

Texas and Climate Change



-Briefing Note-

Andrew Holland

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Nelson W. Cunningham

Nelson Cunningham is President of McLarty Associates.



Governor Christine Todd Whitman

Christine Todd Whitman is the President of the Whitman Strategy Group, a consulting firm that specializes in energy and environmental issues.

In this Report:

Climate change threatens states across the country – few are as exposed to extreme weather as Texas. The combination of a long coast exposed to sea level rise and an inland, arid region exposed to intense heat and drought make the state vulnerable.

Interact:

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Discuss the role of water management and the broader implications of climate change with Andrew at **@TheAndyHolland**
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IN BRIEF

- Generally speaking, climate change will introduce hotter summers, longer droughts, and more frequent intense weather events—such as hurricanes—to Texas.
- Droughts are expected to become more intense and more unpredictable due to climate change. Already, parts of Texas have faced one of the longest-lasting and most devastating droughts in modern history since 2010.
- Projections for the future of Texas's freshwater resources are dire, when climate change is combined with energy production, population growth, and economic development.
- As a result of climate change, the Gulf coast sea-level is expected to rise 1 to 3 feet over the next 100 years – and possibly much more, putting infrastructure and port facilities at risk.

About the Author

Andrew Holland is the Senior Fellow for Energy and Climate at the American Security Project. He was a Legislative Assistant on Energy, Environment, and Infrastructure for United States Senator Chuck Hagel of Nebraska from 2006 through 2008.



The climate of Texas varies from wide open plains and deserts to mountains and coastal regions. In addition to this wide topographical range, the state of Texas is located at the merging of several climate zones.

The Eastern parts of the state are more closely related to the humid, wet climate of Gulf Coast states, while the Western parts of the state are more closely linked to the arid, dry climate of Southwestern states. As a result, weather patterns and their effects vary across the state, and generalizations about the impacts of climate change on the whole state are difficult.

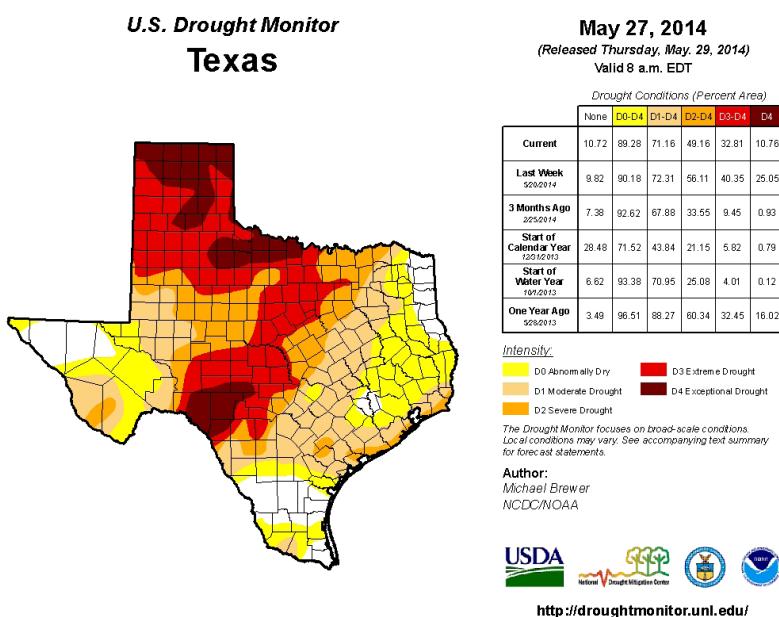
The effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision regarding both impact and location. However, there are clear trends and projections. For Texas, that means towards increased intensity and volatility for climate-related events.

Generally speaking, climate change will introduce hotter summers, longer droughts, and more frequent intense weather events—such as hurricanes—to Texas. While Texas is no stranger to heat or hurricanes, the increased intensity will add to the high costs of mitigating their negative effects.



Drought

Drought is, by its nature, a regional phenomenon. Parts of Texas, particularly, Western, Northern, and all along the border with Mexico, have faced one of the longest-lasting and most devastating droughts in modern history since 2010.



The Highland Lakes, the main reservoirs for over a million people in and around Austin, are only a third full. Elephant Butte Lake, the reservoir in New Mexico that controls the flow of water into the Rio Grande Basin is only 19% full. Other reservoirs in Western Texas, like E.V. Spence Reservoir in Coke County or Lake J.B. Thomas in Scurry County are basically empty.¹

Texas is the nation's top producer of beef, but with the state so hard hit by drought, ranchers have cut back. That has dropped the total U.S. cow herd in 2013 down to 38.5 million head – the smallest since 1941.²

Challenges of Freshwater Availability

Projections for the future of Texas's freshwater resources are dire – even without factoring in climate change. The current population of 27 million is projected to grow to 34 million by 2030, and 52 million by 2050.³

Increased groundwater withdrawals from below-ground resources like the Ogallala Aquifer would accelerate depletion – limiting the ability to irrigate: and without irrigation, crop yields would reduce by at least a factor of two.⁴

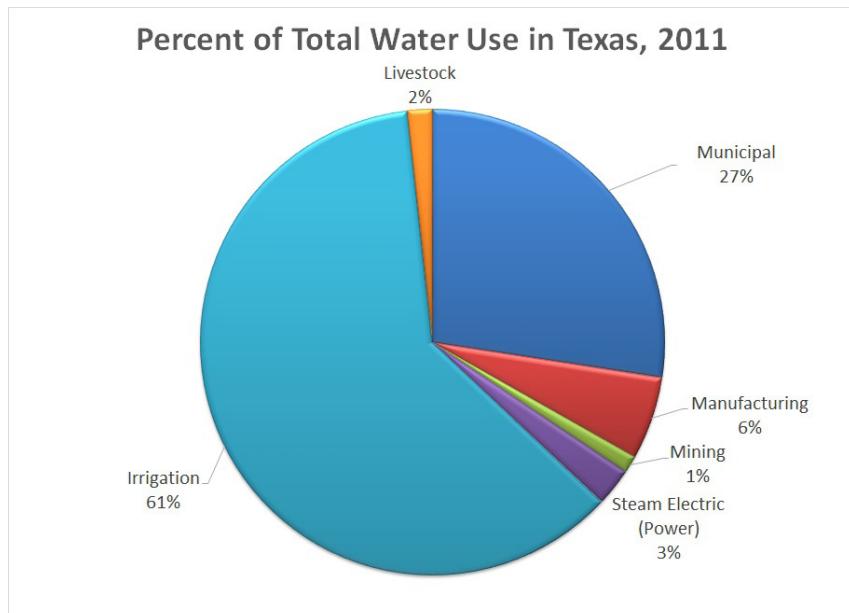
Climate change is only expected to exacerbate these problems, as higher temperatures increase evaporation, causing an increase in water demand from agriculture and an increase in electricity consumption. Meanwhile, predictions about climate change, especially in southern, central, and western Texas, indicate that the state's freshwater resources are predicted to decrease just as the state's demand increases.

Current drought conditions will eventually break, but long-term trends of increased water utilization by a growing population and an increasingly thirsty energy sector will mean that Texas will find it increasingly difficult to manage its freshwater resources.

While mining and electric power production only account for 4% of total water use in the state, much of the energy development in the Eagle Ford Shale is in already water-stressed areas.



EV Spence Reservoir at 1% Capacity



Texas Coastline Economy

The Texas coastline stretches 600-miles and is home to thousands of residents and wildlife.

Almost a quarter of the state's population lives along the Gulf of Mexico, where much of the state's industry is based. More than half of U.S. chemical and petroleum production is located on the Texas coast and over 66 million short tons of cargo—valued at more than \$25 billion—traverse the 420-mile Texas segment of the Intercoastal Waterway each year.⁵ These figures suggest the heart of the Texas economy is dependent on a thriving and stable coastal region.

Recent scientific studies suggest due to climate change the coastal landscape and much of Texas will be threatened.

Sea-Level Rise

As a result of climate change, the Gulf coast sea-level is expected to rise 1 to 3 feet over the next 100 years – and possibly much more, depending on how ice sheets in Greenland and Antarctica react to warmer temperatures.

The coastline of Texas is particularly vulnerable because it sweeps gradually into the sea, with much of the region lying 5 feet or less above sea level. Therefore, a sea level increase of only a foot would cause the loss of more than 400 square miles of the Texas coastline, and a three-foot rise would cause the loss of around 1,000 square miles.

A sea level rise of 3 feet would inundate South Padre Island underwater and much of Galveston as well.⁶

Hurricanes

The impact of climate change on hurricanes is still debated by scientists – they are complex systems impacted by many factors. Evidence, however, points to at least an increase in the intensity of storms, as warmer waters in the Gulf of Mexico will feed increasingly intense and dangerous storms. Combined with rising sea-levels, the Texas coast will become increasingly vulnerable to hurricanes.

On average, hurricanes strike Texas once every other year, but with recent predictions underpinned by the trends of climate change, a 100-year storm will hit Texas twice in one lifetime.

For an example of the destructive power of storms, we can look at Hurricane Ike's impact on Texas in September of 2008. Over 1.2 million Texans had to be evacuated, direct economic damage in the region totaled \$13.283 billion, and statewide total economic damage for the following year amassed over \$142 billion.

A future of more intense storms, with more infrastructure at risk would only pose worse threats.

Further Reading:

www.NationalSecurityandClimateChange.org

[Climate Security Report](#)

[Protecting the Homeland – The Rising Costs of Inaction on Climate Change](#)

[Critical Security Challenges in the Arctic](#)

[The Global Security Defense Index on Climate Change](#)

[Pay Now, Pay Later, ASP's Report on the 50-state impact of Climate Change](#)

Endnotes

1. Water Data for Texas, <http://www.waterdatafortexas.org/reservoirs/statewide>
2. US cow herd to shrink further from 72-year low, Agrimoney.com, June 20, 2013 <http://www.agrimoney.com/news/us-cow-herd-to-shrink-further-from-72-year-low--5963.html>
3. Keith Phillips, Edward Rodrigue and Mine Yücel, "Water Scarcity a Potential Drain on the Texas Economy" Federal Reserve Bank of Dallas, Fourth Quarter 2013. <http://www.dallasfed.org/assets/documents/research/swe/2013/swe1304b.pdf> (accessed May 30, 2014)
4. Colaizzi, P. D., P. H. Gowda, T. H. Marek, and D. O. Porter, 2009: Irrigation in the Texas High Plains: A brief history and potential reductions in demand. Journal of Irrigation and Drainage Engineering, 58, 257-274, doi:10.1002/ird.418
5. Jared Hazleton, "Economy," in The Impact of Global Warming on Texas, ed., Jurgen Schmandt, Judith Clarkson, and Gerald R. North (Austin: University of Texas Press, 2009), <http://www.texasclimate.org/Home/ImpactofGlobalWarmingonTexas/tqid/481/Default.aspx> (accessed May 30, 2014).
6. Ramon Alvarez, Mary Sanger, Colin Rowan and Lisa Moore, Fair Warning: Global Warming and the Lone Star State, Environmental Defense Fund, May 2006, 11. http://www.edf.org/documents/5254_FairWarning.pdf (accessed May 30, 2014).

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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