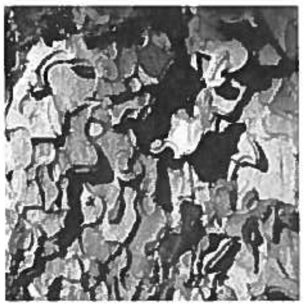
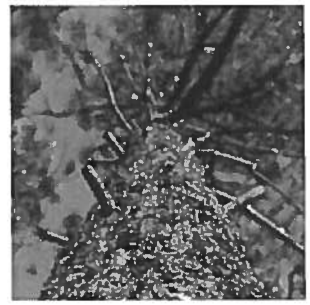
Chapter 2





Ecological Economics

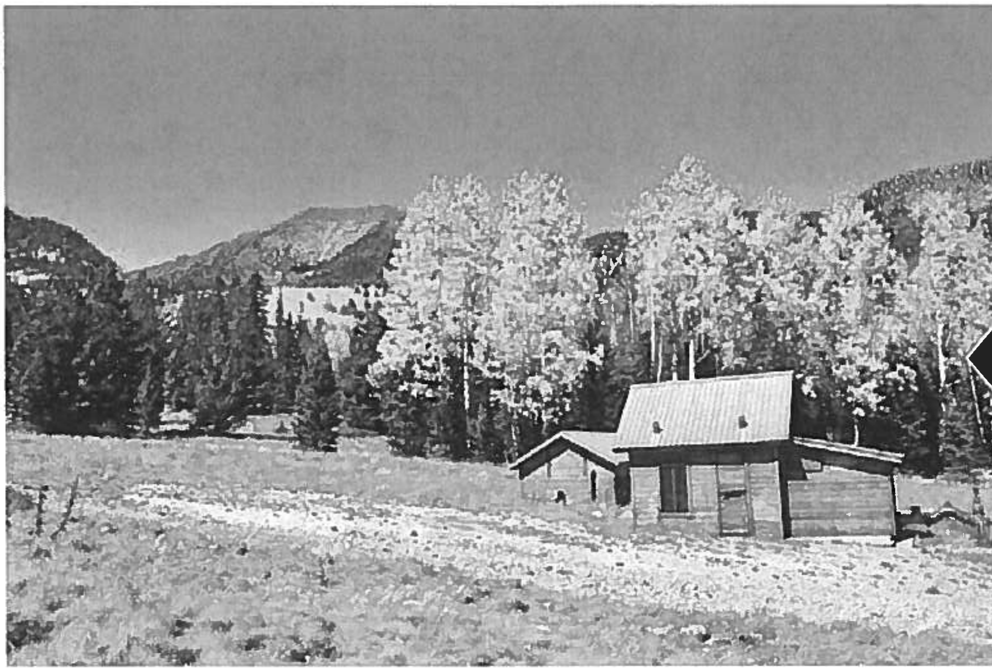
Evan E. Hjerpe

Frequent-fire forests in the western United States burn more intensely and at a greater spatial scale than during any other recent time. The increase in fire intensity is symptomatic of unnatural forest structure spurred by more than a century of grazing, fire exclusion, logging, and road building in these forests (Covington and Moore 1994, Brown et al. 2004) combined with warming climates (Westerling et al. 2006). This loss of ecological integrity in western, frequent-fire forests has numerous political and economic ramifications for communities, management agencies, and taxpayers. Moreover, it has caused a reduction in the flow of ecosystem services—the suite of benefits provided by nature to mankind, such as water purification, recreational opportunities, wildlife habitat, and biodiversity (Benayas et al. 2009).

To address increasing fire management challenges and decreasing ecosystem service benefits, politicians, researchers, land managers, and the public have called for large-scale, forest restoration treatments. The intent of restoration is to return greater naturalness and resilience to forest structure, function, and processes primarily by thinning, prescribed burning, and wildland fire use. Forest restoration is often coupled with watershed restoration to improve degraded streams, decommission old roads, and remove invasive plants. Forest restoration prescriptions are often informed by historical reference conditions, while anticipating future, altered successional trajectories (Allen et al. 2002).

Ample evidence-based research illustrates that forest restoration can effectively change wildfire behavior and help return natural fire regimes to degraded western forests (Cram et al. 2006, Murphy et al. 2010, Fulé et al. 2012). Likewise, research shows that restoration is also effective at increasing the quality and quantity of critical ecosystem services (Benayas et al. 2009). The combination of restored natural fire regimes and increased ecosystem services make forest restoration a powerful economic vehicle for rural communities and the nation. Translating these ecological changes into economic values is paramount for understanding the total value and potential of large-scale forest restoration. Moreover, the ecologically oriented primary intent of landscape-scale forest restoration requires novel social and economic valuation methods to illustrate its associated costs and benefits.

This chapter explores the economics of landscape-level restoration treatments in degraded western forests by focusing on the first large-scale forest restoration program of the U.S. Forest Service (USFS), the Collaborative Forest Landscape Restoration Program (CFLRP). It is important that collaborative stakeholders understand the economics of the CFLRP because the value placed on fiscal returns and responsibilities represent significant aspects of the legislation. In addition, there is significant, vested interest on behalf of the tax-paying public.



The San Francisco Peaks jut out behind a line of yellow aspen in the Inner Basin north of Flagstaff, Arizona. In the foreground is a City of Flagstaff well. Every fall, thousands of tourists visit Flagstaff to see the changing aspen leaves. In June 2010, the Inner Basin was threatened by the 15,075-acre Schultz Fire. Subsequent flooding from the fire destroyed a major waterline for the city and shut down the road to the Inner Basin for a year. *Photo by Brienne Magee, USFS Coconino National Forest*

CFLRP Economics

Title IV of the Omnibus Public Land Management Act of 2009, known as the Forest Landscape Restoration Act (FLRA), established the Collaborative Forest Landscape Restoration Program in large part to deal with wildfire-related issues. The purpose of the Act is to "encourage the collaborative, science-based ecosystem restoration of priority forest landscapes." The legislation emphasizes that forest restoration should be done efficiently so as to maximize regional economic impacts and benefits while achieving significant social and policy objectives.

CFLRP: The Economic Rationale

While the primary intent of the CFLRP is to restore degraded forests, the most important drivers of this legislation were the escalating costs and frequency of fire (Schultz et al. 2012). Section 4001(1–4) of the Act promotes restoration through a process that: "encourages ecological, economic, and social sustainability; leverages local resources with national and private resources; facilitates the reduction of wildfire management costs, including through reestablishing natural fire regimes and reducing the risk of uncharacteristic wildfire; and demonstrates the degree to which—

(A) various ecological restoration techniques—
(i) achieve ecological and watershed health objectives; and
(ii) affect wildfire activity and management costs; and
(B) the use of forest restoration byproducts can offset treatment costs while benefitting local rural economies and improving forest health."

The legislation received widespread support because a restored forest was viewed as additionally enhancing numerous economic values, such as better fish and wildlife habitat, improved water quality, more jobs in-the-woods, and useful woody byproducts.

CFLRP: Leveraging Funds and Economic Monitoring

The CFLRP is a competitive program within the USFS designed to incentivize broad stakeholder agreement about project goals while leveraging local and private resources with federal funding. The competitive nature of the CFLRP theoretically directs funding to the projects and collaborative groups that best illustrate a structure and strategy most capable of successfully implementing landscape-scale restoration. Project selection and continued funding depends significantly on the ability of the designated CFLRP project to create and maintain regional economic impacts, particularly those associated with job creation.

Incentives for leveraging additional funds for CFLRP projects are an important component of the Act because CFLRP funds are not used for National Environmental Policy Act (NEPA) planning, and they only pay for up to 50% of project monitoring. Additionally, an "all lands" approach was employed, leading to project proposals being partially judged by the amount of non-federal investment that would be leveraged. These stipulations force collaborative groups and the USFS to build a foundation of matching funds for many parts of the CFLRP process, and to use additional appropriations for NEPA planning. They also incentivize the regional stakeholders and collaboratives to expose projects to potential outside investors, such as commercial interests, non-profits, tribes, and states.

The economic monitoring of CFLRP projects is extensive. Collaboratives, in conjunction with the USFS, must track various economic metrics—costs of treatments, matching and in-kind resources, leveraged restoration resources adjacent to CFLRP projects, timber and woody biomass sold, and economic impacts. Economic monitoring is critical to determine whether projected economic impacts are realized, if treatment costs decrease over time, and if fire management costs are reduced in the long run.

To streamline and standardize project proposals and economic monitoring, the USFS developed the Treatments for Restoration Economic Analysis Tool (TREAT) to estimate the economic impacts of each proposed CFLRP project. The TREAT provides teams with a standard interface to estimate employment and labor income impacts from proposed restoration activities (Box 1).

CFLRP: Tracking the Flow of Money

Annual congressional appropriations fund CFLRP projects and, while funding is currently only authorized through 2019, there is widespread congressional support for the CFLRP at this time. Initially $10 million were appropriated for the CFLRP in Fiscal Year 2010, $25 million in 2011, and $40 million in 2012. Nevertheless, future appropriations remain uncertain given the concerns about the federal debt and the desire for "smaller" government.

Box 1. The Treatments for Restoration Economic Analysis Tool

The Treatments for Restoration Economic Analysis Tool (TREAT) model is used to help estimate the economic impacts for proposed and ongoing CLFRP projects, specifically employment and labor income. The standardized inputs in TREAT allow for simple aggregations and comparisons among CFLRP projects. The uniform templates also allow USFS economists to calculate final economic impacts based on data entered by CFLRP-associated stakeholders and project managers. USFS economists also work with project managers to ensure accurate data entry.

The first version of the TREAT model was developed specifically for the CFLRP and the 2010 project proposals. That version provided a comprehensive, easy-to-use economic platform for estimating the economic impacts of implementing ten-year strategies. A new version of the TREAT model is now available for the CFLRP projects. Three recent updates to the TREAT model represent advances in terms of capturing more accurate CFLRP economic data:

- County-level economic data is used, which means economic impacts are isolated from out-of-region or national impacts. The original TREAT model used state-level economic linkages that matched USFS regions. That model overestimated the multiplier effects, or the indirect and induced effects, of CFLRP project expenditures. The current TREAT model uses localized economic data for the specific counties where projects occur, producing more reliable estimates of economic impacts.
- Economic impacts are now monitored by specific year. The initial TREAT versions had users enter ten-year total estimates to produce annual averages.
- Local estimates for direct effects of timber harvest and processing are now incorporated. The latest version incorporates local commercial forest product response coefficients as determined through site-specific economic surveying from the University of Montana's Bureau of Business and Economic Research. This allows for more precise estimates of the economic impacts associated with commercial forest products from CFLRP projects.

Appropriations for CFLRP projects are made available at the discretion of the Secretary of Agriculture, acting through the Chief of the USFS. Funds are dispersed to regional USFS offices and individual national forests that are sites of proposed or ongoing CFLRP projects. The funds are then expended on contracts and agreements developed in collaboration with regional forest stakeholders (for more about contracts, see Chapter 5). Contracts and agreements for implementation and monitoring activities are signed with businesses, non-profit organizations, and academic institutions. Expenditures are tracked in annual reports by budget line items for the USFS and by matching funds (Box 2).

Costs and Benefits of Landscape-level Forest Restoration

Landscape-scale forest restoration is designed to protect human lives, communities, and infrastructure as well as return resilience to forest ecosystems. To achieve these goals, CFLRP projects, like all forest management activities, produce costs and benefits. While costs may be more-or-less immediately known, many benefits may not be recognized for quite some time. This can make landscape-scale restoration more difficult to achieve given our culture's desire for immediate gratification. However, if the goals of social and ecological sustainability are to be truly embraced, the current generation must begin to pay off the high-interest, natural capital loans that are the result of logging, development, and fire suppression practices. The following section examines the costs and benefits of forest restoration and summarizes some emerging concepts, such as payments for ecosystem services, which may help offset the costs of landscape-scale forest restoration.

Box 2: Regional Economic Impact of the CFLRP

The ten original CFLRP projects designated in 2010 have already generated tremendous ecological, economic, and social impacts. Initial CFLRP project selections were made near the end of the FY2010, making FY2011 the first full year of project activities. Annual reports for FY2011 were submitted in 2012 by all ten initial CFLRP selections. The cumulative annual impacts for all ten initial projects are impressive. As a result of direct CFLRP funding and matching funds in FY2011, these ten projects accomplished the following restoration objectives:

- Approximately 159,000 forested acres received restoration treatments, and moved those acres from high risk to lower risk for catastrophic wildfire
- Of these restoration treatments, about 31,000 acres were treated by mechanical thinning; 53,000 acres were treated with prescribed fire; and 75,000 acres experienced wildfire managed for resource benefits
- Roughly 43 miles of degraded streams were restored
- Numerous other watershed and forest restoration activities were conducted including: miles of road decommissioning, removal of invasive plants and noxious weeds, culvert replacements, and reforestation.

The ecological accomplishments of CFLRP projects and the associated project monitoring spurred substantial regional economic impacts in FY2011:

- Approximately 2,240 direct full and part-time jobs were created or maintained
- Including indirect and induced effects, about 3,375 total full and part-time jobs were created or maintained
- Nearly $82 million of direct labor income was generated (Labor income is the sum of wages, benefits, and sole proprietor income.)
- Including indirect and induced effects, approximately $125 million of total labor income was generated in the regions

- Much of the labor income and employment came from woody byproduct utilization and commercial forest product activities
- Some 320,000 green tons of small-diameter and low-value trees were made available for bioenergy
- Roughly 240,000 hundred cubic feet of timber was sold within CFLRP project boundaries
- Numerous other values were enhanced by ecosystem service improvements. Many of these increases in value take decades to accrue and/or are non-market in nature.

These results represent significant success for the CFLRP in its first full year of restoration activities, and were achieved even though direct funding was well below the authorized level. The regional economic impacts created by the CFLRP are critical as most of the designated projects occur in rural areas that typically have some of the highest unemployment rates and lowest per capita incomes in the nation. Given that CFLRP appropriations reached the authorized annual funding level of $40 million in FY2012, and that ten additional projects have been chosen, even greater impacts should occur as the CFLRP matures.

The ten projects include the Selway-Middle Fork Clearwater, Southwestern Crown Collaborative, Colorado Front Range, Uncompahgre Plateau, Four Forest Restoration Initiative, Southwest Jemez Mountains, Dinkey Landscape Restoration Project, Deschutes Collaborative Forest, Tapash Collaborative, and Accelerated Longleaf Pine Restoration.

Costs of Forest Restoration

Fighting wildfires is a means to protect lives, property, and structures. The costs of fire management are immense and rapidly increasing as both fire risk and human settlement continue to increase throughout forests in the western United States. Fire management costs for the Forest Service now regularly exceed two billion dollars annually. Some of the most costly wildfires are in frequent-fire forests that have seen per-acre tree densities dramatically increase from historical reference conditions. To wit, the costs of the Rodeo-Chediski and Hayman fires in Arizona and Colorado in 2002 exceeded one-half billion dollars when including suppression, rehabilitation, structural, and tax losses (WFLC 2010).

Many of the costs of uncharacteristic wildfires can be lessened, or avoided, with preventive forest restoration treatments. The direct costs of forest restoration are the result of implementing thinning and burning prescriptions. The cost of these treatments has been the focus of much research. In general, prescribed fire is considered to have the lowest costs per acre for treatment type, although wildland fire use (allowing natural wildfires to burn for resource benefit) can often be the cheapest per acre method of restoring natural fire regimes for larger fires. The cost of thinning-based treatments, including hand-thinning and mechanical treatments, varies significantly. For example, Hartsough et al. (2008) found a range of thinning costs from $500 to $2,000 per acre. In almost all cases, economies of scale exist in both prescribed burning and mechanical treatments, rendering larger treatments less expensive per acre.

Planning costs for forest restoration are substantial, but are likely similar to planning costs for any type of forest management. Additionally, all management actions come with opportunity costs. That is, for whatever action was chosen, other actions could have been implemented but were not undertaken. For example, instead of implementing landscape-level forest restoration, the USFS could pursue a bigger program of traditional timber production. While this could also reduce uncharacteristic wildfire in places, it would come at the cost of virtually all other ecosystem services (see Hjerpe 2011) and could continue the cycle of leaving future generations with greater forest management problems.

Finally, there are other potential costs, or risks, associated with forest restoration. For prescribed fires, these risks include the potential for escaped fires as well as safety and health concerns due to smoke. For thinning, associated risks include erosion from ground disturbance, introduction of invasive weeds, and wildlife disturbance. Additionally, many business costs are necessary to incur if byproduct utilization is able to play a substantial role in offsetting overall restoration costs. Transporting woody material from the forest as well as investing in wood processing equipment and facilities are major initial costs that are incurred prior to the final sale of wood products. Ultimately, potential environmental, social, and commercial costs are risks that will only receive attention when the risk of inaction becomes too great.

Economic Benefits of Forest Restoration

As landscape-scale forest restoration moves forward, there are several ways of examining the benefits that restoration provides. The first valuation method is to examine costs that would have likely accrued without restoration intervention (i.e., avoided costs) and measure the difference of these costs with and without treatment. The second metric involves examining improvements in market values resulting from restored forests. Finally, many benefits spurred by forest restoration can be considered as improvements in the quantity and quality of non-market ecosystem services.

Avoided costs are realized, for example, when restoration treatments help reduce or eliminate the management and societal costs created by catastrophic wildfires or other destructive forces. Such a list of avoided costs might include:

- Avoided fire suppression costs
- Avoided post-fire rehabilitation costs
- Avoided property and structural damages
- Avoided fatalities and injuries
- Avoided flooding and erosion damages
- Avoided tourism and recreation expenditure losses
- Avoided timber losses.

Researchers have investigated and substantiated these avoided costs (Loomis et al. 2003, Mason et al. 2006, Snider et al. 2006, and Mercer et al. 2007). For example, Mason and his colleagues (2006) found that the present value of many of these avoided costs (benefits) was much greater than the present value of treatment costs. Recently, USFS economists and researchers developed the Risk and Cost Analysis Tool (R-CAT) to determine avoided fire suppression costs for CFLRP projects for comparison to the treatment costs (Box 3). This powerful tool should help CLFRP collaboratives estimate potential savings for the federal government and taxpayers from their project.

It is important to note that costs and damages from wildfire or other destructive forces will not be eliminated by applying restoration treatments. However, landscape-scale forest restoration can substantially reduce these costs and damages, and validating long-term savings and avoided costs is critical to understanding the benefits of restoration.

Similarly, numerous research studies have documented market improvements resulting from forest restoration (Loomis et al. 2002, Kim and Wells 2005, Hjerpe and Kim 2008). A partial list of market improvements derived from these studies includes:

- Increased use values for fishing and hunting by improving habitat
- Increased property values
- Increased woody byproducts available for utilization
- Increased production of non-timber forest products.

Recently, disciplines, such as ecological economics, have focused attention on increases in non-market ecosystem services due to restoration treatments or similar conservation efforts (Loomis and Gonzalez-Caban 1998, Winter and Fried 2001, Loomis et al. 2003, Garber-Yonts et al. 2004, Benayas et al. 2009, Hurteau and North 2009, Meyerhoff et al. 2009, North and Hurteau 2011). These include:

- Increased native biodiversity
- Increased water quality and quantity
- Increased long-term carbon storage
- Increased consumer surplus for reduced fire risk
- Increased existence, option, and bequest values.

The reader will note that there are areas of overlap in all the benefits provided by forest restoration. In accounting for the benefits of forest restoration, a clear distinction between benefits will be necessary to reduce the potential for double-counting and exaggerating benefits.

Paying for Restoration

Given the substantial costs and benefits of landscape restoration, who should pay to repair environmental damages and how? While appropriations funded by taxes are the primary payment mechanism for restoration, alternate payment concepts are bridging the gap, including:

- Payments from state, county, or municipality taxes and/or bonds (e.g., the recently approved Flagstaff, AZ bond measure)
- Payments from wood products businesses for access to wood byproducts
- Payments from fishing and hunting organizations for improved habitat (e.g., Rocky Mountain Elk Foundation)
- Payments from private individuals and foundations, typically through non-profit, conservation organizations (e.g., The Nature Conservancy)
- Volunteer labor and management
- In-kind payments for labor from tribal organizations, academic institutions, and others.

As forest restoration yields numerous benefits, new economic strategies are also being developed to capture some of the lesser known, non-market ecosystem services generated by restoration efforts. These include efforts to "marketize" and internalize restoration benefits and are known as Payments for Ecosystem Services (PES; see Forest Trends and others 2008, Greiber 2009). To incorporate PES into a restoration project involves four primary steps:

- Identify ecosystem service prospects and potential buyers
- Assess institutional and technical capacity as well as access
- Structure agreements
- Implement agreements.

While taking such steps can be complicated and difficult, especially on public lands, examples from New York City and Denver illustrate how PES can be captured and used to offset treatment costs. The forested areas

Box 3: The Risk and Cost Analysis Tool [R-CAT] and Avoided Fire Suppression Costs

National Forest System economists and other researchers recently developed the Risk and Cost Analysis Tool (R-CAT). This modeling tool provides a framework for CFLRP projects to estimate avoided suppression costs due to forest restoration and compare avoided costs to fuel treatment costs. The R-CAT model combines spatially explicit fire occurrence and spread models with a statistical fire cost model to predict future suppression cost savings. The R-CAT is currently being operationalized for CFLRP project use, and is now a mandated part of the economic monitoring for the projects.

To use the R-CAT, project teams are asked to help create spatially explicit baseline fuel model and fire behavior maps for their project areas. Next, teams construct a spatially explicit fuel treatment schedule and covert their modeled landscape using this schedule. To determine avoided suppression costs, teams enter information about: 1) fuel treatment acreages over time; 2) fuel treatment effectiveness; 3) fuel treatment costs and revenues; and 4) pre- and post-treatment suppression costs.

Total post-treatment suppression costs, for an assumed duration, can be subtracted from the expected suppression costs associated with no treatment to estimate potential wildfire management cost savings—avoided costs. These savings are then compared to fuel treatment costs to determine impacts of treatments on expected fire program management costs.

However, not all forest restoration will necessarily result in avoided suppression costs. Wildland fire use and less aggressive suppression strategies may reduce per acre costs for fire management, although they can also increase overall costs due to larger, longer-lasting fires (Gebert and Black 2012). Similarly, the economic theory of avoided suppression costs, in general, has been called into question (e.g., Rideout and Ziesler 2008) because fire suppression and restoration treatments are both inputs of fire management, having a range of impacts on fuel levels, fire risk and fire behavior, along with interaction effects. Given the complex nature of new management directions, forest restoration should be examined by considering a broad suite of values as opposed to a simple financial return on investment. Avoided suppression costs are one important economic variable among many when considering the economic benefits and impacts of forest restoration.

for both cities were degraded resulting in diminished water quality and supply (Chichilnisky and Heal 2002, Kaufmann et al. 2005). Municipal utilities often construct expensive man-made purification and treatment facilities in such cases, but New York City and Denver decided to invest in upstream forest restoration and preservation for their water supply and purification needs, saving billions of dollars that would have otherwise had to be expended on water treatment plants. Water and utility companies and their customers now pay for restoration and preservation to produce ecosystem services such as water collection, purification, and delivery.

Clean, plentiful water is just one example of the ecosystem services that can be enhanced by forest restoration. Others include carbon storage, nutrient cycling, water temperatures, fish and wildlife habitat, native biodiversity, recreation opportunities, cultural services, and many more. By bundling multiple ecosystem services, payments for restoration can be increased and management is less likely to focus on singular objectives.

Economic Barriers and Bridges

Economically speaking, landscape-level restoration projects, such as those supported by the CFLRP, represent a new way of doing business in the nation's forests. However, innovation and inventiveness are not always rewarded in a timely manner, and this presents barriers for most CFLRP projects. These barriers are reflections of long-held values, systemic traditions, and out-dated means of accounting for resource goods and services. The major barriers (see Table 1) include:

- Misalignment in term of incentives, information, and practices between ecological restoration and the market economy
- Nascent development of ecological restoration, especially at the landscape scale
- Massive number of acres that need restoration treatment and the relatively short time frame before uncharacteristic wildfires occur throughout degraded forests

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- Lack of complete social acceptance of treatment alternatives
- Continued belief in logging-only treatments as the solution to economic troubles
- A belief that forest management should pay for itself; no new taxes
- Inability to account for non-market flows between the nation's forests and the greater economy.

The barriers to achieving landscape-level forest restoration are significant, requiring innovative bridges to overcome these hurdles. The development of bridges can be viewed as ongoing experiments in the fertile learning grounds of CFLRP projects. Specifically, bridges to greater restoration can be found in the practices of collaboration, sustainability, diversity, education, research, ecosystem services, and community forestry (see Table 1). Continuing to emphasize and expand these practices within a CFLRP project is as important as thinning trees or making wood products. This is why from an economic perspective:

- Collaboration provides the necessary degree of certainty for business interests by providing confidence that the federal agencies, county, municipalities, conservation groups, academic institutions, and tribal organizations all have a level of commitment to completing these projects.
- Collaborative restoration is pro-active in treating forest health symptoms and has a greater and more consistent regional economic impact on rural communities than fire control and suppression practices while providing more ecosystem services than traditional logging practices.
- Comprehensive restoration requires a number of different activities on the landscape (e.g., thinning, burning, removal of invasive plants, road de-commissioning, monitoring, and wildlife habitat improvement) requiring varied workforces (Combrink et al. 2012). It is also labor intensive. In places, landscape restoration has been shown to produce more jobs per million dollars of expenditures

The Horse Pine Stewardship Contract is an ongoing project that will eventually commercially thin 2,334 acres and, using the value of the timber removed, treat at least 1,400 acres non-commercially in order to enhance wildlife habitat. *Photo courtesy of U.S. Forest Service, Southwestern Region, Kaibab National Forest*

Wildlife viewing is an ecosystem service enhanced by healthy forests. Birders and hunters alike bring money into local economies. *Photo by George Andreijko, Arizona Game and Fish Department* in affected rural communities than traditional timber management, despite creating fewer "marketed" goods for immediate sale (Hjerpe 2011).

- Collaborative restoration emphasizes woody byproduct utilization that involves local workforces as much as possible, which tends to result in fewer exports of final products than traditional timber management. This, in effect, supports USDA and USFS policy goals aimed at supporting and developing rural economies.
- Collaborative restoration embraces the concept of ecosystem services and payments for these services. Deriving payments for bundles of non-market ecosystem services may be the greatest hope for replacing taxation as the primary funding mechanism for landscape-scale forest restoration.

Table 1. Economic Barriers and Bridges to Restoration

Economic Barrier to Restoration	Contributing Factors	Manifestations	Economic Bridges
Misalignment between restoration and market economy	Lack of holistic accounting Discounting the future Lack of understanding restoration benefits Cumbersome and expensive valuation methods Rigid economic system Incentives for resource development and extraction Lower-valued byproducts	Restoration is undervalued and underfunded Resource legislation, policy, and management that hinders restoration Difficulty in obtaining business grants and loans	Capture positive and negative externalities Promote research, education, and awareness of restoration Seek payments for ecosystem services Embrace sustainability and inter-generational equity concepts

Economic Barrier to Restoration	Contributing Factors	Manifestations	Economic Bridges
Novelty of restoration	Blueprints are lacking Incentives and metrics are lacking or not appropriate The public has limited awareness of restoration	Projects take years to develop and achieve social license New skill sets and workforce needed	Experiment and manage adaptively Engage communities and local champions Maximize local economic impact
Scale of lands needing restoration	Millions of national forest acres in need of restoration Billions of dollars needed for treatments Reactive fire protection funds takes priority over pro-active restoration funds	Incomplete funding Problems outpace agency resources Continued suppress-and-control fire mgmt.	Maximize restoration impact in treatment location and type Employ cost effectiveness Engage adjacent land owners and diverse constituents Leverage resources from non-traditional sources
Social acceptability	Fire is perceived as bad Treatments involve disturbing the land, creating smoke, and cutting trees Compliance with other laws and codes Confusion between traditional logging and restoration thinning	Lack of understanding the natural role of fire Projects stopped via legal challenges Distrust of industry Distrust of agency Compliance expenses	Promote education and outreach Conduct thorough, collaborative planning Conduct authentic restoration Engage communities and stakeholders Promote transparency

Conclusion

Collaborative landscape-scale forest restoration is a new, hopeful investment in both landscapes and communities. It values a reciprocal attitude to land as opposed to one that only takes from the land. Collaborative landscape-scale forest restoration also seeks to economically reward the community for its ongoing participation in the process. The CFLRP is an excellent example, and model, of a federal agency and regional stakeholders leading in a direction that will yield vast landscape improvements, while providing economic assistance to the rural communities most affected by wildfire and adverse economic conditions.

Despite this progress, stakeholders and policymakers should not expect forest restoration to be an economic silver bullet without some significant evolution in the marketplace for ecosystem services. This is a challenge for all involved and will take considerable time, will, and effort. Collaboratives should also consider monitoring economic activities not only to provide information to refine restoration activities but to also ensure that unintended economic consequences do not happen, such as timber production masquerading as "restoration" in areas that need little, if any, logging. Ultimately, the challenge in achieving collaborative forest restoration may be maintaining the authenticity of restoration projects and adhering to both the ecological and economic principles that have set ecological restoration apart from other forest management practices.

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