

SAFEGUARDING AMERICA'S FORESTS



Forest Adaptation to Global Warming

Global warming is already affecting America's forests, degrading the value of these important ecosystems for both people and wildlife. Even with aggressive reductions in greenhouse gas emissions, climate change will place additional strain on the nation's forestlands. The fate of our forests and the wildlife they support will depend on steps we take to help them survive in the face of a changing climate. **Climate change adaptation** – actions designed to safeguard our forests and other natural ecosystems – will largely define a new era in America's conservation.



Fall color in Vermont.

AMERICA'S FOREST HERITAGE

From the stately longleaf pines of the Southeast and crimson-hued maples of New England, to California's imposing redwoods, America's forests are among our most prominent and important natural resources. Covering more than a third of the nation, forests provide a wealth of products and benefits, from timber and other wood products to abundant clean water. Forested lands also provide essential habitat for many of our most cherished species of fish and wildlife, afford outdoor opportunities for kids, sportsmen, and other recreational enthusiasts, and offer spiritual solace in the midst of a hectic world. Climate change, however, already is having a profound impact on the health of our forests, threatening not only their many benefits to people and wildlife, but also undermining their ability to help cleanse the air of global warming pollution.

IMPACT OF GLOBAL WARMING ON FORESTS

America's forests have been proven to be remarkably resilient, rebounding, for instance, from widespread clearing during colonial and pioneer times. Rapid climate change, however, presents challenges to the health and survival of our forests unlike anything previously experienced. Changes in temperature and precipitation not only will have direct effects on forestlands, but will exacerbate a host of existing threats to these ecosystems. Among the major changes expected to forests are:

Shifts in Forest Types ~ Forest tree species are expected to shift their ranges in response to higher average temperatures and changes in precipitation, resulting in major changes in the types of forests that will be most prevalent in different regions. Sugar maple, for instance, is expected to shift north out of much of New England, replaced by more southern species of oaks and hickory.

More Destructive Pest Outbreaks ~ The rate, intensity, and extent of pest, disease, and invasive species outbreaks are likely to increase due to warmer winter temperatures and longer frost-free seasons. Climate-related insect infestations already have killed millions of acres of Western forests.

More Powerful Storms ~ The intensity and frequency of extreme weather events, such as hurricanes, ice storms, and droughts are expected to increase, causing damage to many forest areas. More powerful rain and windstorms will increase tree blowdowns.

More Severe Wildfires ~ The number and severity of catastrophic wildfires is expected to increase as drought conditions become more frequent, and tree mortality increases due to pests, extreme weather, and other factors.



Redwood forest.

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Tree planting.

FOREST ADAPTATION TO CLIMATE CHANGE

Safeguarding forests in the face of climate change will require looking at forest management and conservation through a different lens, one that acknowledges and addresses problems of the past—such as harmful logging practices, fire suppression, and fragmentation—but recognizes and prepares for those of the future.

Adaptation strategies ideally should anticipate climate impacts by promoting ecosystem resilience and adopting agile management approaches. Many adaptation opportunities, however, will take place in the wake of major disturbances or other extreme events, and forest managers should use those restoration opportunities to facilitate the ability of species and habitats to cope with future climate change. Adaptation approaches will also need to be locally and regionally tailored, reflecting underlying differences in forest types as well as the different options available for public forests, found mostly in the West, and private forests, which are concentrated in the East.

Forest adaptation strategies include:

- **Address current stressors to create more climate-resilient forests.** Threats such as habitat loss and fragmentation, invasive species, and altered fire regimes render forests more vulnerable to the impacts of climate change. Nonetheless, climate change will require us to be strategic in identifying which existing problems are most important to address.
- **Plan ahead to react after extreme events and disturbances.** The best time to adjust forest management can be after a major disturbance, such as wildfire, ice storm, or hurricane. In particular, restoration and replanting efforts should consider mixes of tree species suitable for future climate conditions.
- **Take a landscape approach in protecting high-value forest habitats.** Protect wildlife strongholds and provide connectivity among core habitat areas through use of buffers and corridors to enable unimpeded range shifts in response to climate change.
- **Align carbon sequestration efforts with forest adaptation goals.** Forests offer excellent opportunities for removing heat-trapping carbon from the atmosphere, but forest protection or restoration should target areas with high ecological values and use only regionally appropriate native species.
- **Adaptation depends on detecting change.** Ensure that robust and long-term monitoring systems are in place that can provide forest managers with early warnings about ecological shifts and ecosystem disruptions.

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This fact sheet draws on research supported by the **Wildlife Habitat Policy Research Program**, (WHPRP), a program of the National Council for Science and the Environment (NCSE) with funding from the Doris Duke Charitable Foundation.

For additional information on ecosystem adaptation see P. Glick, A. Staudt, and B. Stein. 2009. *A New Era for Conservation: Review of Climate Change Adaptation Literature*, Washington, DC: National Wildlife Federation (available at: <http://www.nwf.org>).

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