analytical approach started with an assessment of interview respondents; whether they were part of a local government, non-profit, or quasi-government agency. The study then collected information on the types of resources available including tools, policies, or programs that are administered through each particular organization; as well as the overall regional resources available and their impact on NNRE firms. This research highlights this information, comparing the public/non-profit resources available with those needed still needed by NNRE firms.

In sum, this research seeks to identify the types of rural economic development tools which are available to NNRE firms throughout the research areas in the Intermountain West. It will analyze what is currently available, and what is still needed; ultimately providing recommendations of resources that are proven to be useful to NNRE businesses, and those that are still needed to further economic growth in this sector. The study became publicly available in May 2017, and can help guide rural development professionals in administering more effective programs, tools, and policies throughout their target areas.

## Importance of Study

Rural communities in the west possess populations that have limited access to services and amenities regularly available in larger cities. Although technological improvements and stricter environmental regulations have demoted extraction based economic development in these regions, new natural resource economies hope to promote development while sustaining important environmental and ecological systems.

Without the exploration and promotion of the NNRE sector, a major economic opportunity could be lost in rural communities which continue to decline because of the lack of family-wage jobs and amenities more readily available in urban centers. This study hopes to highlight the challenges NNRE firms are facing, providing rural economic development professionals with an analysis of the current status of NNRE firms in the Intermountain West.

## Scope and Limitations

For the purpose of this study, NNRE firms present in rural communities of the Intermountain West were analyzed; specifically, those found in the states Colorado, Montana, and Oregon. In the states of Colorado and Montana, the regions present in the "Intermountain West" include those that are characterized by the geographical features of the Rocky Mountains. In other words, this study will focus on the western half of both Colorado and Montana. In Oregon, the research will take place in the eastern portion of the state, between the Cascade and Blue Mountain range, encompassing the entire central/eastern high desert.

In these regions only local governments, non profits, quasi-governmental, and private sector entities (characterized as an NNRE firms) were interviewed and analyzed. The interviews conducted were concise to increase response rates, meaning extremely detailed information was not collected. The study only focused on the regions provided, and may not be applicable to other states in the Intermountain region.



## Organization of Report

In Chapter 2, the multi-functionality of the NNRE is presented, describing the different attributes found within production, consumption, and restoration activities.

In Chapter 3, a detailed description of the studies methodology is given, highlighting the techniques used to collect information.

In Chapter 4, the findings are discussed, showcasing the present state of rural economies and the resources available from the lens of local business owners in the Intermountain West region.

In Chapter 5, recommendations are presented for rural community leaders to improve NNRE growth.

# Chapter Two



Multifunctionality



## Introduction

Although rural economies have transformed throughout the last 150 years, recent trends have shifted away from primary production sectors toward those of less environmental degradation. While some rural areas still rely upon and promote extraction based development, the new natural resource economy has slowly become a viable option to increase sustainable economic development techniques in ecosystem services, natural resource management, sustainable agriculture, and tourism.

New Natural Resource Economy activities are multifunctional. That is, they aim to manage the landscape for multiple purposes simultaneously -- for production, consumption, and restoration. Production conceptualizes nature as a valuable input for the use of providing goods and services to the global marketplace and includes industries such as farming, ranching, forest products, and alternative energy. Consumption utilizes the landscape without major degradation, most often through amenities which are utilized by people for recreational value, eco/agritourism, and the like. Restoration is the activity that possesses the most direct influence on revitalizing and restoring environmental resources. It includes such things as watershed and forest restoration, fuels reduction, and weed abatement. It also provides ecosystem services which promote water quality, air purification, and erosion control. The following discusses these three pillars of the NNRE and explains the challenges they face.<sup>5</sup>

## Production

A transformation from the traditional forms of agriculture, forest products, and energy production, the new natural resource economy focuses on specialized or value added products. These products or alternative energy sources benefit the environment, or utilize practices which promote the sustainable use of natural resources.

Conventional agriculture focuses on a monoculture approach, most often utilizing high levels of fertilizers, pesticides, and herbicides. These “factory farms” focus on large-scale commodity production, and most often disregard non-regulated environmental concerns. Farming in the new natural resource economy takes on a different approach, focused on sustainable and value-added agriculture, it most often utilizes smaller farms with local production and ownership. Although ranching has not inherently transformed, the NNRE consists of more sustainable ranching techniques which abide by stricter environmental practices such as riparian buffers, and brand products to niche or value added markets (grass-fed beef/jerky).

Since the passage of regulations like the *East-Side Screens*<sup>13</sup> provision which diminished timber harvests on lands east of the cascades, the forest products industry has transformed in the Intermountain West. Utilizing smaller-diameter, fuels reduction, invasive, scrap, and diseased wood, the timber industry in the NNRE focuses on products which restore and promote ecologically healthy timberlands. Usually considered lower grade timber, the attempt to create markets for small-diameter trees has created value for these products, allowing contractors to conduct forest stewardship work while harvesting wood with value-added potential. Other products such as fuel pellets, wood bricks, and even construction panels and beams have been engineered, utilizing new

technologies to transform scraps and waste wood into marketable and viable products.<sup>5</sup>

While many rural communities historically relied on energy production industries including coal, oil, and natural gas, the new natural resource economy utilizes renewable energy sources. Focused on solar, wind, biomass, or geothermal production, these alternative energy facilities utilize renewable resources and don't require permanent removal of minerals, soils, or other ecological amenities.

Ultimately, production in the new natural resource economy focuses on goods and energy sources that are sustainable and promote environmental conservation or stewardship activities. These businesses are usually smaller than conventional firms, and most often return economic or ecological benefits to local communities and regions.<sup>4</sup>

**(Figure 2.1)** Types of Production Industries in the NNRE<sup>4</sup>

Agriculture/Ranching	Alternative Energy	Forest Products
Native Plant Nurseries which raise native plants for habitat restoration	Tree Farms which utilize hybrid poplar trees for electricity generation	Post and Pole manufacturers utilizing small-diameter timber from thinning
Local Produce such as seasonal vegetables or fruit	Generation of geothermal heat in geographically volcanic areas to generate electricity	Beetle Kill timber utilized for lumber façade's and décor.
Local Dairy including artisan pasture raised milk, eggs, and artisan cheeses	Biomass plants which utilize thinning timber or brush from fuels reduction programs	Timber Products developed from invasive tree species such as western juniper.
Local Meat including pasture raised beef, pork, and lamb.	Wind farms placed in regions with consistent wind patterns	Pellets and firewood utilized to generate heat and electricity for private citizens
Value Added crops specific to the Micro-Brew industry including hops, barley, wheat.	Solar farms placed in high elevation regions with high UV ratings	
Seeds, herbs, and flowers sold online or by catalog		
Grapes for local wine production		



# Consumption

Ecotourism
Kayak guides and rental companies depend on water levels, flow, and cleanliness
Mountain bike guide companies depend on groomed trails and scenic "natural" landscapes
Fishing guide companies rely on water quality, and the health of river, lake, and ocean ecology
Hiking guide companies rely on the aesthetic and ecological quality of landscapes
Agritourism
Farm/Ranch stays rely on healthy soils and the lack of noise/light pollution to attract urban tourists
Vineyards depend on healthy soils, good air quality, and scenic overlooks to attract visitors
Subsistence
Harvesting local firewood to replace energy consumption
Harvesting mushrooms, berries, herbs, or other forms of edible plants to reduce traditional consumption activities

Varied from the traditional form of consumption practices within natural resources, consumption in the NNRE relies on amenity-based landscape uses. Unlike conventional consumption activities which physically extract resources, NNRE firms rely on the ecology, sustainability, and aesthetic value of resources to start and expand their business.

Many problems arising from conventional consumption activities began with the ever increasing demand for energy, water, and raw materials. These natural resources consist of numerous environmental assets including timber, minerals, fossil fuels, energy, water, land area, and fertile soil. But as these resources are consumed for production purposes and a positive economic impact, the ecology of these lands degrade, causing unquantifiable damages in ecosystem services such as water and air quality. Along with negative environmental impacts, the conventional form of consumption most often strips land to a bare and uninviting terrain, removing the viability of any sustainable economic benefits of the NNRE. <sup>18</sup>

This is due to the symbiotic relationship between NNRE businesses and the environment; or the lack thereof between conventional forms of consumption and the environment. NNRE consumption based firms involved in ecotourism and agritourism rely heavily on the health, quality, and sustainability of numerous natural resources. These include the amount and quality of waterways for kayak/fishing companies, the ecological benefits of healthy timberlands for hunting and birding guides, and the condition and capacity of soil to promote aesthetic landscapes for farm and ranch stays. <sup>5</sup>

Although less economically impactful, another form of NNRE is the personal consumption or subsistence activities conducted by community members in rural regions. These activities include harvesting firewood, mushrooms, berries, herbs, vegetables, or fruits which help reduce demand for more traditional forms of energy or produce. Although this practice's economic impact is hard to quantify, the education gained and the relationships built between people and the environment increases, causing a greater awareness of the importance of a sustainable environment. <sup>5</sup>

**(Figure 2.2)** Types of Consumption Industries in the NNRE <sup>4</sup>



# Restoration

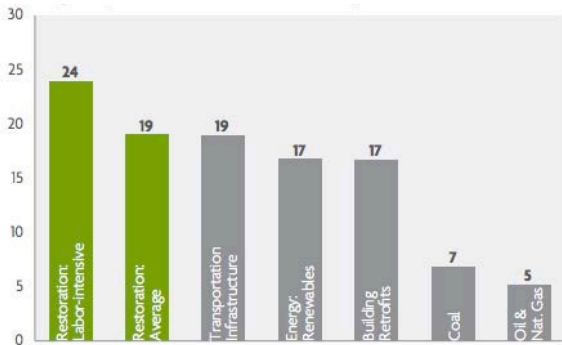
Although conventional businesses have been forced, to some extent, to perform restoration activities through federal or state regulations, NNRE businesses thrive off the very activities that steward and restore the environment. While traditional businesses typically conduct the bare minimum restoration activities needed to meet environmental regulations, NNRE firms benefit from these regulations, relying on public, non-profit, and private contracts to employ their workforce and provide ecosystem restoration and preservation services.

Restoration
Watershed restoration including riparian and fish habitat improvements
Forest restoration including tree planting and fuels reduction
Environmental education surrounding hunting, fishing, and other backcountry activities.
Wildlife habitat restoration and preservation including seeding, planting, and abating invasive species

These services focus on various geographical regions and can include businesses that specialize or perform a multitude of environmental education, watershed, forest, and wildlife preservation/restoration activities. Although these businesses and activities seem small in scale, the external economic impacts are substantial. Not only do these businesses fill the need for traditional environmental positions including biologists and fishery scientists, which attract a younger workforce; environmental projects create jobs for heavy equipment operators, landscapers, construction workers, and natural resource producers like plant nurseries, and technical experts such as engineers. <sup>5</sup>

In Oregon, an Ecotrust study found that restoration projects between 2001-2010 generated an estimated 6,483 jobs and nearly a billion dollars in economic output across the state. Not only do these projects provide family-wage employment in rural areas, they promote the local economy with \$0.80 of every \$1.00 retained in the county it was spent. While this restoration economy grows and attempts to promote the same economic prosperity that more traditional businesses have historically created in rural regions, unquantifiable benefits can already be seen as improvements in vital ecosystem services result in cleaner drinking water/air, and a more diverse set of wildlife and plant species. <sup>8</sup>

**(Figure 2.3)** Types of Restoration Industries in the NNRE <sup>4</sup>



**Figure 2. Restoration project funds stay local<sup>3</sup>**



**(Figure 2.4)** Average Number of Jobs per \$1M of Investment for Restoration Projects <sup>8</sup>



## Conclusion

As NNRE firms expand and contribute to multiple sectors of the economy through their multi-functionality, challenges still exist. Overcoming these barriers, could produce a larger workforce and a stronger economic base in rural regions across the Intermountain West.

One challenge, specific to restoration and preservation businesses but applicable to the entire NNRE, stems from the fact that funding is limited. Most municipal governments, NGO's including watershed councils, and private land owners understand the importance of restoration, but simply cannot fund all the restoration activities that are needed across rural regions of the west. Old natural resource extraction sites, land mismanagement, and pollution from industry have created a large need for these services, but the wide spread ability or necessity does not yet exist.

Although federal and state environmental regulations promote the NNRE, stricter laws could cause unnecessary economic hardship for others, and most likely face heavy private and political opposition. Programs for private land owners also exist, most often focused on wildfire fuels reduction or riparian improvements; these are rarely monitored and the economic impact from private land owners requesting ecosystem services are also difficult to quantify.

This research will feature these challenges, discovering the tools, resources, and policies, available to assist the growth and expansion of the new natural resource economy in the Intermountain West. Conducting interviews with quasi-governmental organizations, NGOs, economic development corporations, and businesses, this study analyzes the Intermountain West, and highlights resources and strategies for new natural resource economies to succeed.



# Chapter Three



Methodology



## Introduction

The purpose of this chapter is to describe in detail the methods used to collect and analyze data about policies and program tools affecting NNRE firms in Colorado, Montana, and Oregon. This study highlights discrepancies between the resources provided by local governments and economic development managers, with those that are needed by NNRE firms. Accompanying this chapter, is a discussion surrounding the limitations of this research.

## Methods and Analysis

Data was collected from specific rural community leaders who possessed a focus on economic and environmental objectives throughout the western portions of Colorado, Montana, and the eastern half of Oregon. A phone survey designed specifically for this study, was administered with various local governments, non-profits, and economic-development leaders throughout the targeted regions. This phone survey was conducted between January and February of 2017, and included questions about the history of rural economic development, current resources available, and the current NNRE firms present in these regions.

Fifty-eight organizations with economic/environmental objectives were contacted by email to describe the nature of the study, and to verify interest in participating. Seventeen organizations agreed to participate in a phone interview throughout the months of January and February of 2017. This included (6) non-profit (501c3) organizations, (5) business leagues (501c6), (3) public agencies, (2) quasi-governmental organizations, and (1) NGO. Participants took part in one session, which took no longer than 1-hour. The total length of participation for participants only lasted during the phone survey. During the day of the scheduled interviews, participants were called at the agreed upon time, and no later/earlier than 10 minutes before or after this time. Once the phone call was established, participants were read the oral consent form script. After oral consent was received, the phone survey was administered.

Throughout phone-survey-one, public and non-profit rural community leaders were asked a series of questions including:

- How has the economy has changed in the past 25 years?
- What are the types of industries that have declined or grown?
- Are there new or innovative ways natural resources are being utilized?

Community leaders were asked to provide the city, county, or region that they serve, including their opinion of their areas overall economic health. Participants were also asked to provide NNRE firms in their working region, to help guide session two of this research study. This information helped in establishing publicly available data for the current rural economic status of these regions from the lens of local economic development professionals. In the end, participants were thanked for their participation and received follow-up information upon request. After the completion of each survey, notes were compiled and reviewed, distinguishing between each participant and their given region/state.

After initial review of the data collected, which included NNRE firms provided by participants from the phone survey, a list of NNRE firms in each state was compiled. This NNRE firm database was created by collecting the business names suggested by participants in the phone survey, and by personally identifying NNRE firms in the study region. This list included fifty-two firms that were identified as participating in the new natural resource economy. Every business owner on this list was contacted through email or phone to schedule in-person interviews/tours of their facilities. NNRE business owners were reminded 7-days after initial email contact, if no reply had been received. Business owners received one final phone call, 3-days after receiving Email #2. If no response was received after this process, business owners were listed as not available.

Fourteen business owners agreed to participate and were interviewed for this research study. The businesses interviewed included (5) logging/timber companies, (2) restoration contractors, (2) farmers (2) ranchers, (1) winery, (1) garden store, and (1) distillery. In-person interviews and site visits were strategically scheduled according to state, to save commuting time. These site visits and interviews occurred in March 2017. Once these interviews were scheduled, business owners were reminded by email of their scheduled participation, 1-week prior to the agreed upon interview date. The principal investigator then traveled to each given interview site and conducted interviews which consisted of one 2-hour session with each NNRE business participant. NNRE interviews were informal to build trust and rapport, but included set questions from including:

- What kind of resources or tools are you aware of to support or expand your business?
- Which resources or tools are most useful to your business?
- Which resources or tools are still needed to support or expand your business?

After fourteen in-person interviews the principal investigator compiled notes and a summary from each interview, and notified participants of any follow-up questions that may be requested. Once all of the in-person interviews were complete, the principal investigator possessed all of the data needed for the entirety of the study.

The analytical approach of this research began with an assessment of the seventeen phone surveys conducted in January and February of 2017. The principal investigator compiled information on the types of resources available in each state including tools, policies, or programs that were administered through each particular organization; as well as the overall regional resources each organization was aware of. After the phone survey data had been analyzed, the principal investigator possessed the following data:

- Tools and resources being provided in each state
- Policies or programs implemented by organizations in each given state
- Tools and resources that are still needed (from the lens of public/NGO)
- Policies or programs that are still needed (from the lens of public/NGO)



After this data was compiled, an analysis of the fourteen in-person interviews began. After the in-person interview data had been analyzed, the principal investigator possessed the following data:

- Tools and resources being used by each NNRE Firm.
- Policies or programs being used by each NNRE Firm.
- Tools and resources that each NNRE Firm is aware of, but not using.
- Policies and programs each NNRE Firm is aware of, but not using.
- Tools and resources still needed by NNRE Firms. (from the lens of private sector)
- Policies and programs still needed by NNRE Firms. (from the lens of private sector)

Once all of the information was compiled into one large NNRE Database the majority of the analysis focused on the similarities or differences between resources available from rural community organization and what was needed by the NNRE firms they serve. The study then highlighted the effectiveness of the tools made available by rural economic development professionals, and those still needed in the study areas.

In sum, this research identified the types of rural economic development tools which were available to NNRE businesses throughout the research areas in the Intermountain West. It analyzed what was currently available, and what was still needed; ultimately providing recommendations of resources that are proven to be useful to NNRE businesses, and those that are still needed to further economic growth in this sector. The study was made publicly available in May 2017, and serves as a guide to rural development professionals in administering economic programs, tools, and policies throughout their target areas. Since most participants requested anonymity, all of the data presented is anonymous.

## Limitations

Although the principal investigator took great lengths to compile and analyze all available data, limitations in time and finances prevented a more comprehensive study. Phone survey interviews concluded once similar information became frequent across survey participants. Due to interchangeable data across states and time constraints which limited interviews to take place in during the months of January and February 2017, the phone survey ended with (17) participants.

In-person interview data was also limited due to travel time, scheduling, and finances which only allowed interviews to take place in March of 2017. The in-person interview data concluded with (14) participants. With an attempt to interview and tour facilities of NNRE businesses, limitations in data were experienced because of business owner time constraints, and limited traveling time available for the principal investigator. Thus, although the results are suggestive of the problems and opportunities facing NNRE firms in the areas studied, it is impossible to say that they are conclusive.

# Chapter Four

A wide-angle landscape photograph showing a vast valley with rolling hills and sparse vegetation. The foreground is dominated by a large, dense green tree on the left side. The middle ground features a wide expanse of land with scattered trees and shrubs, leading up to a range of low, rounded hills in the distance. The sky is a uniform, light greyish-blue, suggesting an overcast or hazy day. The overall scene is a natural, open landscape.

Findings



## Introduction

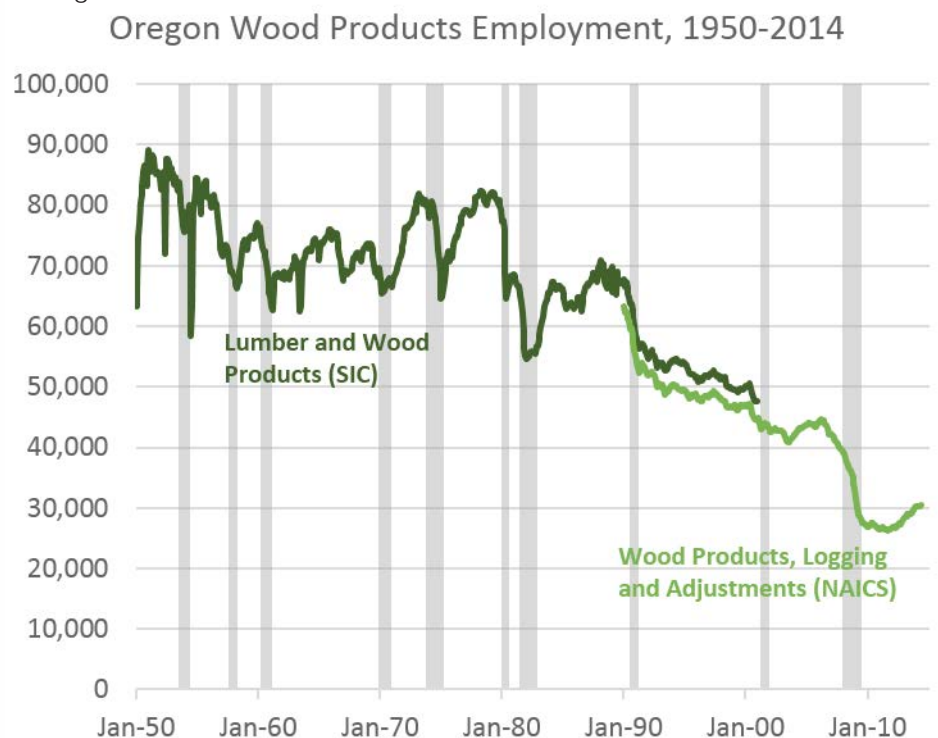
The purpose of this chapter is to provide an analysis of the data collected surrounding the policies and program tools affecting NNRE firms in Colorado, Montana, and Oregon. This section presents the results of phone interviews with public and non-profit organizations, and in-person interviews with NNRE businesses.

## Inter-Mountain Economic Changes

Throughout this study, one thing was clear, regardless of the agency, organization, or business, everyone agreed that the traditional form of agriculture and extraction industries do not employ the same amount of workers they once did. In all three states, the employment opportunities provided by the timber, agriculture, and mining industries have significantly diminished.

Although the timber industry is still present in the rural communities of Montana, Colorado, and Oregon, its ability to inject wealth into communities has all but vanished. Today, the multiple mills that communities once relied upon to provide employment have disappeared. Only those that were able to withstand stricter regulations and globalized markets stand today. Most mills that did survive, are highly automated or have utilized innovative approaches like bio-mass, cross-laminated, or small diameter timber operations to stay in business. As mentioned by logging companies interviewed; although mills still exist, they do not provide the same employment opportunities once available, and are usually limited in providing one work shift a day.

In the agriculture sector, similar trends were found. While the production of commodities is still prevalent, the amount of employment and scale of farms have drastically changed. Ranchers and farmer's dependent on traditional products have increased the scale of production to stay competitive. These changes along with mechanization, have provided an environment where only individuals who own large swaths of land can still rely on agriculture as a means of living.



**(Figure 4.1)** Oregon Wood Products Employment Losses

Source: <https://oregoneconomicanalysis.com/2012/01/23/historical-look-at-oregons-wood-product-industry/>

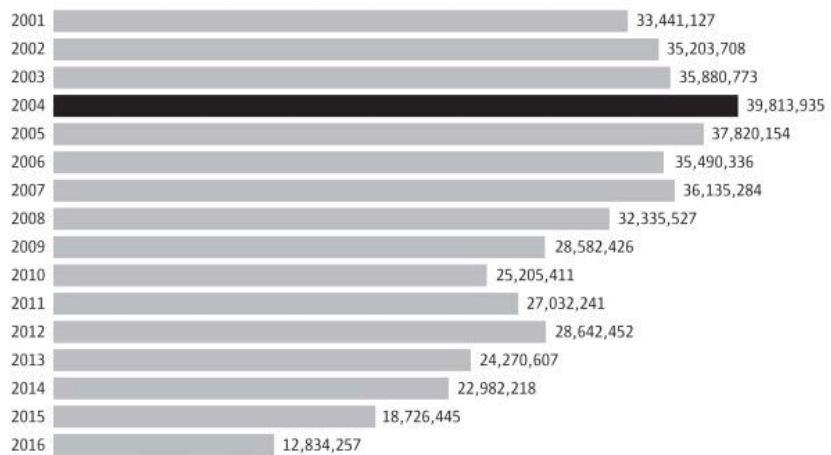


In Montana, hard rock mining including gold, copper, and aluminum has diminished, while Colorado has experienced recent reductions in employment provided by the coal, oil, and natural gas industries. As mentioned by local residents, the mining industry in Montana's Intermountain West region no longer exists in any substantial matter. Colorado on the other hand, has experienced significant impacts based on recent fluctuations in global markets, federal regulations, and the price of energy production. The coal industry that once provided a strong economic base has swiftly diminished, leaving many communities in Colorado's western slope without a strong family-wage employer.

Although these industries no longer provide the employment opportunities that were once prevalent, it is important to highlight that traditional forms of timber, agriculture, and mining still play a significant role in the economy of the Intermountain West. The economy in this region has diversified based upon necessity, but still relies heavily on these industries. Despite the fact that agriculture and energy production sectors no longer need human capital that was once necessary, these industries still provide equivalent if not larger scales of commodity production compared to historic levels in the 20th century.

**Colorado coal production, in tons, 2001-16**

Since hitting a high in 2004, coal production in Colorado has declined 67 percent, driven down by low commodity prices and reduced demand as utilities have switched to cleaner, cheaper natural gas for generating electricity.



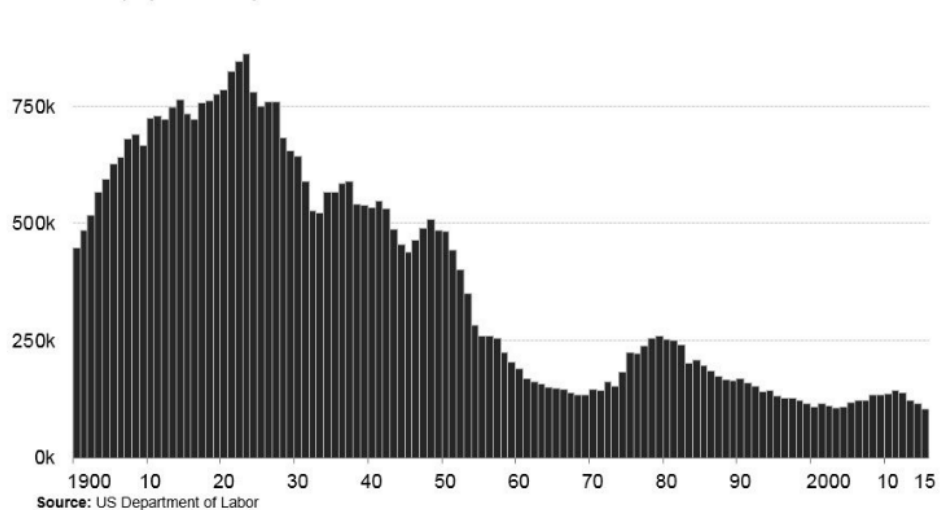
Source: Colorado Division of Reclamation Mining and Safety

The Denver Post

**(Figure 4.2) Colorado Coal Production Losses**

Source: <http://www.denverpost.com/2017/04/16/colorado-coal-donald-trump-jobs/>

**1m miners employed annually**



Source: US Department of Labor

**(Figure 4.3) U.S Coal Mining Employment Losses**

Source: <http://www.energytrendtracker.org/2017/01/century-long-decline-for-u-s-coal-jobs/>



## Cause of Change

While the decline of these traditional industries cannot be attributed to one specific reason, the compounding impacts of higher levels of regulation, globalized markets, and advances in production technology have played a large role in diminishing the jobs once available in these sectors.

## Federal/State Regulations

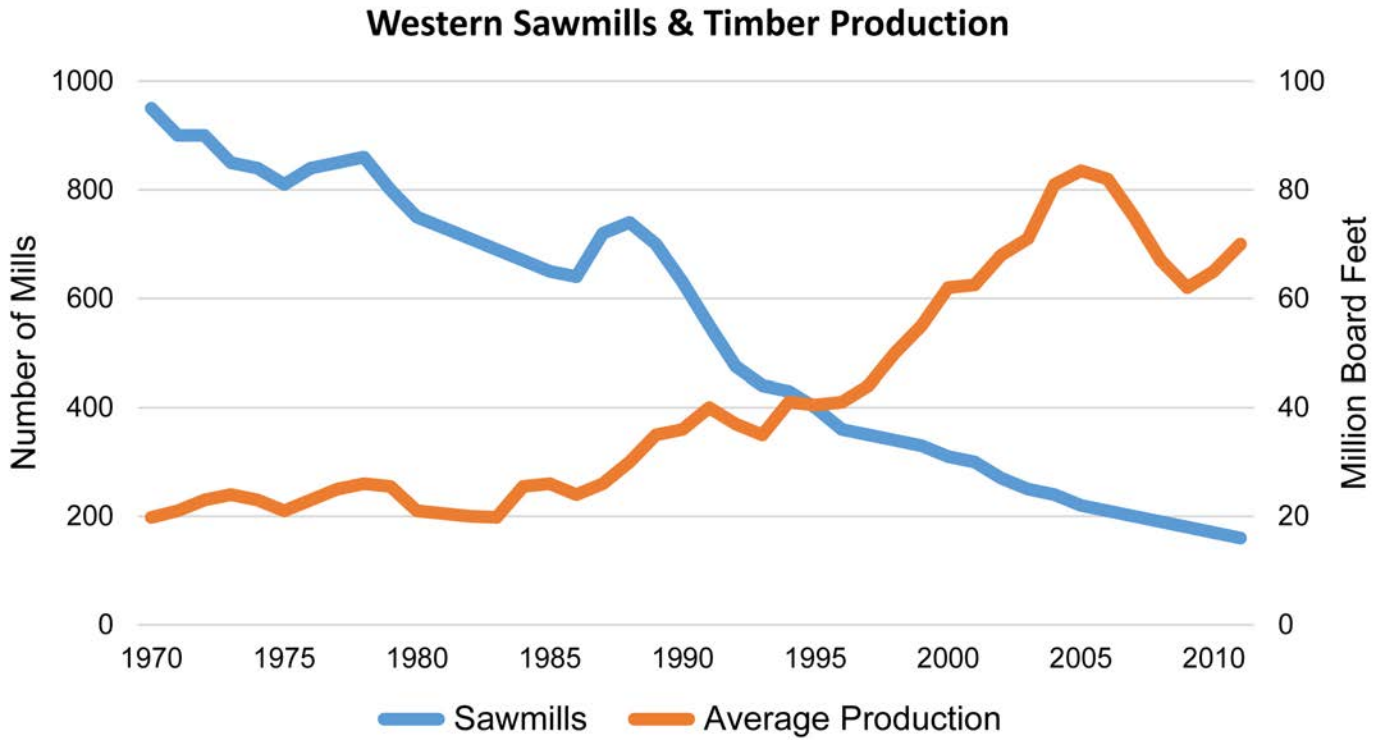
When discussing traditional extraction based businesses, NNRE firms mentioned that the regulatory environment had the most significant impact on the timber and mining industry. Both businesses and agencies agreed, some form of regulation was necessary as the traditional form of timber harvests accelerated to unsustainable levels. The positive impacts of these regulations included a larger amount of land set aside for conservation, wildlife habitat, and recreational use. The negative, stemmed from the disproportionate impacts on smaller, community based, and family owned mills. While larger mills and lumber suppliers were able to cope with stricter regulations, many smaller operations that provided family-wage employment for rural residents were unable to pivot. With the industry relying heavily on federal land access, smaller mills were unable to replace the harvests once available on public lands and quickly downsized their workforce, ultimately shutting down.

As mentioned by various local residents in the Intermountain West region, these mills were crucial to all three states, providing an economic structure that transcended just employment. As mills closed, former employees moved away into metropolitan regions. Others which lacked any additional skills, stayed in these economically depressed towns and became victim to drugs or alcohol. While these mills provided the primary source of wages in many rural communities throughout the Intermountain West, their true value rested in the social cohesion created by community members sharing a common and prosperous form of employment.

With Oregon's rural economy focused mainly on timber, the downfall of the mining industry primarily impacted Colorado and Montana. Although the mining industries decline was largely due to uncontrollable market forces, federal and state regulations contributed in a significant way. As mentioned by public agencies, the western portion of Montana's industry focused on hard rock mining which included gold, silver, copper, aluminum, and phosphate. In the western slope of Colorado, the industry focused on the energy sector; mining coal, natural gas, and drilling for oil. While Montana's industry faced higher levels of state regulations due to the abuse of natural resources, Colorado faced federal pressures surrounding the emissions from fracking, drilling, and mining.

As stated by local residents, these federal policies assisted the downfall of the industry in Colorado, lowering margins to a point in which mines were no longer viable. With thousands employed by the energy production industry in the western slope, many residents lost their only family-wage employer. Subsequently, the spending power of these communities vanished, and other community businesses like restaurants and retail shops struggled to stay open. With a heavy reliance on this industry and policies within the last decade that imposed an even higher level of regulation, community members are still experiencing the impacts of mining's decline today.

Although state regulations in Montana negatively impacted the hard rock mining industry, many interview participants found this as a necessary direction to prevent the further degradation of crucial ecological systems including watersheds and soils. This changing social perspective on mining, along with movement towards a more diverse economy, impacted Montana to a much lesser extent, and has helped move the state in a more sustainable economic direction.



**(Figure 4.4)** Automation/Mechanizations impact on Western Mill Operations and Production

Source: <https://headwaterseconomics.org/economic-development/trends-performance/changing-role-manufacturing/>





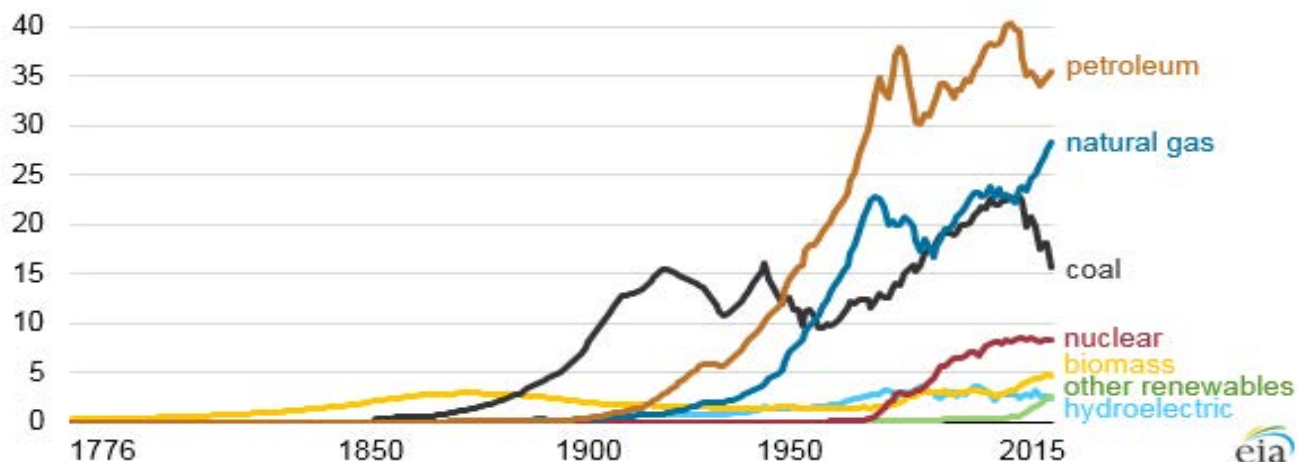
## Commodity Prices and International Markets

As the U.S. continues to rely more heavily on cheaper and cleaner forms of energy like natural gas, the coal industry has struggled to compete. In the western slope of Colorado, the decreasing role of coal's share in U.S. electricity production has dramatically cut mining jobs. With abundant and cheap natural gas production prevalent in the U.S., and many private entities shifting away from the dirty and inefficient energy source, the coal industry has largely been victim to uncontrollable market forces.

Oil drilling in Colorado has also suffered from international forces, falling victim to the lowering commodity prices in the last decade. With a higher level of mechanization, and OPEC's decision to continue production in late 2014, the drop in oil price was felt across rural Colorado. On top of Colorado's already challenging geography and increasing air emissions standards, international market fluctuations made most oil drilling operations unviable in Colorado's western slope.

While Montana faced similar issues with coal and oil, the state still relies heavily upon agriculture which includes commodity crops and cattle ranching. Similarly in Oregon, these farms have been subject to fluctuating commodity prices. While prices have recently hit historic highs, the inability to dictate the future of global markets has made most ranching/farming ventures difficult to operate. With the rise of larger farms necessary to mitigate global market swings, many agricultural operations are no longer owned by families and local residents. On top of lowering profit margins, generational inheritance challenges, and the lack of affordable land, many ranches and farms have been bought by outside investors to cease production and utilize as hunting, retirement, or vacation stays.

As expressed by logging companies, timber production fell victim to a rise in global competition on top of the decrease in federally available land which ultimately transformed the entire industry. As the market became more globalized, competitive lumber produced in places like Canada flooded the market. With a more competitive market place, and the transition in U.S. policy to utilize smaller-diameter timber, many smaller mills were unable to compete. As timber increasingly became a commodity in the global system, many mills in Oregon and Montana shut down, while large national businesses curtailed their operations into single mills, most often found in larger population centers.



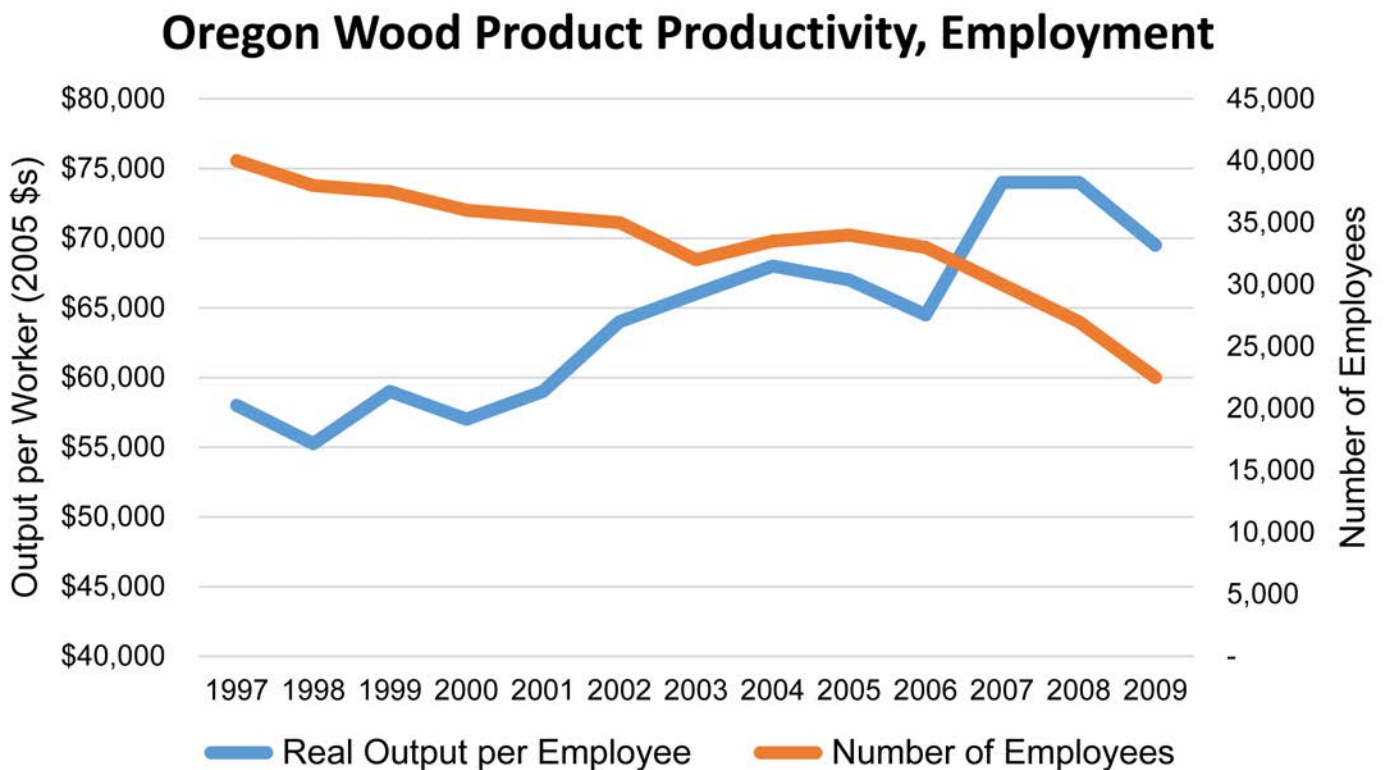
(Figure 4.5) Energy Consumption in the U.S

Source: <https://www.eia.gov/consumption/>

## Mechanization, Automation, and Demographic Shifts

While lumber production has inherently changed based on the need for more effective forestland management and competitive disadvantages with the globalized market, its diminishment of employment came largely from advancements in technology. With larger mills utilizing more efficient practices which required less workers to produce a higher amount of board feet, many of the timber employment opportunities that were once prevalent would most likely cease to exist, regardless of federal regulations or international markets.

All three states faced this challenge, as increasing automation and mechanization transformed all of the natural resource sectors. Timber, coal, oil, and agriculture practices transformed throughout the 20th century. With these industries requiring lower levels of workforce to create higher levels of commodity production, many people which possessed singular skills moved outside of rural regions into larger metropolitan regions. With a loss of the majority of workforce that existed, it is difficult to say whether looser federal regulations and favorable global markets would have made a significant impact in the employment opportunities offered by these industries.



(Figure 4.6) Automation/Mechanizations impact on Oregon wood product employment

Source: <https://headwaterseconomics.org/economic-development/trends-performance/changing-role-manufacturing/>



## NNRE Economy

As the employment opportunities for traditional forms of natural resource industries has dwindled in the Intermountain West, innovative NNRE firms are beginning to replace the once prevalent family-wage jobs in rural communities. Although NNRE firms alone cannot replace the high employment base once provided by extraction industries, this type of economic development can increase community wealth while protecting/enhancing critical natural resources.





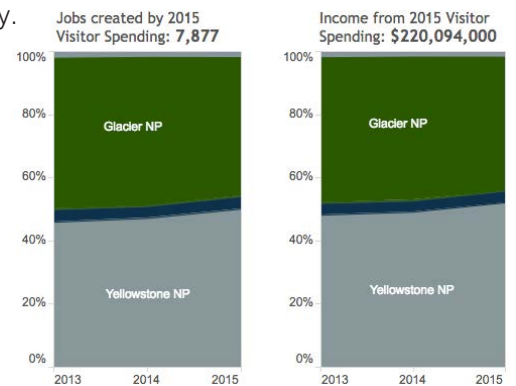


While tourism expands its role in the economy of the Intermountain West, businesses that rely on the influx of tourist populations are benefiting greatly. Although this is not prevalent throughout the entire region, communities that have leveraged public lands like BLM land, national, and state parks have attracted more tourists, which has correlated with positive population trends and recreational-based business growth. Firms that sell products based on the shared relationship with surrounding public lands include outfitters which produce fishing waders/rods, backpacks, boots and more. Those that sell experiences based on the health of surrounding natural resources include fishing/hunting guides, farm/ranch stays, vineyards and more. Many of these industries are tied into public lands, and depend heavily on the sustainability and health of surrounding natural resources, because of the customer base they attract for recreational opportunities.

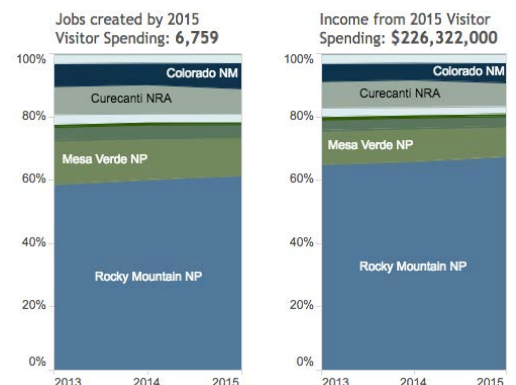
Other beneficiaries of the growth in tourism include the food and beverage sector. Although they are not inherently tied into this cluster, businesses like restaurants and wineries all benefit from the increase of tourism. While these businesses do not need pristine natural resources to succeed, some try to utilize local produce, fruits, crops, or grain to create a distinct product which adds value and promotes the local economy.



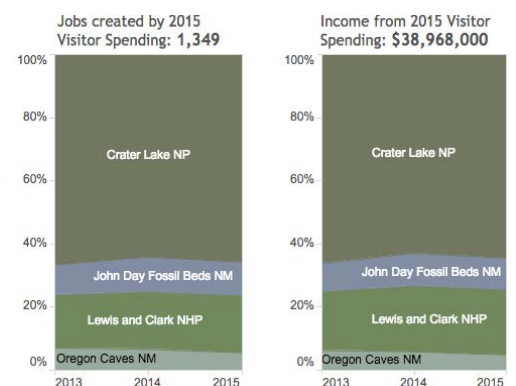
**(Figure 4.7)** Economic Impacts of Federal Lands in Montana



**(Figure 4.8)** Economic Impacts of Federal Lands in Colorado



**(Figure 4.9)** Economic Impacts of Federal Lands in Oregon



Sources (4.7; 4.8; 4.9): <https://headwaterseconomics.org/dataviz/national-park-service-units/>





In the new natural resource economy, timber businesses lack the traditional forms of environmental degradation, and even improve ecological systems which has promoted job growth and healthier environmental systems. In Montana, environmentally conscious companies are utilizing value-added methods to cut less, and gain more. While a traditional timber company might utilize around 30 truckloads of logs a day, innovative NNRE businesses are highly efficient, employing the same amount of people with just one truckload. Not only do these businesses require less wood from forests, they employ beneficial techniques and services to keep timberlands healthier, which subsequently produces more timber for them to harvest in the future. Using traditional methods like hand logging, and conducting extra environmental work that is unrequired, these businesses help to thin, regenerate, and protect residual growth and wildlife habitat. All of this is possible because of the value-added products these companies create which include doors, tables, siding, flooring, cants, and more.

Other smaller timber businesses also take an approach of environmental stewardship, but focus on utilizing commercial-thinned logs. Using thinned logs for furniture and even mortise and tenon joint sheds, smaller NNRE firms are creating value-added products while reducing fuel loads in forestlands. With landowners becoming more aware of the benefits in appropriate thinning/replanting, and thousands of acres of forest that still need replenishment, these types of timber businesses are growing and subsequently providing family-wage jobs.

On the other side of the spectrum, some companies are planting and harvesting tree farms, selling poplar trees for paper, and poplar cuttings to nurseries or garden stores. These NNRE businesses are promoting ecological innovation in a whole new way. In Montana, where tree farms are even present in urban centers, municipalities are diverting waste water to these sites, feeding/watering these crops and saving approximately one-million-gallons of wastewater from entering local rivers and streams. These types of activities have become highly advanced, utilizing drones to monitor pest and rodent damage. While employment numbers are low for these types of projects, the external environmental impacts are highly valuable.

In Colorado, where forests have been devastated by the spread of the mountain pine beetle and spruce beetle, mills have switched over to standing dead beetle-killed timber. While it is beneficial to leave some beetle-killed tree's to create snags for critical habitat like birds and mammals, harvesting the over abundance of these dead tree's is also crucial in reducing abundant fuel loads in timberlands.

While businesses in this industry differ in their individual impacts on job growth and environmental benefits, the expansion of NNRE timber firms is needed more than ever as ineffective forest management has created a build-up of fuel hazards throughout the Intermountain West. While restrictions were well intended, some have created forestlands which are now overgrown and highly susceptible to extreme wildfires. NNRE firms which thin and regenerate forest ecosystems, while producing valuable products, are becoming increasingly popular to spur this innovative approach in forest management and economic development.



Despite the fact that large commodity based farms and ranches still exist throughout Colorado, Montana, and Oregon, new value-added products have created a smaller-scale approach to agriculture. Largely dependent on regional market demand, some ranchers have switched to grass-fed beef. Although grass-fed cattle take a year longer to harvest, the impact this style of grazing has on the natural environment is much lower than traditionally raised feed-lot cattle. Ranchers that utilize this approach need to focus on good soil health, and thus healthy grass lands which feed their cattle with vital nutrients. As more ranchers become educated about the financial and environmental benefits of grass-fed beef, many are switching their once industrialized system of feed-lot cattle, to one with lower ecological degradation and higher market cost.

For farmers which produce vegetables or fruit, the farm to table movement has benefited the increase of organic and sustainably grown products. With more awareness, education, and higher demand for locally grown food, many farmers are utilizing approaches that are much less stringent upon, and ultimately safer for the environment. Foregoing harmful pesticides and fertilizers, farmers are utilizing traditional techniques like crop rotation to prevent bug infestations and promote healthy soils. These smaller farms focus on high-value products which include items like heirloom tomato's, micro-greens, or cheese. Other farmers which graze sheep or alpaca for wool, are finding that wealthier and more educated consumers are willing to pay a premium price for American made fibers.

Other agricultural businesses are promoting an entirely new approach to farming. With the rise of indoor farming systems, some firms are switching to innovative growing techniques which include hydroponics, aeroponics, or even aquaponics. Although these systems can be utilized outdoors, they are most often used indoors and help in promoting major reductions in water consumption. These growing systems completely bypass the need for soil, and thus reduce water waste, increasing growing efficiency most beneficial in places with high susceptibility to drought conditions.

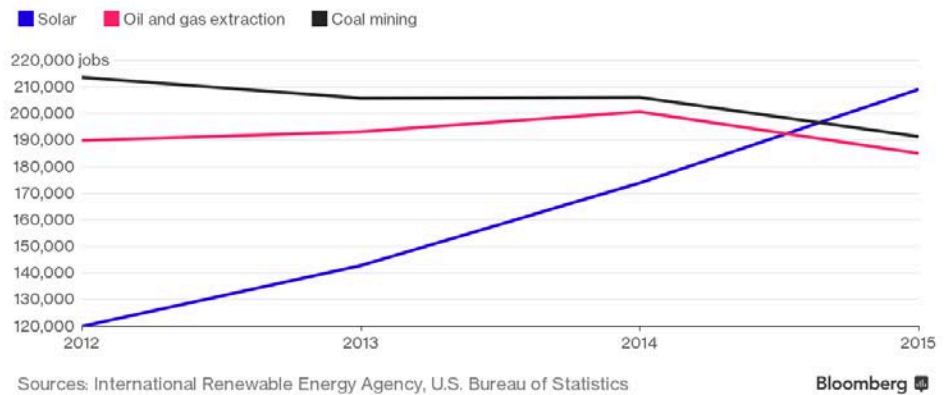
Although traditional farming and ranching operations have historically relied on high volumes of commodity production, NNRE firms are utilizing less land and creating higher values in their products by focusing on niche markets. Not only do these businesses promote a more sustainable approach to farming and ranching, they subsequently promote environmental stewardship and the value of their product by partaking in environmentally sound practices.





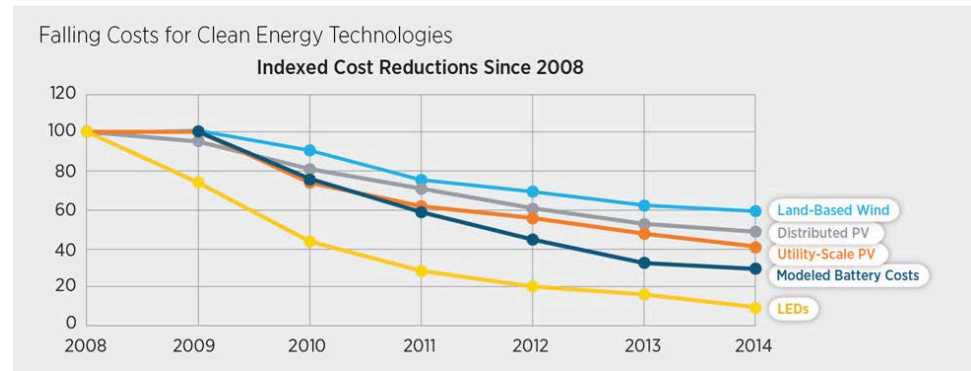
While the share of renewable energy’s role in U.S. electricity production is growing, its impact in the Intermountain West is not yet substantial. At current market levels, many renewable energy projects require heavy subsidies to move forward. While communities throughout the Intermountain West have implemented some form of wind and solar, the relative impact compared to traditional forms of energy production is still small.

That being said, advancements in technology are quickly making renewable energy sources like solar extremely competitive with traditional forms of energy. Solar on top of other innovative approaches including bio-mass and geothermal energy, are all becoming more viable as technological advancements lower cost, and infrastructure expands throughout rural regions of the Intermountain West. Many organizations in these rural communities are aware and willing to develop these types of energy systems, but are currently unable because of infrastructure barriers or market challenges.



**(Figure 4.10)** U.S growth in Solar Employment; Decline of Extraction Employment

Source: <http://gas2.org/wp-content/uploads/2016/06/Renewable-Vs-Fossil-Jobs-Bloomberg.png>



**(Figure 4.11)** Falling Costs for U.S. Clean Energy Technologies

Source: <https://obamawhitehouse.archives.gov/blog/2015/11/13/investments-renewable-energy-are-paying-and-paving-way-ambitious-climate-action>

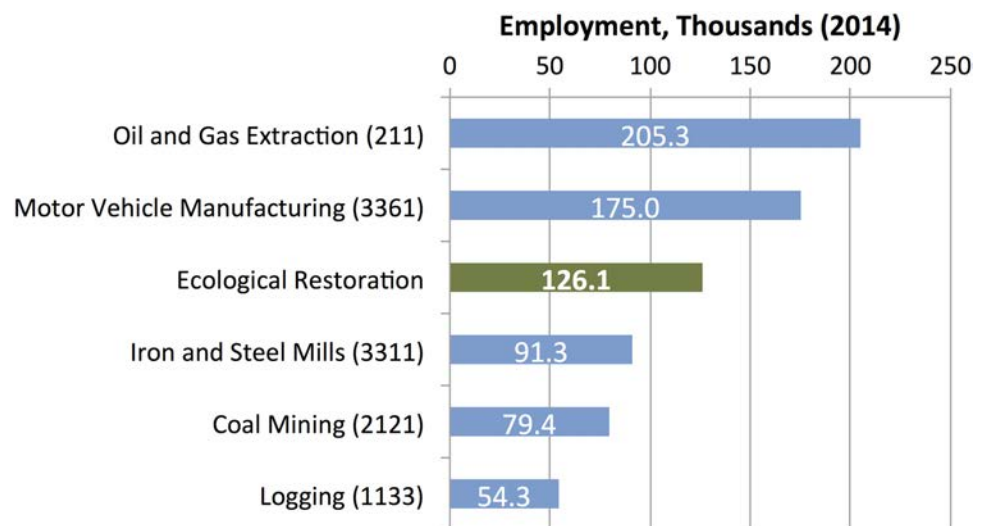




With abundant environmental degradation present in areas of the Intermountain West due to traditional extraction based industries, the restoration economy continues to grow. These activities take place on public and private land, usually focused on streams, forests, wetlands, or previous mine sites. While these projects are mostly administered through non-profit or public sector organizations, the work itself is often done by private companies, ultimately creating jobs and high paying wages because of the need for specialized contractors and engineers. While activities like forest restoration focus on thinning and replanting, watershed restoration focuses on riparian areas and fish habitat.

Most watershed restoration work currently conducted in the NNRE is due to the mismanagement of cattle grazing and farming practices. With historic ranching operations allowing cattle to graze near streams and rivers, many riparian areas through the Intermountain West were destroyed. This accompanied by the leaching of fertilizers, destroyed water quality and areas of fish habitat. On top of these challenges, fish have struggled to survive because of ditches, dams, and other structures that prevent their natural migration. While smaller restoration businesses focus solely on increasing fish habitat, installing fish screens and constructing soils to increase stream flows, larger companies conduct higher and more diverse levels of restoration activities.

Those that have the capacity and capability, apply for larger projects, which usually require restoration activities on multiple acres of land. In Montana, these larger watershed restoration firms employ anywhere between 5-30 workers, with jobs that average between \$22-\$30 an hour.



**(Figure 4.12)** U.S. jobs in ecological restoration and carbon intensive industries

Source: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0128339#sec015>



## Barriers

Although public, private, and non-profit organizations agreed about most of the barriers and challenges present in the Intermountain West, a distinct disconnect existed between businesses and public/non-profit organizations for one of the identified issues.





The largest discrepancy between the private and public/non-profit sectors, capital, was never mentioned as a challenge for NNRE businesses. Throughout the studied region, not one business identified capital as being a major barrier to development or growth. Regardless of the type of NNRE firm, all agreed that capital was neither a challenge they faced in the past, or an issue that would be pertinent in the future. Some businesses began with credit cards, small bank loans, or saved their own money to begin their venture. Although many were aware of grant and loan funding available throughout various public programs, none seemed interested in utilizing these financial services.

This lack of public/non-profit funding utilization stemmed from three major reasons. The first, was identified as the lack of need for capital, including both grants or loans. Many of the NNRE firms interviewed stressed a slow-growth business model, where infrastructure, equipment, or personnel would not be undertaken unless the business had the funds available to pay for it. In other words, firms seemed unwilling to take on loans or grants to expand because of the associated risks and interest payments. This slow-growth model, allowed businesses to grow at a comfortable pace, and ensured that they did not grow too big, too fast, which was cited repeatedly as a cause for business failure.

The second reason NNRE firms stayed away from grant or loan programs, arose from the lack of willingness to abide by the regulatory stipulations that accompany most of these financial services. Simply put, businesses did not feel a need, nor did they want to spend more time to attain funding. Most businesses believed that these funding mechanisms would only cause them higher levels of work and stress.

The last, derived from a negative stigma or distrust of local or state agencies. With a majority of these businesses located in very rural regions of the Intermountain West, many possessed skepticism about the programs or held past adverse relationships with previous public sector officials. These characteristics, on top of the belief that businesses which rely heavily on grant or loan funding ultimately fail, prevented most firms from utilizing any capital from public or non/profit agencies.

While businesses focused on other challenges, many organizations and agencies interviewed throughout Montana, Colorado, and Oregon felt that capital was indeed a large barrier to NNRE growth. Citing reasons such as the unwillingness of banks to lend to new or untested industries, many organizations believed that capital was in fact a major barrier in NNRE development. While this insight may very well be true for start-up businesses, the notion that established firms need any type of financial services seems unlikely.





Both businesses and agency's interviewed agreed, some form of challenges did exist within the current regulatory structure. Although these issue varied by types of NNRE firms, both private and public organizations mentioned that regulations were too burdensome. These regulatory issues were two-fold, with some impacting employer-employee relations, and others impacting processing capabilities. While businesses understood the need for regulations, many experienced unnecessary challenges and inflexibility in business practices because of policies designed for larger corporations.

Many NNRE firms felt that the impacts of the regulatory environment were disproportionately affecting small businesses. Firms mentioned that policies designed on a federal level, focused on large corporations, which could absorb the financial costs associated with these regulations. Smaller family owned NNRE firms abide by the same set of rules, and found it extremely difficult to increase profit margins or expand because of unnecessary financial burdens imposed by this regulatory environment.

Ultimately, firms wanted to abide by regulations, but were frustrated by the unnecessary costs and differences in policy that lack clarity between the local, state, and federal level. This type of regulatory environment on top of the financial burdens the current health care system imposed on many mid-sized NNRE firms, were identified as some of the largest challenges throughout this study.



While healthcare reform is a national challenge, various NNRE firms specifically mentioned this topic when discussing federal overreach. All of these businesses wanted to provide good health insurance to employees, but were frustrated by higher costs and penalties associated with providing certain types of coverage. Most firms, simply wanted a higher level of flexibility, with some discussing the willingness to pay for employee health services directly.

On the other side of the spectrum, other NNRE firms cited the unnecessary processing policies which created higher costs and lower profit margins. These challenges were specific to the agriculture/ranching NNRE, where producers are forced to travel large distances to metropolitan processing facilities. While centralized facilities do provide a benefit, farmers/ranchers wanted higher levels of flexibility to process certain products on-site.

While some logging firms also discussed challenges associated with federal land access, most agreed that the administrative inefficiency of timber sales were a larger barrier than land access itself.

From the public and non-profit lens, most organizations agreed that the regulatory environment was a challenge for the development and expansion of NNRE businesses. These organizations focused on the unnecessary hurdles businesses needed to jump through for the permitting of infrastructure. Others mentioned the lack of cohesion between the regulations present in various forms of government. With all organizations in agreement surrounding the burdensome regulatory environment, many suggested a streamlined and localized process was needed to ensure unnecessary hardships in NNRE development and growth.

## Markets

Many of the NNRE firms interviewed varied in their locations and overall market reach. Although some had minimal sales internationally in Asia or Mexico, most sold their products or services in the U.S. Some NNRE firms focused on a very local market, selling products to the major cities surrounding their rural area. Other larger businesses expanded to regional markets, selling products to adjacent states in the Intermountain West. The largest firms, took advantage of the entire U.S. market shipping and selling products throughout the large metro areas of the West, Midwest, and East Coast.

While the current markets accessed by NNRE firms differed greatly, both agencies and businesses agreed that access to markets was a large challenge in growth and development. Most firms interviewed were located in extremely rural areas, while others depended on rural regions to conduct environmental services. These large distances created an environment where processing or shipping products became extremely costly. With a lack of rail or air transportation options, most NNRE firms depended on ground transportation to move materials or merchandise.

Proximity to markets challenged all businesses, with many relying on regional population centers to sell their products. These regional centers usually consisted of the major cities surrounding their rural region, and rarely crossed state lines. Some relied upon online platforms, while others depended on local residents and tourists to sell their products or services. Regardless of their current market access, most NNRE firms agreed that expanding their business was largely dependent on the costs associated with shipping their products to larger and further population centers.





## Infrastructure

Most of the issues attributed to the proximity of markets, stemmed from the lack or quality of infrastructure. Unlike urban areas, many rural regions possess poor road infrastructure characterized by single lane roads subject to treacherous and imposing terrain. Accompanying poor road infrastructure, some regions no longer possess freight rail services or airports, which make reaching markets extremely difficult.

Although infrastructure mainly impacts NNRE firms that produce a product, businesses that rely on tourists and visitors could also lose customers if their location is unnecessarily hard to reach. While infrastructure is most often undertaken by public agencies, the lack of tax funding attributed to low levels of development make large capital improvement projects in rural regions extremely difficult to finance.

The lack of critical infrastructure systems was also mentioned as a major deterrent in developing renewable energy projects in many rural areas. Communities and regions that had successfully invested in capital improvement projects specific to energy production noticed an increase in interest from private sector energy producers. Those that have yet to invest in these capital improvement projects, found that infrastructure was usually the determining factor of where renewable energy investment occurred.



## Education

For some NNRE firms and most public/non-profit agencies, education was identified as a minor barrier. Although the lack of education by community members or the local customer base did not impact them greatly, those that depended on higher educated customers felt that increasing education would be extremely beneficial to their business reach.

In this scope, breaking down the education barrier had two different directions. The first, was to educate current NNRE firms on the best practices that exist in their industry. Some mentioned the use of educational programs through university extension programs to enhance their knowledge of expanding technologies and techniques. Those unaware or unwilling to participate in these educational opportunities, face the risk of utilizing old, inefficient, and costly practices. While education was not cited as an extremely large challenge, many businesses agreed that an educational network specific to their industry would be socially and economically beneficial.

The second form of education identified as a barrier, related back to customers. Most NNRE businesses that sold value-added products like organic vegetables or grass-fed beef, depended on larger markets of more educated consumers. With more abundant wages, these consumers were willing to pay larger prices for higher quality products.



An increase in the education of rural regions throughout the Intermountain West, surrounding the benefits of organic or grass-fed products, was identified as a challenge in capturing a higher local customer base. However, it is important to note, that even rural consumers that are aware of these benefits, most often face higher levels of financial struggle, and thus do not invest their wages on more expensive food products.



## Workforce

Most prevalent in the timber industry, many NNRE firms continue to struggle with the availability and quality of workforce. Agreed upon by businesses, public, and non-profit organizations, many cited the lack of quality workforce as a huge challenge. While many businesses mentioned the willingness and even desire to train employees to conduct NNRE work in a safe and efficient matter, most stated the lack of soft skills in workers prevented them from increasing employment numbers. The mention of workers who could not show up to work on time, pass a drug test, or did not respect business policy, were all mentioned when discussing the quality of workforce available.

This challenge was unsurmountable for many businesses, as a dwindling population base and lack of amenities in these rural regions makes it extremely difficult to attract good employees. Others mentioned the need for the restructuring of social services, citing welfare as one of the main reasons that people are unwilling to work. Regardless of the reasons that have currently created this quality workforce drought, everyone agreed that overcoming the challenge of finding quality employees was crucial in expanding NNRE businesses.



## Conclusion

While the types of NNRE firms that were interviewed differed between states, there were no major differences between the barriers experienced by businesses on an individual state level. Instead, the analysis revealed trends that were similar across the entire Intermountain West region. While these findings do not comprehensively highlight every type of NNRE firm that exists, this information provides a foundation of knowledge surrounding the core business types that currently exist in the economy. Barriers presented by these businesses may change over time, and may not align with other NNRE firms, but are an important insight into the current challenges facing NNRE development. While the study area focuses on a large region, the information in this chapter is specific to the Intermountain West, and may not be applicable to other regions of the United States.

## Tools Available

Although many of the businesses interviewed were aware of the programs and tools available to assist their development, many were unwilling to participate. Most cited traditional forms of economic development services which included: small business development centers, state workforce training programs, USDA grants, and small business administration programs. Many businesses cited the extremely broad reach of these programs, which focus on traditional industries, as another reason that prevented participation.

As most NNRE firms work in a specialized or niche market, many felt that the programs and tools offered were too broad to be applicable or beneficial to their industry. The specific tools and programs mentioned by agencies and businesses are organized by state and provided on the following pages. Recommendations for additional programs to develop the NNRE are presented in the following chapter.



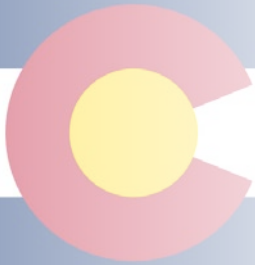
## Montana

### MONTANA



1. Small Business Development Center
  - Monthly Pre-Business Workshops
  - BRE Resource Team
  - Business Financing Programs
  - Workforce Training Grants
2. Department of Labor Incumbent Worker Training Program
  - Funds to train workforce into higher levels of education
3. Big Sky Trust Fund
  - Grant funding to pay for infrastructure and workforce development
4. Montana Board of Investments
  - Funds distributed to local governments for infrastructure, job creation, and tax credits
5. Snowy Development Regional Development Corporation
  - Business planning and development; Access to markets; Gaps in workforce housing
6. Industry Specific Collaborative Efforts
  - Beverage industry (Wine, Beer, Distillery) working together to increase tourism
  - Informal networks increasing workforce development by offering internships/apprenticeship programs.

## Colorado



1. Community Based Services
  - Small grant technical assistance
  - Workforce training specific to youths
  - Promoting occupations that could keep youths in the area
2. Small Business Development Centers
  - Workforce development working with local colleges/universities
  - Tax benefits
3. Workforce Centers
  - Training college/university students for new technologies
  - Incentives to locate in rural enterprise zones
  - Loan guarantees
  - Increase of broadband in rural areas
4. USDA and EDA Financing Mechanisms
  - Business incubation and planning
  - Workforce development
  - Product development and research

## Oregon

### STATE OF OREGON



1859

1. Small Business Development Center
  - Mentoring, education, and workshops
  - Workforce Development
  - Assistance with business planning, incubation, and physical infrastructure
2. Extension and Education Programs
  - Outreach, mentorship
  - Access to training and resources available in urban areas
  - Programs geared toward youth to spend time volunteering among natural resources (invasive weed removal, replanting)
3. Collaborative Networks
  - Volunteer mentors and business owners
  - Entrepreneurial education

A misty forest landscape with tall evergreen trees in the foreground and mountains in the distance. The scene is captured in a soft, hazy light, likely during dawn or dusk, with the trees appearing as dark silhouettes against a lighter, misty background. The overall mood is serene and atmospheric.

# Chapter Five

## Recommendations



## Introduction

The purpose of this chapter is to provide strategies for economic development managers, organizations, and elected officials to increase NNRE business development and growth. This section was designed by analyzing data from phone interviews conducted with public and non-profit organizations, and in-person interviews with NNRE businesses.

## Tools Needed by NNRE Firms

The following presents seven tools and programs that would be beneficial to the development and expansion of the new natural resource economy.



## Streamlined and Localized Regulations

State and local agencies must work together to make regulations more efficient. Collaborating with various forms of state and local governments could create a regulatory environment that is more cohesive and thus easier to abide by. Some federal regulations that do not pose risks to human health, should not be applicable to smaller businesses. Instead, state governments should enforce regulations based on regional needs, following broad federal guidelines that ensure public safety.

This type of regulatory environment is not only crucial in expanding the NNRE, but small businesses as a whole in rural communities. This need stems from the lack of clarity, cohesion, and assistance with current policies impacting the business community. Many NNRE firms mentioned conflicting regulations between multiple local, county, and state agencies. These mixed signals frustrate current business owners, and may prevent others from starting a new venture.

Here are three major tasks that should be undertaken to create a more effective regulatory environment:

### Federal

Encourage congressman, senators, and governors to lobby for a higher level of flexibility in the regulations enforced by the federal government. While federal oversight is absolutely crucial in ensuring public health and safety, individual states need to have more power to enforce the policies most beneficial for their residents.

### State

Collaborate with state agencies to create policies specific to regions or industry clusters. With an extremely diverse relationship between the urban and rural west, certain regulations need to be regionally specific to ensure efficient and effective oversight.

### Local

Work alongside the business community to discover the best methods for NNRE firm retention and expansion. Form strong relationships with the business community and utilize the information gained to assist in the growth of the industry.



## Workforce Pathway Development

Although many workforce development programs already exist throughout the Intermountain region, businesses discussed workforce as a major challenge. While it is extremely important to train community members currently in the workforce, these programs must also focus on bridging the gap between youth and the jobs currently available in communities.

Many rural areas are losing their young population because youth do not identify any opportunities or future in those communities. Providing internship or apprenticeship programs that start early in H.S. and connect students to businesses in the local community, could have a positive impact on retaining younger populations in rural regions.

Most NNRE firms expressed the need for a higher quality workforce. While the small workforce that already exists in rural regions needs to be well skilled and prepared, communities need to focus on retaining their young population to ensure their population losses do not continue.

Here are three major tasks that could promote a higher quality workforce and retain a younger population base in rural communities:

### Middle School

Collaborate with school principles and superintendents to ensure an effective curriculum. At this stage, students should be learning valuable soft skills including timeliness, a positive attitude, and social communication techniques to ensure their success.

### High School

Collaborate with school principles, superintendents, public agencies, non-profits, and business owners to engage students with their community. Create an internship program that allows students to build valuable skills from organizations within the community.

### College

Collaborate with colleges, universities, extension programs, and business owners to guide high school students straight into a local career path. Create an apprenticeship program that assists local businesses with a young workforce and pays young students a living wage to encourage population retention.

## Generational Inheritance Programs

With the average age of farmers in the U.S. aging dramatically, many still want their land to produce an agricultural product. But as these farmers retire, they find it increasingly difficult to find people to take over their business. On the other end of the spectrum, many youths want to partake in farming, but cannot afford the extremely valuable farmland that is left in rural regions. A generational inheritance program could help solve this problem.

By bridging the gap between old farmers ready to transfer their land, and young individuals looking for an opportunity to join this type of venture, local agencies can help move farmland into higher levels of production. A generational inheritance program with many options and a strong branding strategy, may even encourage young populations from urban areas to move into rural regions.

This type of program is necessary in rural communities to prevent the loss of valuable farmland. While large swaths of land still produce agricultural products, many farm owners are selling off land to investors, which are transforming productive land into vacation destinations, and retirement homes.

While this type of development can be beneficial in attracting tourism, it should not be the primary economic driver in rural regions. Agricultural production has a higher value in terms of employment and wages, and allowing an overabundance of agri-tourism could raise property values to extreme levels.

Here are three major tasks that should be undertaken to create an effective generational inheritance program:

### Farmer Engagement

Meet with local farmers to gauge interest in such a program. Form relationships and discover what community farmers plan to do with their properties.

### Program Design

Collaborate with farmers and local agencies to create an effective program. Make sure the program benefits the farmers in some way.

### Program Marketing

Create a strong brand, identity, and story to attract youth into the rural region. Highlight the programs strengths, the skills to be gained, and the lifestyle that is awarded with such work.



## Investment in Infrastructure

Capital improvement may be the costliest, yet most beneficial tool to provide to NNRE businesses. Many firms cited the costs and transportation challenges associated with processing facility locations. With many of these facilities in major population centers, producers spend more time and money traveling to process their goods. Allowing on-site processing, or public/private partnerships which create community based processing facilities, could help these businesses greatly.

In addition to localized processing infrastructure, improving road networks and creating more options for freight and product distribution would also help to lower costs of products coming out of rural regions. Although this requires large capital investments, rural communities will not grow unless state, county, or local governments invest in vital infrastructure systems.

As important as physical transportation infrastructure is, public agencies must also enhance electrical grids and internet capabilities to expand the capacity for development and growth. Providing infrastructure to transmit energy out of rural regions could greatly enhance the chances of private sector renewable energy development in rural regions. Providing fiber/broadband internet capabilities throughout commercial and industrial zoned land could expand business recruitment efforts.

Here are three major tasks that should be undertaken to help expand infrastructure opportunities in rural regions:

### Processing Facilities

Meet with local producers to gauge the interest in a community based processing facility. Form a public/private partnership, steering committee, or group of local residents to guide this process.

### Transportation Infrastructure

Apply for state and federal grants to attain any funds available for road improvements. Strategize and collaborate with organizations to discover local or regional revenue opportunities to increase the capital improvements budget.

### Energy and Internet

Form strong public/private partnerships with current energy/internet providers. Collaborate with local businesses, or recruit larger firms to help fund crucial infrastructure costs while expanding their market.

## Extension and Education

While university extension and education programs already exist in many rural areas, the expansion of these tools could be highly beneficial. Extension programs were very valuable to most NNRE firms interviewed, and expanding access to education through this venue could provide businesses with best practices and networking opportunities.

Education and extension programs should expand, while focusing resources on the types of business that exist within the community. With a program geared to specific industry clusters that exist within the region, business owners will most likely find higher value in the courses and educational opportunities being offered.

Here are three major tasks that should be undertaken to expand upon extension and educational programs:

### Site Visits

Increase the availability and funding for professionals to meet directly with business owners. Invest in individuals that can build trust, rapport, and relationships with rural stakeholders and business owners.

### Virtual Classrooms

Create an online platform that business owners can utilize remotely to gain valuable skills and knowledge. Utilize this platform to communicate directly with business owners without traveling long distances.

### Collaborative Networks

Work alongside local groups, agencies, and business owners to conduct social and educational gatherings. These events could help promote social cohesion and expand the knowledge of local residents.



## Market Expansion Assistance

One of the major challenges NNRE businesses faced was the lack of time or knowledge of how to market their product properly. While this type of tool would most likely come out of the non-profit/private sector, the value of such a service could be extremely impactful.

Creating marketing tools or investing in individuals which could specifically market products for businesses, could increase business growth and thus employment. Many NNRE firms cited the challenges they faced in their inability to market or brand their products effectively and efficiently. Many business owners lack the ability to market their products in a distinct way, and rely upon smaller markets to sell their product.

Here are three major tasks that should be undertaken to help business owners expand their access to markets:

### Local Community Network

Create an online platform that can help market local business products. Build revenue to balance costs by charging small fee's for this service.

### Regional Branding

Help local businesses by developing a cohesive branding and marketing strategy they can utilize. Tell a story, and make it easy for consumers to distinguish the products developed in your region.

### Marketing Assistance

Increase the availability and funding for professionals to meet directly with business owners to market their products. Invest in people and organizations that can help promote entrepreneurship, innovation, and micro-enterprise development.

## Ecosystem Services

While educating private land owners on the benefits of thinning and planting may increase the projects available for restoration work, public/non-profit sectors must lead the way. Although these services are costly, agencies can build revenue from taxing the negative externalities of traditional industries, ultimately providing funding for private contractors to conduct restoration work.

Without proper funding mechanisms this industry is difficult to promote. While some businesses create wood products from thinned logs, many restoration activities are inherently tied to environmental stewardship and not product development. Although this challenge exists, many consumers, organizations, and business owners understand the importance of this work. With higher wildfire rates and fuel loads, this type of work is crucial in mitigating catastrophic losses from hazard events.

Here are three major tasks that should be undertaken to expand ecosystem service projects:

### Funding Mechanisms

Work with local, regional, and state agencies to ensure that extraction based industries are paying for the negative externalities they produce. Utilize community health as a metric to gauge the financial liability of polluting industries.

### Land Owner Grants

Provide a wider range of incentives and funding opportunities for private lands owners. Create a process that's easy, efficient, and effective to encourage participation.

### Restoration Projects

Invest in environmental systems by directing funds to restoration contractors. Instead of utilizing low-bid methods, hire contractors that pay their employees living wages and conduct quality work.



## Conclusion

The rural communities of the Intermountain West have continually struggled and persevered through seemingly unsurmountable challenges. Whether it be global market fluctuations, federal regulations, or the loss of community members, rural regions have overcome hardships and barriers that have hindered socio-economic prosperity.

With the information presented, this research hopes to inform, educate, and assist the tenacious community members, business owners, and economic development professionals that strive to make rural communities a better place.

While rural communities may lack the expansive development and wealth seen in urban centers, they possess passionate individuals full of adversity, discipline, and integrity. The information and strategies presented are designed to develop rural communities in a sustainable matter, in hopes of providing cleaner environments, higher wages, and a more prosperous life for the men and women of the Intermountain West.



# Bibliography

1. Abbott, Carl (2008) *How Cities Won the West*. Albuquerque: University of New Mexico Press.
2. Brown, D.L. and J.M. Wardwell. (1980) *New Directions in Urban-Rural Migration: The Population Turnaround in Rural America*. New York: Academic Press.
3. Center of the American West (<http://www.centerwest.org/publications/oilshale/3engineering/6blacksunday.php>)
4. Hibbard, Michael and Lurie, Susan (2015) *The New Natural Resource Economy: A Framework for Rural Community Resilience*. Pp. 192-210 in *Bridging the Distance: Common Issues of the Rural West*, edited by Danbom, David B. Salt Lake City: University of Utah Press.
5. Hibbard et al. (2011) *Toward One Oregon*. Corvallis: Oregon State University Press.
6. Hurt, Douglas R. (1998) *The Rural West Since World War II*. Lawrence: University Press of Kansas
7. Jones, R.E., J.M. Fly, J. Talley, and H.K. Cordell. (2003) 'Green Migration into Rural America: The New Frontier of Environmentalism. *Society and Natural Resources* 16:221–38.
8. Kellon, Cathy. (2011+) *Oregon's Restoration Economy: Investing in natural assets for the benefit of communities and salmon*. with sources from Moseley, Cassandra and Nielsen-Pincus Max. (2010) *Economic and Employment Impacts of Forest and Watershed Restoration in Oregon*. Ecosystem Workforce Program, Working Paper no. 24.
9. Longbrake, David B., and Robert V. Johnston. (1981) *Evolving Socioeconomic Analysis in Small Intermountain Communities: The Rapid Development Scenario*. *Yearbook of the Association of Pacific Coast Geographers* 43, no. 1: 101-12.
10. McGranahan, D.A. (1999) *Natural Amenities Drive Rural Population Change*. ERS-781, U.S. Department of Agriculture. Washington, DC: US Government Printing Office.
11. Montana.gov ([http://mt.gov/discover/brief\\_history.mcpix](http://mt.gov/discover/brief_history.mcpix))
12. Nash, G.D. (1993) *New Approaches to the American West*. Pp. 15–27 in *Old West-New West: Centennial Essays*, edited by B.H. Meldrum. Moscow, ID: University of Idaho Press. Otterstrom
13. Powell, David C. (2007) *Eastside Screens Chronology* ([https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprd3794796.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3794796.pdf))
14. Resettlement Administration (<https://livingnewdeal.org/glossary/resettlement-administration-ra-1935/>)
15. Reeder, R.J. and D.M. Brown. (2005) *Recreation, Tourism, and Rural Well-Being*. ERR-7, US Department of Agriculture, Economic Research Service. Washington, DC: US Government Printing Office.
16. Robert, Young F. (2015) *The Oregon Way: Planning a Sustainable Economy in the American West*. *Journal of Planning Education and Research* 1 –14
17. Robbins, William G. (1994) *Colony and Empire: The Capitalist Transformation of the American West*. Lawrence: University Press of Kansas
18. Seri & Friends of the Earth Austria. (2009) *Overconsumption? Our use of the world's natural resources*
19. White, Richard. *Gilder Lehrman Institute of American History* (<https://www.gilderlehrman.org/category/creator/richard-white>)
20. Winkler, R., Field, D. R., Luloff, A. E., Krannich, R. S., & Williams, T. (2007) *Social Landscapes of the Intermountain West: A Comparison of 'Old West' and 'New West' Communities*. *Rural Sociology*, 72(3), 478-501



# Figures

## Chapter Two

**(Figure 2.1)** Types of Production Industries in the NNRE <sup>4</sup>

**(Figure 2.2)** Types of Consumption Industries in the NNRE <sup>4</sup>

**(Figure 2.3)** Types of Restoration Industries in the NNRE <sup>4</sup>

**(Figure 2.4)** Average Number of Jobs per \$1M of Investment for Restoration Projects <sup>8</sup>

## Chapter Four

**(Figure 4.1)** Oregon Wood Products Employment Losses

<https://oregoneconomicanalysis.com/2012/01/23/historical-look-at-oregons-wood-product-industry/>

**(Figure 4.2)** Colorado Coal Production Losses

<http://www.denverpost.com/2017/04/16/colorado-coal-donald-trump-jobs/>

**(Figure 4.3)** U.S Coal Mining Employment Losses

<http://www.energytrendtracker.org/2017/01/century-long-decline-for-u-s-coal-jobs/>

**(Figure 4.4)** Automation/Mechanizations impact on Western Mill Operations and Production

<https://headwaterseconomics.org/economic-development/trends-performance/changing-role-manufacturing/>

**(Figure 4.5)** Energy Consumption in the U.S.

<https://www.eia.gov/consumption/>

**(Figure 4.6)** Automation/Mechanizations impact on Oregon wood product employment

<https://headwaterseconomics.org/economic-development/trends-performance/changing-role-manufacturing/>

**(Figure 4.7)** Economic Impacts of Federal Lands in Montana

<https://headwaterseconomics.org/dataviz/national-park-service-units/>

**(Figure 4.8)** Economic Impacts of Federal Lands in Colorado

<https://headwaterseconomics.org/dataviz/national-park-service-units/>

**(Figure 4.9)** Economic Impacts of Federal Lands in Oregon

<https://headwaterseconomics.org/dataviz/national-park-service-units/>

**(Figure 4.10)** U.S. growth in Solar Employment; Decline of Oil, Gas, and Coal Employment

<http://gas2.org/wp-content/uploads/2016/06/Renewable-Vs-Fossil-Jobs-Bloomberg.png>

**(Figure 4.11)** Falling Costs for U.S. Clean Energy Technologies

<https://obamawhitehouse.archives.gov/blog/2015/11/13/investments-renewable-energy-are-paying-and-paving-way-ambitious-climate-action>

**(Figure 4.12)** U.S. jobs in ecological restoration and selected carbon intensive industries

<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0128339#sec015>

**Montana, Colorado, Oregon Flags**

<http://www.50states.com/>

**NNRE Barrier Icons**

<http://www.flaticon.com/> (Gregor Cresnar; Freepik; OCHA)

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