SOUTH CAROLINA'S EMERGING FOREST THREATS

Healthy Forests Management Options

WHY DOES IT MATTER TO ME ?

It is important for private forest landowners to prepare for the likelihood of increasing threats to their forest lands. Private forests make up the largest holdings of forestlands in the southeastern U.S. These properties collectively will be crucial in protecting the overall health of our landscape. Management that uses the most current forest science will better enable landowners to protect their land and resources, and to contribute positively to the conservation and productivity of South Carolina's forestlands.

USDA Southeast Climate Hub
U.S. DEPARTMENT OF AGRICULTURE

The mission of the Southeast Climate Hub is to develop and deliver science-based, region-specific information and technologies, with USDA agencies and partners, to agricultural and natural resource managers that enable climate-informed decision-making, and to provide access to assistance to implement those decisions. This is in alignment with the USDA mission to provide leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on sound public policy, the best available science, and efficient management.

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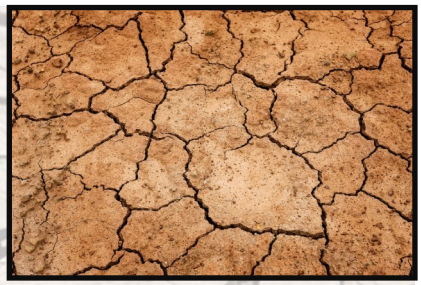
EMERGING THREATS & HEALTHY FOREST MANAGEMENT

Introduction- Forests occupy over 13 million acres of South Carolina and 68% of the total land area. The forests of South Carolina are a resource for both their economic value, and for the ecosystem services they provide. Almost 90% of these forests are privately owned and the total annual contribution to the state's economy is over $21 billion. Major commercial tree species include loblolly pine, sweetgum, yellow poplar, and water oak. The forestlands of South Carolina are some of the most productive in the world. However, there are several major threats that reduce productivity and economic return each year. Threats from extreme weather, invasive species, wildfire, and disease have increased in severity due to climate change. Fortunately, there are adaptation practices that landowners can use to reduce or eliminate these threats, while increasing the stands value.

Threats from Invasive Species/Insects/Disease - Invasive species, insects, and disease cause $7 million dollars in forest damage each year in South Carolina and can impact forest productivity, recreation, and wildlife. Increasing air temperatures associated with climate change can extend the tree growing season, but also extend the outbreak season. Additionally, invasive species may outcompete native or planted species for resources during periods of drought. They also may lead to habitat destruction or fragmentation and to the loss of aesthetic value in recreational areas. Invasive species are particularly prevalent in the southeast due to the region's mild winters that fail to kill imported insects and invasive plants. There are management practices to control these threats, including prescribed burning, thinning, proper herbicide or pesticide application, and decreasing the movement of dead wood or woody debris. Early detection is critical to finding outbreak areas before the problem can multiply and spread.



Threats from Drought - Increasing drought frequency and extreme heat are responsible for severe damage to forest stands and ecosystems each year in South Carolina while also impacting productivity, water quantity and quality, and biodiversity. Heat and water stress can leave stands more vulnerable to secondary pests and diseases and may result in minor to substantial dieback. Drought conditions also lead to increased wildfire potential, accelerated soil organic matter decomposition, and changes in vegetation. Primary damage along with added secondary damages (i.e. pest outbreaks) have totaled upwards of $325 million dollars per year in the state during drought events. Adaptation options include thinning to reduce stand water stress, maintaining a canopied riparian zone to reduce stream temperatures, incorporation of drought-resistant species, and using prescribed burns to reduce fuel loads and wildfire risk. Monitoring for signs of disease or pest activity will alert landowners to the problem and allow for actions for stopping outbreaks early.

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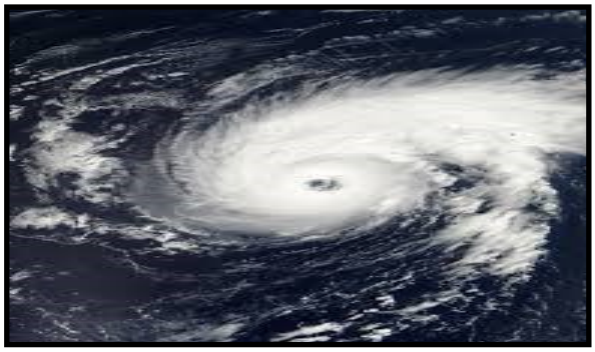
Threats from Wildfire - Increased fuel loads and more frequent droughts could increase wildfire frequency and intensity within the southeast, with South Carolina already experiencing $1 million of fire caused forest damage each year. Other impacts include habitat destruction and fragmentation, and biodiversity decline. Prescribing burning to reduce fuel loads and periodic thinning are important control methods. Salvage logging after extreme weather events or significant timber losses reduces fuel loads and the chances for pest or disease outbreaks. Incorporating fire-resistant species such as longleaf pine may also mitigate wildfire risks.

Threats from Flooding - Extreme precipitation events from storms and hurricanes can harm coastal and inland forests, especially recently established plantations. Flooding is a common disturbance within the Southeast U.S. due to the frequency of extreme (more than 2.5" in a day) rainfall events. Floods impact forest productivity by altering soil conditions and exposing or burying root systems. Reductions in stream water quality, aquatic habitat, the aesthetic value of recreational areas, and soil productivity can all occur after floods. Management practices to mitigate damages include post-disturbance revegetation, maintaining the areas natural hydrology and riparian zone health, planting flood-tolerant tree species, monitoring susceptible trees for outbreaks or fungal growth, and implementing proper erosion control structures such as culverts and drainage ditches where needed.



Threats from Hurricanes/Tornadoes - Hurricane Matthew caused $200 million in forest damage across the state in 2019. Additionally, tornadoes can be locally destructive and cause up to $5 million per year in forest damage. Increases in hurricane intensity and storm frequency are related to warming air and water temperatures. Therefore, annual forest damage is likely to increase in the coming years. Hurricanes and tornadoes cause habitat and recreational area destruction, reduce biodiversity and water quality, and can cause inland soil salinization from storm surges. Adaptation practices to reduce wind damage impacts include rotational harvesting to reduce stand age uniformity, incorporating wind resistant tree species, and modifying thinning frequencies.

EMERGING THREATS & HEALTHY FOREST MANAGEMENT

Threats from Sea Level Rise - Accelerated sea level rise has been correlated with warming sea surface and air temperatures. Due to this trend, southeastern coastal states like South Carolina have experienced soil salinity issues moving further inland, resulting in severe forest damage and the overall loss of workable lands. Other impacts include vegetation changes, biodiversity, habitat loss, water quality declines, and increased invasive species outbreaks. Planting more salt-resistant species is one adaptation option for creating salt-tolerant forest stands that are more resilient to storm surge. As soil salinity becomes a chronic issue, implementing short-rotation woody crops may help retain profits while decreasing risks from storm surge events. Drainage system installation may reduce the probability of developing salinity issues by lowering the height of the soil water table.

Threats from Ice Storms - Ice storms are another, lesser known threat to southeastern forests. The most likely area to see ice storms is northern South Carolina. However, this area could shift northward with warming winters. As ice builds on branches, the weight of the ice exceeds the carrying capacity of the branch and it breaks. Pines collect more ice compared to hardwoods because they retain their needles year-round, and the needles hold the ice. Additionally, pines branches break under less weight than hardwoods, so pines are particularly vulnerable to ice storms. As little as ¼' of ice can cause breakage. Adaptation practices includes decreasing tree density, adjusting thinning timing frequencies to reduce the probability of damage after fresh thinning, and planting/regenerating breakage-resistant tree species. Post-disturbance monitoring will aid in preventing pest outbreaks and attacks on green timber.

Summary - Many threats impact the economic and ecosystem value of South Carolina's forestland. Threats such as wildfires, hurricanes, soil salinization from storm surge and sea-level rise, and insect and invasive species outbreaks have always existed, but are now being amplified by warming temperatures and changes in rainfall frequency and amounts. The adaptation methods listed on this sheet are just a few of the available options that help forest land managers improve resilience and reduce risk. Consult your local forest extension agent or a county forester for more information about threats and corrective measures appropriate for your forest.

FOR MORE INFORMATION ON MANAGEMENT OPTIONS FOR YOUR WOODLANDS:

Contact the South Carolina Forestry Commission Office at 803-896-8800

www.trees.sc.gov