# How Do Forests Affect our Drinking Water?

Clean water is one of life's basic necessities. Healthy forests help keep streams clean and water quality high by promoting soils that provide natural filtration and vegetative cover that minimizes soil erosion and sediment runoff. Most of Idaho's municipal water systems use water that originates from forestlands, including those managed for wood production. The quality of this source water is among the best in the nation.

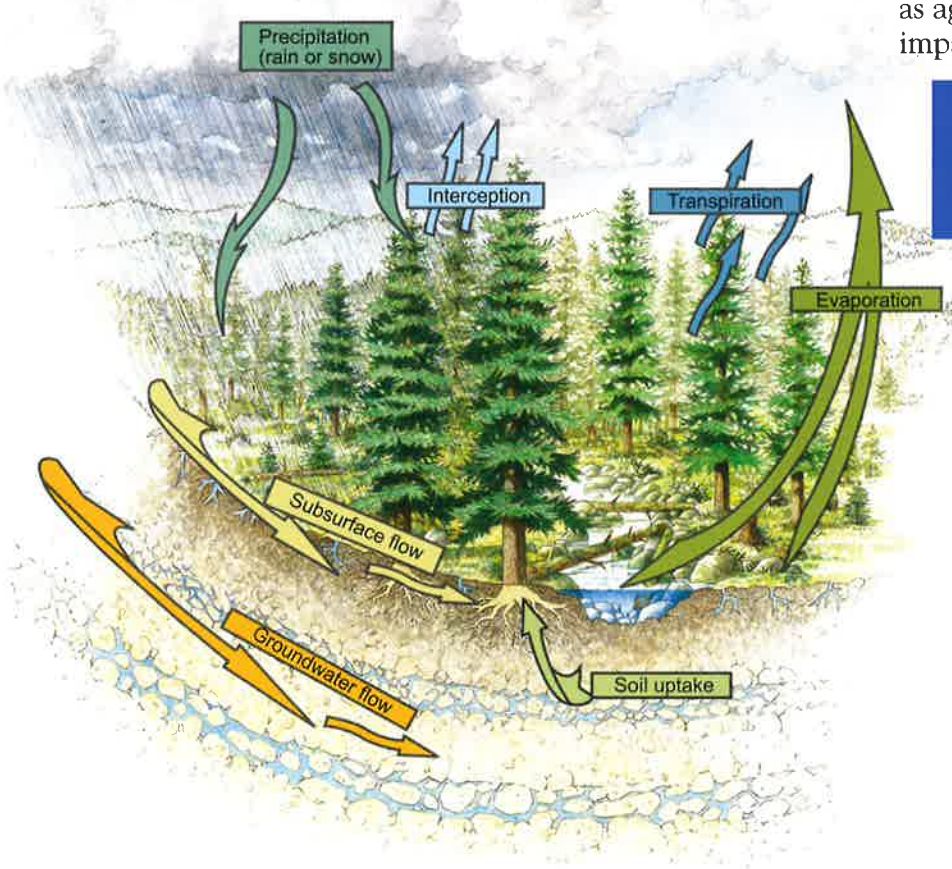
## What is a Watershed?

A watershed is an area of land that absorbs rain and snow and drains it through a network of streams into a river or other major water body. All land in Idaho is within one watershed or another. Watershed boundaries can be generally identified by mountains and ridges that divide the drainage areas for different water bodies.

## How Does the Water Cycle Work?

As the water reaches healthy forest soils, most is absorbed and, over time, is released to nearby streams or groundwater aquifers, filtering it in the process. Most communities in the United States get their water from watersheds where mixed land uses such as agriculture and development may impact source water quality.

## The Forest Water Cycle




***Forest soils act as a natural filtration system resulting in high-quality source water that requires minimal treatment.***

**Interception** Vegetation catches and deflects rain, snow & fog.

**Evaporation** Some water, in the form of vapor, returns to the atmosphere.

**Subsurface flow** Most water seeps into soil and streams.

**Groundwater** Some water seeps deeper, reaching underground aquifers.

**Soil uptake** Roots take in water from the soil.

**Transpiration** Water moves through the tree and evaporates from the surface of leaves or needles.

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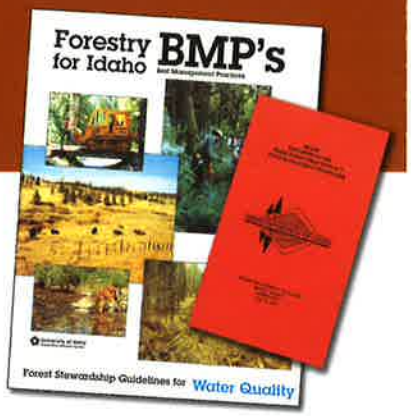
# Are There Laws That Protect Our Forests?




In 1974, Idaho enacted a comprehensive law governing forest practices and safeguarding our forest resources including water, fish, wildlife, soil and air. The Idaho Forest Practices Act is updated periodically to keep pace with the most current scientific research.

## *The Idaho Forest Practices Act Requires*:*

### • Reforestation

Harvested areas must have viable trees growing within five years after harvest. Reforestation may be accomplished by natural regeneration or by planting seedlings, but must be done in a way that insures successful seedling growth.

### • Protection of Water and Soil Resources

Timber harvesting, road building and the use of chemicals are restricted close to streams to protect fish and drinking water. Rules require that some trees must remain near streams for resource protection. Care must also be taken to avoid compacting or disturbing the soil.

### • Protection of Wildlife Habitat

Live trees, snags and fallen logs must be left after harvest to provide structure for wildlife habitat.

### • Protection of the Air

Limbs and other burnable materials remaining after harvest known as "slash" must be spread across the landscape or piled and burned to reduce the possibility of a wildfire.

*For complete requirements, see the Idaho Forest Practices Act at www.idl.idaho.gov.

Photo: Hal Korber

***Idaho enacted comprehensive forest protection laws in 1974.***

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# Who owns Idaho's Forests?


There are thousands of forest landowners in Idaho. All forests, even those that might appear to be wilderness, are owned by someone: state, federal or local governments, private businesses, tribes, families or individuals.

## Federal Ownership

Idaho contains over 21 million acres of forestland. By far the biggest single forest landowner—79 percent—is the federal government. Most of this land is managed by the U.S. Forest Service.

## State Endowment Forests

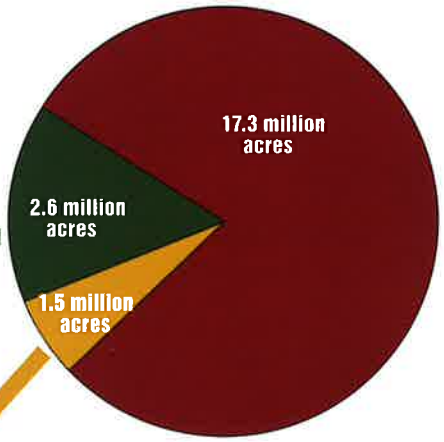
At statehood, the federal government endowed Idaho with forest and rangelands to provide a perpetual stream of income for public education for the new state. Since that time, revenues from timber sales on these state endowment forests are dedicated to fund public schools and institutions.

## Different Owners, Different Objectives

Different forest landowners may choose to emphasize different values. Some own forestland to produce wood products. Others own forestland to promote wildlife habitat. And many promote a mix of environmental and economic values.

***85% of all Idaho forestlands are publicly owned.***

**79% Federal Government**
- *U.S. Forest Service*
- *Bureau of Land Management*




**15% Private**
- *Corporations*
- *Tribes*
- *Family Forest Landowners*

**6% State of Idaho**
- *State Forests*
- *State Parks*

Steve and Janet Funk of Wolf Lodge own forestland certified under the American Tree Farm System

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# Why Do Forest Animals Live Where They Do?

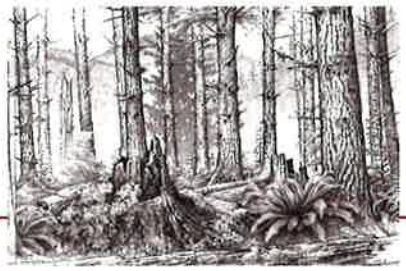
Different forest animals need different types of habitat to meet their food, water and shelter needs. Some prefer the vegetation associated with young, open forests. Others need habitat features like snags or fallen logs found in more mature forests. Some animals are found in forests of any age. As forests grow and mature, the resident wildlife will change as the habitat structure changes.

## Young, Open Forests

Young, open forests occur following disturbances such as fire or logging. Shrubs, grasses and young trees emerge first.

Who's here: mountain bluebird, Rocky Mountain elk and chipping sparrow

## Middle-Aged Forests



The trees in a middle-aged forest have outgrown weaker trees and other vegetation. The canopy is open enough for the growth of ground vegetation that some animals prefer.

Who's here: American black bear, yellow-pine chipmunk and Swainson's thrush

## Mature Forests

Mature forests contain large trees and have a complex canopy, a highly developed vegetation understory and fallen logs and snags that provide habitat for some animals.

Who's here: hoary bat, red squirrel, American marten and northern goshawk

***Animals live in young, middle-aged or mature forests, depending on their specific habitat needs.***

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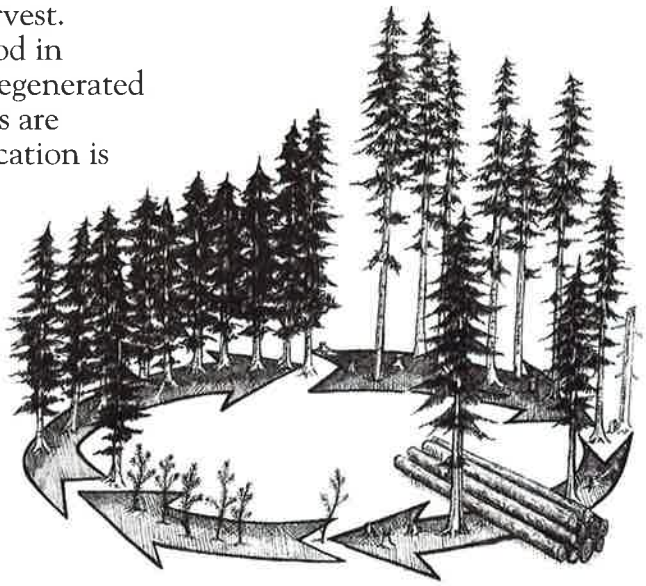
# Why Are Some Forests Clearcut?

Different forest landowners have different objectives ranging from wood production and wildlife habitat to scenic beauty and recreation. They have several harvest options to choose from to reach their goals. Their choice is influenced by tree species as well as climate, landscape, economics and conditions that affect how the forest will regenerate and grow after harvest. Clearcutting, one of several harvest options, is a method in which most of the trees are removed and the forest is regenerated by planting new trees or where seeds from healthy trees are allowed to naturally regenerate the area. Not every location is suitable for clearcutting.

## Management Decisions

While many people think of clearcutting as a harvest decision, forest landowners often choose to clearcut because of the regeneration needs of the tree species that will be grown in the future. Some tree species such as western larch, lodgepole pine, ponderosa pine and western white pine grow poorly in shade and need full sunlight as seedlings to successfully compete with other vegetation. Clear-cutting is also used to renew areas damaged by insects, disease, windstorms or fire or to create wildlife habitat for specific species. To grow healthier forests, areas with tree species such as grand fir which are prone to insect and disease problems are sometimes replanted with more resistant species of trees.

**Idaho law requires that new trees be growing within five years after harvest, and that trees be left as buffers around streams and retained for wildlife habitat.**



***Clearcutting is used to renew areas with tree species that grow best in full sunlight and where there is damage by insects, disease, wind-storms or fire.***

## Diversity

A variety of harvest methods creates a mosaic of forest ages and habitat characteristics. This pattern is similar to landscapes created by natural disturbances such as wind and fire. Scientists say the worst possible approach would be to manage all forestlands in the same way.

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# How Does Reforestation Work?


## Reforestation – Good for Forests Good for Forest Owners

When trees are harvested, forests are renewed through reforestation and a new forest cycle begins. Planting trees keeps forests growing and makes good business sense. Rules of the Idaho Forest Practices Act require reforestation after harvest. Every harvested acre must be successfully reforested within five years of harvest with a minimum number of seedlings growing per acre. The Idaho Department of Lands checks compliance through frequent inspections.

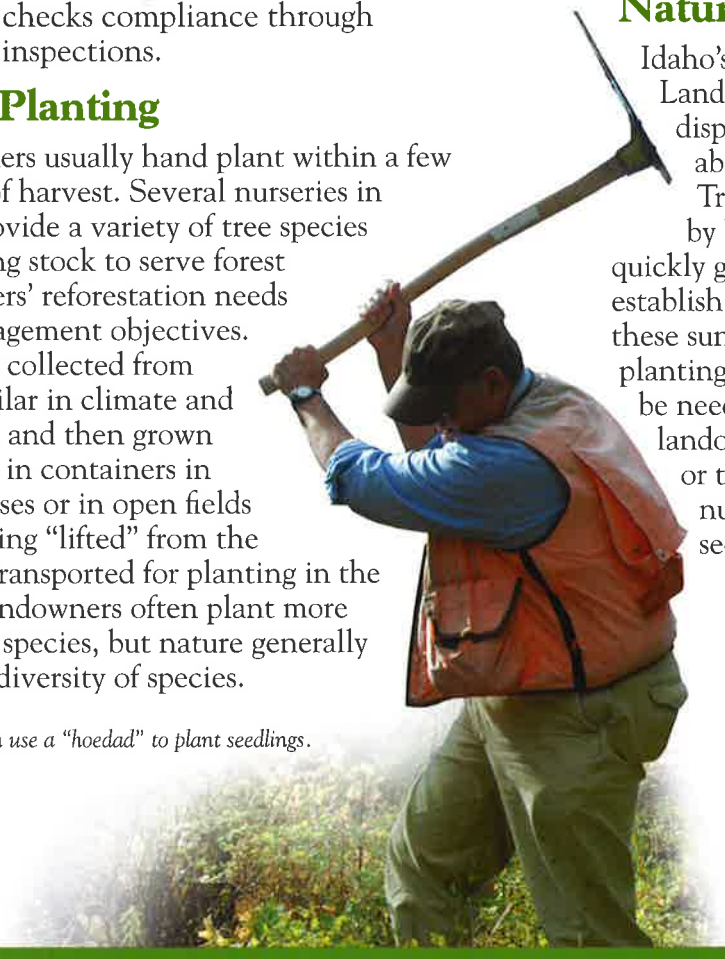
*Seeds and Seedlings*

*Planting*

*8 years growth*

## Hand Planting

Landowners usually hand plant within a few months of harvest. Several nurseries in Idaho provide a variety of tree species as planting stock to serve forest landowners' reforestation needs and management objectives. Seeds are collected from areas similar in climate and elevation and then grown for a year in containers in greenhouses or in open fields before being "lifted" from the soil and transported for planting in the forest. Landowners often plant more than one species, but nature generally assures a diversity of species.



*Planters often use a "hoedad" to plant seedlings.*

## Natural Regeneration

Idaho's forests are fertile and prolific. Landowners sometimes rely on nature to disperse seed in harvested areas where abundant sunshine reaches the ground. Tree seeds carried by birds and wind quickly germinate and establish seedlings in these sunny areas. Hand planting may still be needed to meet landowner objectives or the required number of seedlings per acre.

*Trees are always growing in Idaho where working forests have been harvested and replanted since statehood.*

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# Are Idaho Forests Renewable & Sustainable?

*A **RENEWABLE** resource is one that can that can be regrown, remade or regenerated.*

*A **SUSTAINABLE** resource is one that can be managed to meet current environmental, economic and social needs while assuring future generations the opportunity to meet those same needs.*

**Because trees are a renewable resource that can be sustainably managed, Idaho's forests offer a *sustainable future* based on a *renewable resource*.**

The idea of forest sustainability is that environmental, social and economic issues must be integrated into decision making and actions that affect forests, while taking into account both future *and* present needs.


***Sustainable Forest Management is Ecologically Sound, Economically Viable and Socially Desirable.***

## It's the law!

Idaho's Forest Practices Act makes renewability and sustainability a legal responsibility on all private and state lands. Landowners are required to reforest following harvest and to comply with Best Management Practices (BMPs) in all management activities to assure sustainability of water quality, soils and wildlife habitat. On private forest lands, the Idaho Department of Lands assures compliance with the law through inspections of harvested areas. Over many years, those inspections have shown a 97% compliance with the Act's many rules. On federal lands, managers comply with an agreement to meet or exceed the Act's rules covering Best Management Practices. The Idaho Department of Environmental Quality conducts periodic audits of all forest ownerships to ensure compliance and resource protection.

## Forest Certification The Extra Step

In addition to meeting legal standards of the Idaho Forest Practices Act, many forest landowners and manufacturers choose to voluntarily meet additional standards, at their own expense, to gain recognition from forest sustainability certification systems. Forest certification programs recognize responsible forestry practices. These private programs apply independent, third-party standards and audits to forest management and wood product manufacturing. This level of transparency gives consumers, architects, engineers and builders credible evidence that these materials came from forests that are sustainably managed. Wood product certification includes the opportunity to display an "ecolabel" seal of approval. America's three largest forest certification programs are the American Tree Farm System (ATFS), the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative® (SFI).

FSC

SUSTAINABLE FORESTRY INITIATIVE

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# Why are some forest fires so intense?

Fire is an ongoing, natural change agent in Idaho's forest ecosystems. Historically, low-intensity fires burned small areas of the ponderosa pine and dry mixed-conifer forests of southern Idaho every 5 – 40 years. In the wetter regions of northern Idaho, fires came every 100 - 450 years, but were larger and often burned entire forest stands. A century of fire suppression interrupting natural fire cycles without a matching level of fuels reduction has resulted in massive fuel build-up and fires that are larger and more intense.

## Forests At Risk

A large percent of Idaho's forests are at dangerously high risk of severe fire because of dense forests overcrowded with stressed, dying and dead trees.

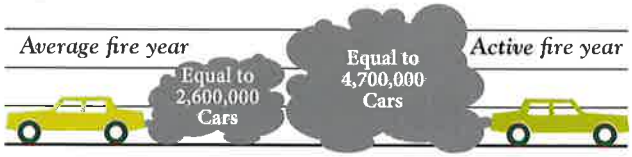
These "at-risk" forests burn more intensely and are more likely to destroy existing wildlife habitat, threaten homes and watersheds, damage soils, and emit large amounts of carbon dioxide and other pollutants.

## Fuel Ladders

In overcrowded forests, fire jumps quickly from the ground to tree tops. Shrubs, small trees, snags and downed logs, low branches and harvest debris can all act as fuel ladders during a wildfire. When ground fire ignites understory trees, flames climb to the crowns of big trees and spread through the canopy. Crown fires can burn hotter and are more hazardous for firefighters to fight.


## Carbon Emissions

By capturing, storing and cycling carbon, forests play a key role in the global carbon cycle. During a wildfire, carbon goes into the atmosphere as carbon dioxide and impacts the air we breathe.




*$CO_2$ emissions from Idaho wildfires.*

## Managing For Fire Resiliency

Forest managers are using our understanding of fire's historic role to manage forests sustainably for the future. Three common management tools used to limit the severity of wildfire and help improve fire resiliency include *thinning, prescribed burning after thinning* and *mechanical treatments such as logging.* Reducing fuel loads by thinning trees and harvesting timber help make forests more resilient to wildfires.

***Firefighting costs exceed one billion dollars every year!***

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# The Carbon Cycle

## What Role do Forests Play?


## Carbon Released

Catastrophic fires release carbon that has been stored in trees into the atmosphere. Manufacturing and automobiles also contribute carbon to the atmosphere by burning fossil fuels. Natural processes like volcanoes and decomposition also release carbon to the atmosphere.

## Carbon Absorbed

Young healthy forests absorb carbon more rapidly than older, dense forests. Older forests release carbon at the same rate that they absorb it, neutralizing their effect on global warming. Sustainably managing forests is an effective way to store carbon. Trees also produce oxygen that we all need.

## Carbon Stored

As a tree grows, it stores carbon in its trunk, branches and roots. Sustainably managed forests continuously store and absorb carbon. Trees store carbon for a long time. When trees are harvested, the carbon continues to be stored in wood products. Harvested forests are replanted and the cycle begins again.

*Courtesy of The Forest Foundation*

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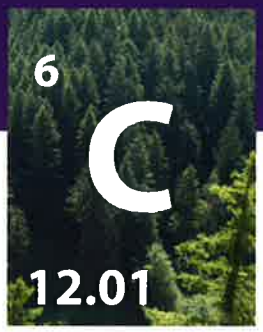
# Are Forests, Carbon and Climate Change Related?




Increases in the amount of carbon dioxide in the atmosphere result in higher air temperatures. Carbon dioxide, a greenhouse gas, is released through such processes as volcanic eruptions and forest fires, as well as through human activities such as the burning of fossil fuels. Scientists generally agree that human contributions to global climate change are increasing, and they are concerned about its implications for the future.

## Trees Use Atmospheric Carbon to Grow

Forests absorb large quantities of carbon dioxide and reduce its presence in the atmosphere. Growing forests turn water, sunlight and atmospheric carbon dioxide into solid carbon and oxygen and continue to store significant amounts of carbon when they are old.

## Wood Products Store Carbon Long Term

Wood products store carbon and reduce its presence in the atmosphere in contrast to steel, concrete and plastic, whose production requires the use of much more fossil fuel.

## Agriculture and Development

The significant loss of forests worldwide to agriculture and urbanization – particularly tropical forests – has also affected our climate. Keeping forestland in forest uses is crucial to capturing and storing atmospheric carbon in the future.

## Forest Fires and Climate

A warmer climate makes dense, overstocked forests even more vulnerable to wildfire. Forest fires release huge amounts of carbon into the atmosphere.

### *Forestry Can Reduce Atmospheric Carbon:*

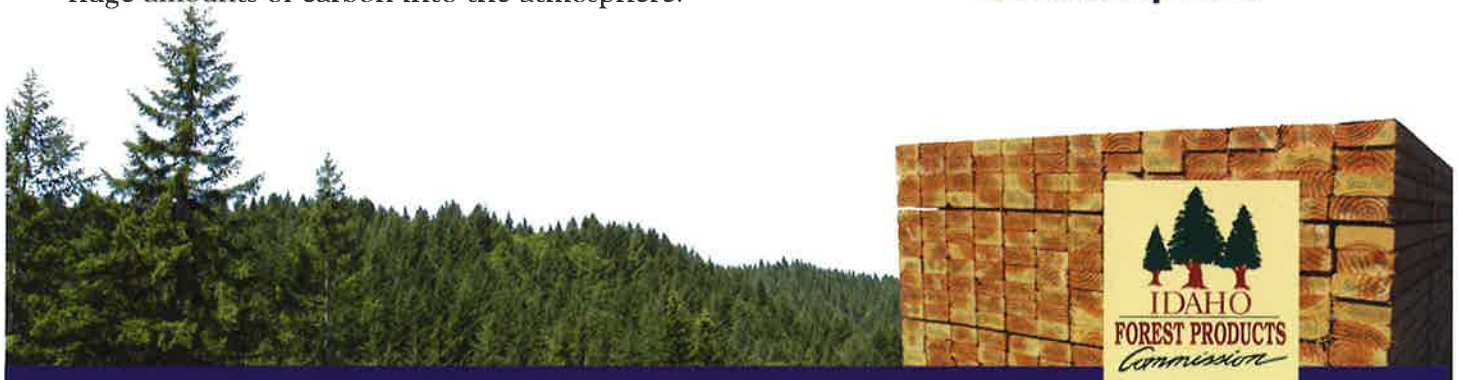
Keep forestland in forest uses

Plant and grow healthy forests

Thin forests for fire resilience

Use wood products vs. alternatives

***Wood products store carbon and reduce its presence in the atmosphere.***

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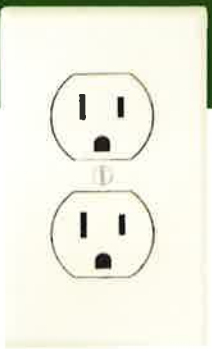
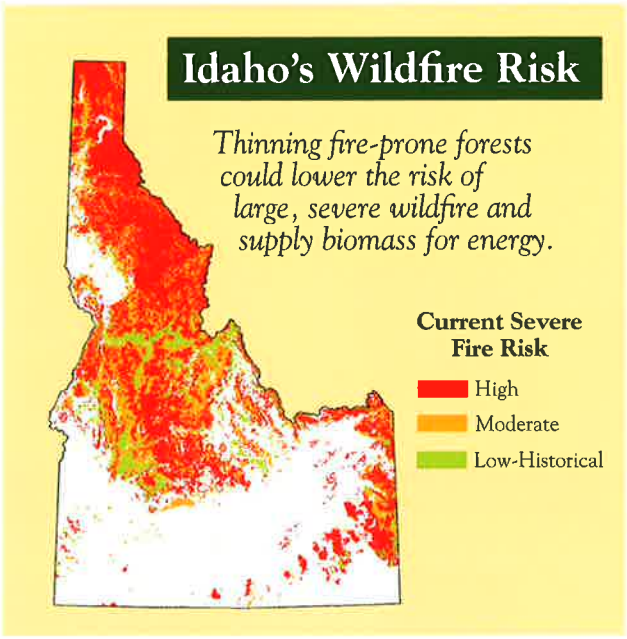
# How Can We Get Green Power from Overcrowded Forests?



An estimated 8 million acres, about 36% of Idaho's forestland, could provide useful woody biomass through thinning to reduce risks of uncharacteristically large, severe forest fires. Most of these overly dense forests are federally owned and managed.




## Short-Term Use

The best short-term use for woody biomass might be as a fuel for generating electricity and heat used in wood products manufacturing.

## Long-Term Use

A potential long-term use is converting woody biomass to biofuels and bioproducts to replace fossil fuels.

## The Woody Biomass Triple Win:

- ***Restore Forest Health, Fire Resiliency and Wildlife Habitat.***
- ***Help Meet Idaho's Energy Needs with a Renewable Resource.***
- ***Provide Hundreds of Jobs and Help Revitalize Rural Economies.***

## Idaho's Growing Energy Needs

Thinning only the forests with the most need for hazardous fuel reduction over 22 years would provide enough woody biomass per year to generate about 90 megawatts of electricity. To put that in perspective, the use of electricity in Idaho currently is growing at a rate of about 32 megawatts per year.

Other sources of woody biomass include wood waste generated at wood products plants as well as juniper woodlands, logging slash and discarded wood and yard debris that often ends up in landfills.

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# Why Are Roads Important to Keep Working Forests Working?

The web of highways and forest roads that tie our state together provide an important infrastructure for commerce, travel and recreation. Roads are especially important to forest businesses, landowners and managers. They rely on a network of roads to care for working forests, safely bring logs from the woods to the mills, and efficiently transport wood and paper products throughout Idaho and beyond.

Forest product businesses make significant investments in highways through state and federal highway user taxes and fees which average $17,500 per truck each year. Forest businesses invest thousands of dollars every year building and maintaining forest roads for timber harvest and resource management. These roads provide valuable forest access to outdoor enthusiasts, families and tourists so they can enjoy the forests. Firefighters also use these roads to protect lives, property and wildlife habitat.

## Down the Road...

Efficient road systems will be an essential component in keeping forests healthy and productive, and forest businesses competitive, vibrant and growing. Idaho's 21 million acres of forests hold tremendous promise as a source of energy and bio-fuels. Emerging carbon credit markets increase the demand for healthy, growing forests that remove and store carbon from the atmosphere. Demand for products from renewable and sustainable resources is on the rise. Every year, more people want to access and use Idaho forests.

## We all share the roadways and benefit from their use and upkeep.

## Roads link Idaho Together

- We all benefit from safe roads and bridges.
- Nearly everything we consume has touched a roadway at some point.
- Using wood and paper products made in Idaho saves energy, uses a locally grown renweable resource, encourages sustainable growth, and supports businesses and communities in our state.


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