

Tennessee and Climate Change

Overall, Tennessee has a temperate climate, with warm summers and mild winters. Tennessee's varied topography leads to a wide range of climatic conditions. The flat plain of West Tennessee, an extension of the Gulf Coastal Plain, is climatically the warmest part of the state. West Tennessee is also the most active area of the state for severe weather. Owing to its presence north of the Gulf Coast, it is also susceptible to the remnants of tropical storms and hurricanes.

Tennessee is a state defined by its natural environment, with an abundance of wildlife and natural resources. Its environment is varied, from the peaks of the Great Smoky Mountains to the fertile farms of the Nashville Basin, from the rich bottomlands along the Mississippi River to the Tennessee River that lends the state its name.

Like the rest of the country, Tennessee is at risk from the effects of climate change. Average temperatures in Tennessee could rise by nearly 7°F by the end of the century. This will be accompanied by an increasing likelihood of extreme weather events like droughts and floods and an increasing unpredictability of weather systems that will make planning difficult.

Extreme Weather – Risks from Both Flooding and Drought

In May 2010, flooding in Nashville caused economic damages of over \$1 billion. Extreme weather events like floods are expected to become more common, as increases in temperature will allow the atmosphere to carry more precipitation. This poses direct threats to built-infrastructure in cities and towns across the state.



The 2010 Nashville Flood

Ironically, droughts are also expected to become more common.

Droughts have the potential to significantly affect Tennessee's lumber and agricultural industries. Larger floods and longer droughts could cause increased erosion, reduce water supply and allow the spread of invasive species.

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Agriculture in Tennessee

Rising temperatures and increased levels of carbon dioxide will damage Tennessee's agricultural industry, in particular the critical soybean and corn crops. Agriculture (including forestry) in Tennessee provides 363,500 jobs and contributes \$71.4 billion to the state's economy.¹

It has been estimated that, for every 1°C increase in temperature, corn yields will decrease by an estimated 8.3%. Increasing temperatures have also been found to decrease soybean yields by nearly 3.5% for every increase of 1.2°C.² Farmers can adapt to changes in temperatures by planting different crops or different varieties of seeds. However, an increasingly unpredictable climate will make adaptation more of a series of educated guesses



Climate Change in the Hardwood Capital of the World

Tennessee has earned the moniker “Hardwood Capital of the World” for its tremendously productive lumber industry. The state is the number one producer of hardwood flooring in the United States. Climate change will cause increased droughts and wildfires, and change the composition of forests in Tennessee, jeopardizing the \$21.7 billion forest industry, which employs over 180,000 Tennesseans.³

Tennessee's forests are expected to undergo changes in growth and composition, with some tree types expanding at the expense of others. Some high elevation forest types will be dramatically impacted or lost entirely.

Economic Impact of Biodiversity and Wetlands

Tennessee's wetlands provide immeasurable economic benefits to the state, both as a natural water filtering system and as a habitat for game animals that contribute to Tennessee's \$500 million hunting industry. Predicted declines in Tennessean wildlife, such as duck, geese and trout populations, could cost the state's hunting industry at least \$80 million in lost revenue.⁴ Outdoor activities are a part of the state's culture that will be hard to sustain with such environmental changes.

By acting as a natural filtering system, Tennessee's wetlands provide a valuable service to the state's residents. Wetlands lower the amount of pollutants in the water, which sustains industries dependent on wildlife, and also decrease water treatment costs for Tennessee residents.

Key Issues Affected by Climate Change Recognized by the Tennessee Valley Authority (TVA)

Climate change, coupled with human adaptation to rising temperatures, will influence the demand for and supply of water. These changes may affect hydropower generation, thermoelectric cooling, reservoir-based recreation, navigation, municipal and industrial uses, and environmental flows.⁵



Electricity demand may increase with warming, especially in southern states like Tennessee. The 2009 United States Global Change Research Program (USGCRP) report concluded that the demand for cooling energy generally increases between 5 and 20% per 1.8° F of warming.

Increases in the intensity of precipitation events, increases in water temperature, coupled with extended periods of lower stream flow may intensify pollutant concentration, increasing the number of streams EPA considers to be impaired in future years.

Building a 21st Century Vision of Sustainable Security in Tennessee

Today, we face new and different challenges; America's security is no longer measured in guns, bombs, battleships or tanks.

Security in this new era requires harnessing all of America's strengths: the force of our diplomacy; the might of our military; the vigor and competitiveness of our economy; and the power of our ideals. It means we have to be aware of new threats; one new threat is **climate change**, partially caused by emissions from fossil fuels.

A changing climate is impacting us worldwide and opening new areas, like the Arctic, to human exploitation – requiring a military presence.

Changing weather patterns in Africa and Asia are creating new instability – potentially leading to new wars over resources. Extreme weather, like typhoons in Asia or hurricanes here are placing increasing demands on our armed forces to respond.

Fortunately, Tennessee is poised to help lead the country into a new “21st Century” vision for national security.

The University of Tennessee has partnered with the Mascoma Corporation to build the nation's first switchgrass-based ethanol plant, which has the capacity to produce 5 million gallons of ethanol annually. Switchgrass is estimated to produce 500 gallons of biofuel per acre, is non-invasive, and adapts well to a variety of climates.

Tennessee residents should consider action on climate change not just in terms of cost, but also in terms of opportunities. With clear and consistent signals from the federal government, Tennessee's population, businesses, and investors can continue their investment and innovation in building a climate-resilient state.

For More Information

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ASP’s “[Pay Now, Pay Later](#),” a state-by-state assessment of the costs of climate change. “[Pay Now, Pay Later: Tennessee](#).”

ASP’s “[Climate Security Report](#),” which presents a comprehensive assessment of climate change’s danger to the United States. The report aims to move past the current debate about climate change and towards a real, informed discussion about its security implications—both global and domestic.

“[Climate Change & the Homeland](#)”

1. *Climate Change and Potential Impacts to Wildlife in Tennessee*. Tennessee Wildlife Resource Agency. Available at: <http://www.tn.gov/twra/pdfs/climatefacts.pdf>
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3. *Tennessee – A Tale of Three Climates*. Tennessee’s Climate: The Cocorah’s State Climates’ Series. Available at: http://www.cocorahs.org/Media/docs/ClimateSum_TN.pdf
4. *Sustaining Tennessee in the Face of Climate Change*. Sustainable Tennessee Organization. Available at: http://sustainabletennessee.org/wp-content/uploads/2012/09/Sustainable_TN.pdf

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Endnotes

1. English, Burton C.; Menard, R. Jamey; and Jensen, Kim L. “Economic Impacts of Tennessee Agriculture and Forestry” Tennessee Department of Agriculture, University of Tennessee Institute of Agriculture. <http://aimag.ag.utk.edu/impact.html> (accessed April 2, 2014).
2. U.S. Climate Change Science Program, “The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States” May 2008. http://www.usda.gov/oce/climate_change/SAP4_3/CCSPFinalReport.pdf (accessed April 2, 2014).
3. Center for Integrative Environmental Research, University of Maryland, Economic Impacts of Climate Change on Tennessee, September 2008, 8. <http://www.sehn.org/tccpdf/Tennessee.pdf> (accessed April 2, 2014).
4. Tennessee Wildlife Resources Agency, “Climate Change and Potential Impacts to Wildlife in Tennessee” 2009. <http://www.tennessee.gov/twra/pdfs/tclimatechange.pdf> (accessed April 2, 2014).
5. Tennessee Valley Authority, Climate Change Adaptation Action Plan. Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance http://www.tva.com/environment/sustainability/TVA_Climate_Change_Adaptation_Plan_2012.pdf (accessed April 2, 2014).

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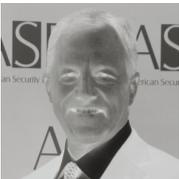
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The American Security Project (ASP) is a nonpartisan organization created to educate the American public and the world about the changing nature of national security in the 21st Century.

Gone are the days when a nation's security could be measured by bombers and battleships. Security in this new era requires harnessing all of America's strengths: the force of our diplomacy; the might of our military; the vigor and competitiveness of our economy; and the power of our ideals.

We believe that America must lead in the pursuit of our common goals and shared security. We must confront international challenges with our partners and with all the tools at our disposal and address emerging problems before they become security crises. And to do this we must forge a bipartisan consensus here at home.

ASP brings together prominent American business leaders, former members of Congress, retired military flag officers, and prominent former government officials. ASP conducts research on a broad range of issues and engages and empowers the American public by taking its findings directly to them via events, traditional & new media, meetings, and publications.

We live in a time when the threats to our security are as complex and diverse as terrorism, nuclear proliferation, climate change, energy challenges, and our economic wellbeing. Partisan bickering and age old solutions simply won't solve our problems. America – and the world - needs an honest dialogue about security that is as robust as it is realistic.

ASP exists to promote that dialogue, to forge that consensus, and to spur constructive action so that America meets the challenges to its security while seizing the opportunities that abound.



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