

LONGLEAF PINE:

A Tall Drink of Water

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Did you know that forested watersheds provide nearly two-thirds of the freshwater in the United States? Healthy, well-managed forests provide the cleanest water of any land use and help keep drinking water safe, reliable, and affordable.

Stretching from Texas to Virginia is a heavily forested region with forest densities reaching more than 80 percent in several areas. These forests comprise the headwaters and watersheds that recharge surface and groundwater resources supplying the southeast's population and businesses with drinking and industrial water. Healthy, managed forests provide water filtration, support water flows, regulate water temperatures, and offer other important benefits such as, timber and wood products and associated jobs, wildlife habitat, and recreational opportunities, all benefiting local communities and economies.

How Forests Contribute to Watersheds and Drinking Water

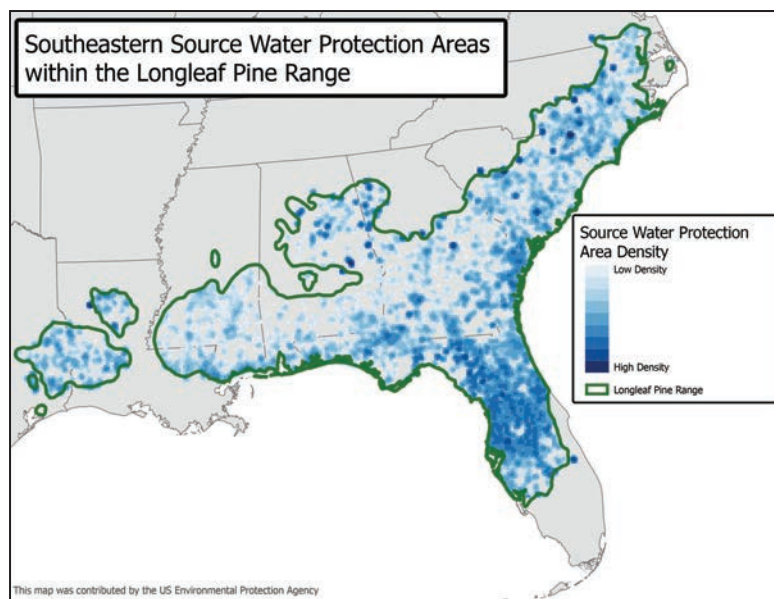
There is a well-researched and documented connection between forests and water quality. Healthy, managed forests provide natural filtration of precipitation and stormwater runoff resulting in cleaner water reaching drinking water treatment plants. This natural filtration lowers treatment costs and enables utilities to avoid building or upgrading expensive treatment infrastructure, keeping water affordable for customers.

If forests are lost, several public health impacts arise, including increased contamination of water supplies, increased flooding, and decreased drinking water availability. Without the natural filtration provided by forests, there may also be depleted groundwater resources, increased erosion and runoff, and varying water temperatures, which can negatively affect aquatic life.

Forest land conservation and stewardship clearly benefits drinking water and public health, but it also benefits forest landowners and local economies. Southeastern forests are a foundational element for local economic health and vitality. About 80 percent of southern forests are privately owned, and 58 percent are family owned. Ensuring forest landowners can hold onto their lands and manage them well supports communities dependent on forest and drinking water resources.

Key Messages

- Healthy, managed forests help keep drinking water safe, reliable, and affordable.
- Lower tree density, longer rotations, and prescribed fire in longleaf pine forests can have a positive impact on forest health and source water.
- Private landowners can help support clean drinking water through good forest stewardship.
- Helping to support private forest lands conservation can be a good investment for water utilities resulting in increased water yield, water quality improvements, and aquifer recharge.



Source water protection areas in the nine southeastern states in the longleaf range. Source water refers to rivers, streams, lakes, reservoirs, springs, and groundwater that provide drinking water.

But the Southeast is at a crossroads when it comes to the important connection between forests and drinking water. Population is expected to increase more than thirty percent in the Southeast over the next 40 years compared to 2012 levels. Up to 30 million acres of southeastern forests are forecast to be converted to other uses by 2060. Population growth and land-use change will decrease water availability, but healthy forested watersheds and long-term forest stewardship can help minimize declines in drinking water quality and quantity.

The Longleaf Ecosystem

An important tool for watershed stewardship and drinking water protection is restoring native tree species within their historic range. Longleaf pine (*Pinus palustris*) is an excellent candidate for forest restoration in many parts of the Southeast if the site conditions are suitable and if landowner management objectives fit. If managed properly, longleaf pine forests can improve drinking water quality and quantity, provide drought tolerance and resistance to insects and diseases, and enhance the landscape's resilience to windstorms and wildfires.

Longleaf pine forests are an important piece of the landscape puzzle when considering how to restore forest ecosystems that support the Southeast's growing population. Longleaf pine forests once covered an estimated 90 million acres from Texas to Virginia. These forests are culturally, ecologically, and economically important and represent one of the most biologically diverse ecosystems in the world. Before the early 1900s, longleaf pine forests were the largest ecosystem in North America; however, due to overuse and habitat loss, longleaf pine decreased to a historic low of 3% of its original acreage. Today, partner organizations are working together to restore longleaf pine and its natural systems and welcome additional partners in this effort.

Well-managed longleaf pine forests depend on frequent prescribed fire to maintain open, park-like forest conditions for optimal forest growth and health. Trees are often selectively harvested, allowing for natural regeneration, as opposed to southeastern pine plantations planted primarily for shorter rotations and a single age class. Longleaf pines can live to be several hundred years old, and many longleaf forests are managed by landowners as uneven age stands for multiple resource values. The sparse canopy allows for sunlight to reach the ground, promoting a diverse understory beneficial to wildlife. Longleaf pine is used to develop higher quality products, especially sawtimber and poles, rather than fiber and can therefore have higher rates of financial return.

The Benefits of Longleaf Pine to Drinking Water

Compared with other forest types in the region, longleaf pine forest management has distinct benefits for water quality and water yield. Longleaf pine management practices such as prescribed fire and thinning can reduce water demand, increase water yield, and improve water quality over time by retaining nutrients and preventing soil loss.

Longleaf pine typically has longer harvesting rotations that are beneficial for watershed health, in part because this approach results in fewer landscape and habitat disturbances. Longer rotations and long-term forest planning and management associated with longleaf pine is better aligned

with the longer asset management schedules used by drinking water utilities. The Water Research Foundation recently found that "in most cases, constructing natural asset investments in a way that fit into a local utility's capital budget likely would have the biggest impact in changing how natural assets investments are viewed and evaluated."

WATER YIELD

The close relationship between water yield and land cover suggests that forests with wider tree spacing and lower densities are more advantageous for water quantity. Forests with fewer trees lose less water through evapotranspiration while also enabling increased groundwater recharge and stream flow. This results in more ground and surface water being available, which is especially helpful during times of drought.

WATER QUALITY

Longleaf pine forests and their management play a role in water quality by reducing sediment, retaining nutrients, preventing soil loss, and decreasing erosion runoff and stormwater impacts. These benefits result from both the tree species and the longleaf pine ecosystem. Another cost-effective forest management tool for improving water quality is prescribed fire. By using frequent, low intensity fires, to maintain the understory, fewer chemical treatments are needed to reduce or control forest growth. Water originating from forests that are frequently burned is less acidic and has lower dissolved nutrients and organic carbon, needing less water treatment.

STRESS TOLERANCE

There is a dynamic relationship between site, species, and climate for longleaf pine. Longleaf pines are drought tolerant and use water efficiently, especially under conditions when water is scarce. In appropriate locations, well-managed longleaf pine forests can play a valuable role in protecting water resources by mitigating stressors from increased water demand, changes in land use, and climate change.

GROUNDWATER AND AQUIFERS

In certain regions where critical drinking water aquifers are geographically contained or closed, such as Florida, the reduced tree density of longleaf pine forests may enhance aquifer recharge. This same objective can be achieved with other pine species, but with longleaf pine restoration financial incentives may be available. Because longleaf pine restoration provides multiple other benefits, there are partners, incentives, and opportunities for financial and technical assistance.



A. Longleaf pine forests provide thousands of forest products such as flooring, paper, utility poles, and pine straw. Photo by Ad Platt. **B.** Longleaf pine restoration on Santee Experimental Forest at the Francis Marion National Forest where researchers are conducting a study on the watershed response to restoration. Photo by Carl Trettin.

Considerations for Landowners

- Private landowners play an important role in protecting water resources through forest stewardship and may be eligible for financial incentives to do so.
- Longleaf pine forests can have many co-benefits including recharging water supplies, reducing the risk of harmful insects and diseases, and increasing resilience to windstorms and wildfires.
- Active longleaf pine forest management may be more costly than short-rotation production, but incentive programs are available to assist landowners with various practices. Check with your state forestry agency or the USDA Natural Resources Conservation Service (NRCS) office to see what resources may be available to you.
- Uneven-aged forest stand management, low tree density, and prescribed fire can have a positive impact on forest health, resilience, and water quality.
- Increased water yield resulting from lower tree density of longleaf pine forests can be critical for fish and wildlife species during times of drought.

Considerations for Drinking Water Utilities and Businesses

- Utilities and businesses can consider creating financial incentives for forest stewardship and management. This will likely require educating community leaders and customers but can result in long-term forest and drinking water protection.
- Costs to establish and manage longleaf pine forests can be initially higher than establishing other types of pine forests. Utilities and businesses can partner with forest landowners by contributing towards that cost and seek grant funding with watershed partners to support landowners ability to restore and maintain longleaf pine. This will result in a reliable water supply in the long-term and is far less expensive than purchasing forested lands.

- Water utilities may own land in their source watershed that could benefit from improved forest management. Longleaf pine may be a good choice and may be advantageous from a water quality and water yield perspective (see map).
- Supporting permanent forest lands conservation in source watersheds may be a good investment for utilities, because utilities can benefit from these forest lands without the added cost or burden of owning and managing the land themselves.
- Funding opportunities, such as the USDA RESTORE Council programs, for the Gulf States and NRCS Regional Conservation Partnership Program continue to add momentum and new participants to forest restoration programs in priority watersheds.
- In the future, protected forest lands may also be important for wastewater disposal and water recycling.

Conclusion

Conversion of forests to non-forest land uses in certain key areas permanently impairs watershed functions and drinking water supplies. Forest stewardship and protection are important tools to help ensure water quantity and quality. Longleaf pine forests can be part of the solution because they contribute to healthy watersheds and safe and reliable drinking water. These forests also provide many other benefits including forest resiliency, erosion control, flood mitigation, recreation, fish and wildlife, carbon sequestration, strong economies and forest markets. Maintaining forests and considering longleaf pine restoration in southeastern watersheds will ensure safe, reliable drinking water for current and future generations. Landowners, water utilities, agencies, forest consultants, businesses, local governments, and other partners can work together to make forest stewardship, conservation, and restoration a priority.

By Jeremy Olson

The St. Johns River Water Management District serving northeast and east-central Florida is focused on ensuring a long-term drinking water supply and protecting and restoring the health of water resources in the District’s 18 counties. Over 774,000 acres of land are managed in cooperation with a variety of federal and state partners to accomplish its core missions including maintaining water quality, water quantity, flood control, and natural systems.

About 100,000 acres of District-managed lands are pine-dominated uplands. Many of these forests were intensively managed for silviculture prior to acquisition. There is a commitment to gradually phasing in longleaf pine restoration using revenues from harvesting slash, loblolly, or sand pine plantations to fund restoration and currently manages 17,000 acres of longleaf.

The District is especially proud of the 10,338-acre Lochloosa Wildlife Conservation Area in southern Alachua County. A 400-acre sandhill on the property, densely planted with slash pine, was harvested and the proceeds were then used for longleaf pine forest restoration and management. After harvest, the temporary absence of trees provided an opportunity to level large earthen windrows, eliminating historical erosion and sediment transport into Lake Lochloosa. The windrows (relics of previous silvicultural site preparation) were eroding and contributing to sediment runoff into the lake, making drinking water treatment more difficult and costly. Invasive plants were removed, and the property was replanted with native bunchgrasses and wildflowers collected from sandhill donor sites nearby. Finally, the property was planted with longleaf pine.



Chris Kinslow collecting Lopsided Indiangrass.
Photo by Jeremy Olson

“Longleaf pine is a great fit for our core missions. Its co-evolution with frequent fire fits right in with our prescribed fire program, and the resilience of a fire-maintained upland benefits water quantity and quality while also providing valuable habitat for species dependent on this tree and this ecosystem,” says District Executive Director Dr. Ann Shortelle. The District is providing funding, research sites, and implementing management actions to continue to better understand the water supply benefits of forest management.

It took a long time to reduce longleaf pine’s dominance over the flatwoods and sandhills of this area and will take some time to bring it back. There are still many areas across the range that can benefit from longleaf pine restoration. Longleaf pine forests are being planted for the next generation, hoping they too will enjoy the feeling of walking through a successful restoration area with a diverse understory growing under an open longleaf canopy.

Resources

- Protecting Drinking Water at the Source
- The Longleaf Alliance
- Americas Longleaf Restoration Initiative
- Forests to Faucets
- Wildfire Impact on Drinking Water Quality
- Prescribed Fire Improves Drinking Water Quality
- Southeastern Partnership for Forests and Water

