



What do I do AFTER THE FIRE?

Use economic analyses
to understand aesthetic
and financial uncertainties
following wildfire

While many landowners would like to do everything they can after a wildfire to help their land, it is often neither practical nor affordable.

Finding Economic Help

Assistance in economic analysis can be found by contacting:

- University of Wyoming Department of Agricultural and Applied Economics
- Natural Resources Conservation Service in your area
- University of Wyoming Extension office in your county

How does a landowner decide what to invest in?

There are many factors to consider.

- *What values are you trying to restore?*
- *Are they short-term or long-term issues?*
- *And, how much can you afford to spend?*

What Values Do You Want to Restore?

Create a plan that lists goals and objectives for the land to define what you want to restore to your property after the wildfire. Is it grazing capacity, timber production, scenic views, wildlife habitat, clean water, or something else? Once done, put economic values on the goals and objectives. Some are easier than others to value. Grazeable forage and trees for timber generally have a market value. Scenic views and wildlife habitat are generally called nonmarket values and have to be inferred from other sources. Clean water can be valued different ways depending upon whether or not things like municipal water sources (a market value or cost-reducing value) or fish habitat (a nonmarket value) are helped.

Short-term versus Long-term

Next, to complete an economic analysis that will help evaluate different scenarios, think about the assumptions you made about short-term and long-term inputs and consequences of possible actions.

In the short-term, if revegetating a site burned by a wildfire, one assumption may be that the seeds you plant will grow next year. If your plan is to use those plants for grazing, you may have to assume they will be ready to graze in the second year and produce some known amount of forage that will persist for a known number of years. Consider the risk involved in those assumptions. How

likely will the seeding succeed? How much variation in forage production is expected year to year?

Some decisions will have long-term consequences. Deciding to revegetate to reduce erosion after the wildfire brings a new set of issues. In cases like this, economists may choose to do a with-and-without treatment analysis. Account for all the direct and indirect impacts of erosion in the short- and long-term. In the short-term, once the fire is out, there may not be much ground cover to protect the soil from raindrops or wind. Any weather event can cause soil to move into waterways or into the atmosphere and create water and air quality problems. In the long-term, this soil loss may reduce the overall productivity of the land – an effect that may be irreversible other than in geologic time.

Long-term Analyses Pose Problems

Herein lies the economic problem.

We can do some analyses on the short-term issues, but long-term analyses are more problematic. Both timeframes require that soil scientists and ecologists quantify those impacts (e.g., if you lose 0.25 inches of topsoil, that means water quality decreases by X amount, air quality by Y amount, and long-term forage productivity by Z amount). For economic purposes, focus on costs and returns over the next 30-50 years (see the reforestation example page 46).

Consider this: time has value. A discount rate to account for the time value of money is used during an economic analysis of investments. All that means is a dollar received sometime in the future is worth less than a dollar in hand today. It is the opposite of compound interest (the bank pays interest for money in a savings account). Choosing the discount rate

for analysis is tricky. In theory, the discount rate represents the long-term, risk-free return on investments. In reality, economists and others often use a range of discount rates in the analysis to see if it makes a difference in the outcome. If it does, then more investigation may be necessary to determine if you really want to make the investment. If it doesn't, and you are comfortable with all the assumptions that go into an investment, then the analysis would indicate you may want to pursue those profitable options.

How Much Can You Afford to Spend?

As with all investment decisions, there are multiple aspects to consider. "How much can you afford to spend?" depends on how much cash you have or how much a bank is willing to loan. The question is, do you want to spend that much and is it a good investment of a scarce resource (capital and labor)?

That is what economic analysis is all about.

There are many options for how you use your cash. You can choose to use it for restoration that will return value to you or your operation or you may choose to use that cash to go on a vacation that will return a different set of values to you. If a rancher, restoring the forage base for your livestock gives one set of values while restoring it for wildlife habitat may give a different value depending on whether you like or dislike wildlife and whether you can capitalize on that wildlife as an enterprise within your ranch.

The Bottom Line

From an economic standpoint, there are many things to consider as you decide what to do following the wildfire. The basic decision depends a lot on what the land is capable of doing.

Knowing things like the land's potential, how it will respond to the fire, what the likely biological, ecological, and physical impacts of the fire are going to be, what the likely time frames are for the responses, and what the chances are for each response will all be critical factors in making an economic decision.

Once biologists, ecologists, and physical scientists define those responses, you can make an investment decision.

The questions you are seeking answers to include:

1. Should I spend my money and time on this project,
2. Will I get the type of outputs I am hoping for,
3. Will those outputs provide me with the values I want, and
4. How much should I invest?

From strictly an economic perspective, the important decisions are should I invest – can you expect a positive net return – and where and how much should I invest, and should I treat everywhere or just in areas with the best response likelihood to get the biggest bang for my buck?

The bottom line is choices have to be made on what you want to see happen on the landscape based on your values. If the benefits outweigh the costs, it will be a good investment. If you run an enterprise on your land and can't cover the cash costs with the market benefits you receive, think long and hard whether you can afford to invest in something that only returns "good feelings" or provides benefits to society at large rather than to your business.

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An example economic analysis of a forest restoration project

Tom has 40 acres of forested land burned to varying degrees by fire. His cabin damage is being handled by insurance, but he would like to take a proactive approach to reforestation of his property.

First, he should determine his objectives for the restoration. Questions such as what he wants the land to look like, time frames, and how the land will be used during and after restoration are important considerations.

Second, he should determine which trees are likely to survive and how that fits in with his objectives. He may have to wait until spring when the conifers put on new growth to determine which are alive. His aspen stands will likely survive and send up suckers in the spring.

He decides he wants to remove all dead trees and prevent heavy fuel loading as the trees come down. He also wants to plant several large aspen trees in high priority areas such as at the cabin site and plant seedling conifers where aspen trees are not present. He is advised to wait several years to see where natural conifer regeneration of the conifers occurs so he can better target planting efforts.

Here are some of his considerations from a financial perspective:

- Purchasing balled-and-burlapped aspen and hiring a contractor to plant trees: \$350-\$400/tree clump
- Hiring a contractor to cut trees down, remove from property, and chip tops and branches: \$2,000-\$4,000/acre (cost could be slightly offset by value of post and poles and firewood: \$75-\$125/acre)
- Purchasing conifer tree seedlings: \$40/30 trees, need 436 trees/acre = \$581.33/acre
- Hiring a contractor to plant conifer tree seedlings at 10-foot x 10-foot spacing: \$200-\$400/acre on 10 acres of best ground

Item	Description	Quantity	Cost	Total
Aspen clumps	Trees and labor	3 clumps	\$ 400	\$1,200
Tree removal	contractor to cut trees	10 acres	\$ 3,000	\$ 30,000
Seedling trees	planted 10 ft x 10 ft on 10 acres	4,360 trees	\$ 1.34	\$ 5,842
Contractor seedling trees	Labor	10 acres	\$ 300	\$ 3,000
replant 20%	replant for mortality after year 1	872 trees	\$ 1.34	\$ 1,168.48
Watering for first five years of establishment			\$ 1,000	\$ 5,000
Incidentals			\$ 1,000	\$ 1,000
Total nominal cost				\$ 47,210.88

Since not all of the investment occurs in the first year, subsequent year costs must be discounted to the present (when you make your decision).

After working through his expected costs, Tom discovers it will cost about \$46,429 after seven years in today's dollars if his discount rate is 3 percent.

This presumes there was no regeneration on his property the first two years and he opted to plant seedlings. After seven years, he will have some trees started on the property, and he expects them to be about waist high at that point.

Tom takes this plan to visit with a forestry expert, who tells him that, after 20 years, he should expect a 50-percent survival rate on the trees he plants. Those that survive will likely be 10 feet tall and provide nice aesthetic value; however, he also learns if he does nothing, after 30 years trees will likely begin to populate the property on their own, and 50 years later there will have been little difference between the site if Tom would have done nothing or taking the proposed action.

If Tom puts the money he would have spent into investments instead, making 3 percent interest, he would have \$53,823 after five years and \$203,538 at the end of the 50 years.

To round out the picture, Tom can expect other benefits to accrue from his investment. If the trees are planted, he expects to harvest \$125 of firewood per acre starting in year 20. He expects the value of his property to increase by \$1,000/year starting in year 20 and increasing by \$100/year thereafter. He has no interest in selling the trees, so this is the only value he will derive from them directly. Forage for livestock would start in year four and produce \$25/acre, increase by \$1/year through year 20 and then decline by \$1/year thereafter as the trees begin to close in. Wildlife habitat values would start at \$20/acre, increase by \$1/year through year 20 and then remain at \$39/acre thereafter. Additionally, he has found a group to cost-share the restoration at 50 percent of his costs that occur in year three. The cost-share is to pay for societal benefits such as aesthetics, water quality and quantity, and reduced soil erosion.

The following table summarizes the total investment choices he has at different discount rates. In this example, if the landowner believes his opportunity cost or cost of borrowing is 3 percent, the investment would be profitable. If his rates are much higher than that, the investment should not be made from an economic standpoint.

Example of expected net present value for a 50-year forest restoration investment

Discount rate	Investment in present value	Benefits in present value	Net present value
3	\$46,429	\$50,421	\$3,992
5	\$45,979	\$35,321	(-\$10,658)
8	\$45,578	\$24,820	(-\$20,758)

What Should Tom Do?

As the article states, all depends upon his goals, values, and his opportunity costs. It also depends on the value restoration would add to his property. This scenario is designed to convey the concepts. The specifics of costs, benefits, and timing need to be determined on an individual basis and will bring in many complex issues.

If you:

- *Reseed at \$60/acre
- *Expect forage to be produced starting in the second year that is worth \$5/year
- *Expect that to last 20 years before trees reduce production or accessibility, and
- *You use a 3% and 5% discount rate,

Your expected profit is \$9.53 at 3 percent and -\$2.45 at 5 percent.

You have to decide your opportunity cost for the initial investment. Would your funds be better invested in something where you could earn at least 3 percent? 5 percent?

If you think 3 percent is appropriate, then the reseeding should return a positive net present value. If you expect you could earn 5 percent elsewhere, then the reseeding probably should not be done from an economic standpoint.

Of course, there are other values to consider besides just forage value, such as any loss of topsoil due to erosion caused by lack of vegetation cover, and those would need to be included in a real analysis.