



USDA Regional Climate Hubs: Southern Forests and Rangelands

Effects of Drought on Forests and Rangelands in the United States: A Comprehensive Science Synthesis

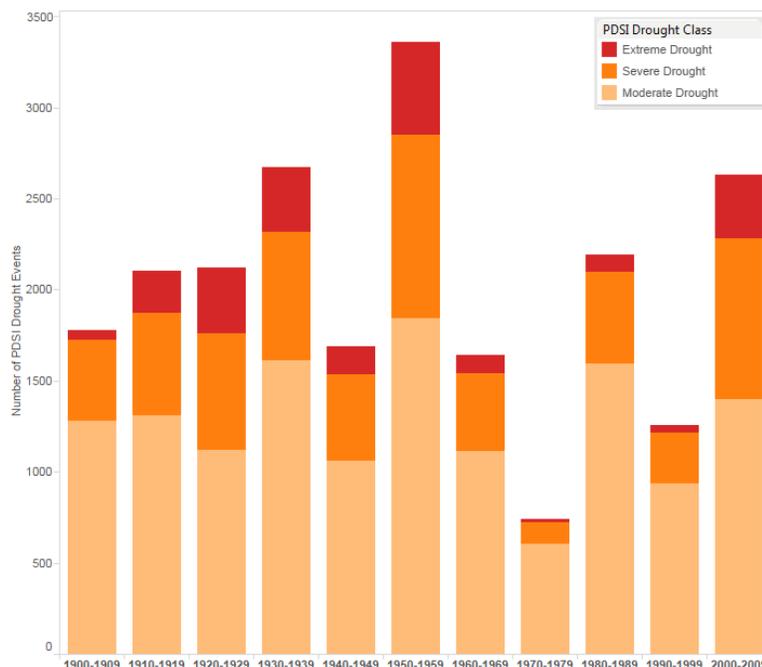
Drought Impacts on Forests and Rangeland in the Southern Region

Overview:

USDA Forest Service scientists have just published a new report called *Effects of Drought on Forests and Rangelands in the United States: A Comprehensive Science Synthesis*. This document establishes the scientific foundation to manage forests and rangelands for drought resilience and adaptation. It highlights drought characterization, impacts on forest processes and disturbances, and consequences on forest and rangeland values.

The southeastern (SE) United States (US) is the largest single producer of pulp and timber in the US. The productivity of southeastern forests is dependent on abundant soil moisture. Trees require at least 16 inches (400 mm) of water a year to survive. Generally, the SE receives precipitation far in excess of this amount, but drought conditions can significantly reduce forest productivity, and in extreme cases, cause mass forest dieback. **The newly released Drought Synthesis concludes that meteorological drought has become more frequent and severe in the SE since the 1980s.**

- **Climate variability is increasing across the SE**, and combined with **agricultural irrigation and population growth**, is increasing the likelihood of increased water scarcity across the region. The SE is the most rapidly growing region in the US, and increasing air temperature coupled with precipitation variability are placing increasing demands on a limited water supply.
- Seasonal changes in precipitation trend towards **more frequent heavy rainfall events**. **Warmer winters** may lead to earlier snowmelt in the spring, and **longer growing seasons** combined with warmer temperatures may lead to more frequent moisture stress in the summer and fall.
- **Climate conditions will increase fire risks** by the end of the century, particularly for temperate coniferous forests and temperate broadleaf forests. Increases in fuel loads from pest-induced mortality, blowdown events, or other disturbances could also increase fire risk.
- **Many invasive species, insect pests, and pathogens will increase or become more severe and damaging**, as warmer temperatures may help invasive species and pests expand into new areas. Droughts can weaken healthy trees and increase susceptibility to native and invasive diseases and insects. Drought from increased summer temperatures and decreased precipitation can lead to larger insect outbreaks.
- **Low diversity forest systems are at a greater risk**. Diverse systems are more adaptable to drought and disturbance, facilitating range shifts and resilience. Heterogeneous stands may allow more flexibility in management options for responding to change or uncertainty and reducing risk.



Climate variability, including drought and flooding, has been increasing over the last century. **Click** the graph to explore drought frequency and severity across the region. *Data source: NOAA's National Climatic Data Center, <http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers>.*

Adaptation Considerations for Drought and Forests:

Reductions in soil moisture can increase forest stress-induced mortality. Stressed pines are more susceptible to southern pine beetle outbreaks. Adaptive management practices can increase forest resilience to drought and flooding.

- Increase use of [longleaf](#) and shortleaf pine species that are more drought or fire resistant than other commercial pines
- Thin forest stands to increase water availability, improve timber crop production, and reduce wildfire hazard
- Use controlled burning to reduce wildfire hazards and water use by undesirable vegetation

The Southeast Regional Climate Hub (SERCH) develops and shares online tools that put adaptive management practices at your fingertips:

- Decision support tools like [TACCIMO](#) to access the most current science about forests, climate trends, and adaptive management options
- Drought alert services such as [SERCH LIGHTS](#) to spot and prepare for changes in local drought conditions
- Forest monitoring systems such as [FORWARN](#) to rapidly locate southern pine beetle outbreak areas and treat impacted stands



Image credits: NRCS

Adaptation Considerations for Drought and Rangelands:

Reduced precipitation impacts soil quality and rangeland productivity. Severe drought can impact hay, stock, and land prices. Adaptive management practices like mob grazing can increase rangeland resilience to drought and flooding.

Use online tools like [TACCIMO](#) to access the most current science about rangeland, livestock, climate trends, and adaptive management options, including:

- Stock conservatively to allow for an adequate buffer of forage; buy or sell animals frequently; or grow or purchase supplemental fodder (Ash et al. 2012)
- Monitor for cattle heat stress as livestock travel greater distances to water and provide adequate shade and water resources (Polley et al. 2013)

Use online tools like the [NRCS Climate Tool](#) to search resource concerns, conservation practices, and climate connections, including:

- Control access of animals, vehicles, and equipment to protect vegetation and soil resources (Conservation Practice Standard 472)
- Use prescribed grazing to vary the location, frequency, duration, and intensity of browsing impacts on plant communities and soils (Conservation Practice Standard 528)

Conclusions:

- Climate variability, population increases, and a greater need for agriculture irrigation are stressing water resources across the region
- Numerous tools are available to help land managers better adapt to climate change related drought stress
- The USDA SE Regional Climate Hub is working with state, federal, and private land managers to fully implement these tools

To learn more about the Southeast Hub visit: <http://climatehubs.occ.usda.gov/southeast>

To read the full report *Effects of Drought on Forests and Rangelands in the United States: A Comprehensive Science Synthesis* visit: <http://go.usa.gov/cEtd9>