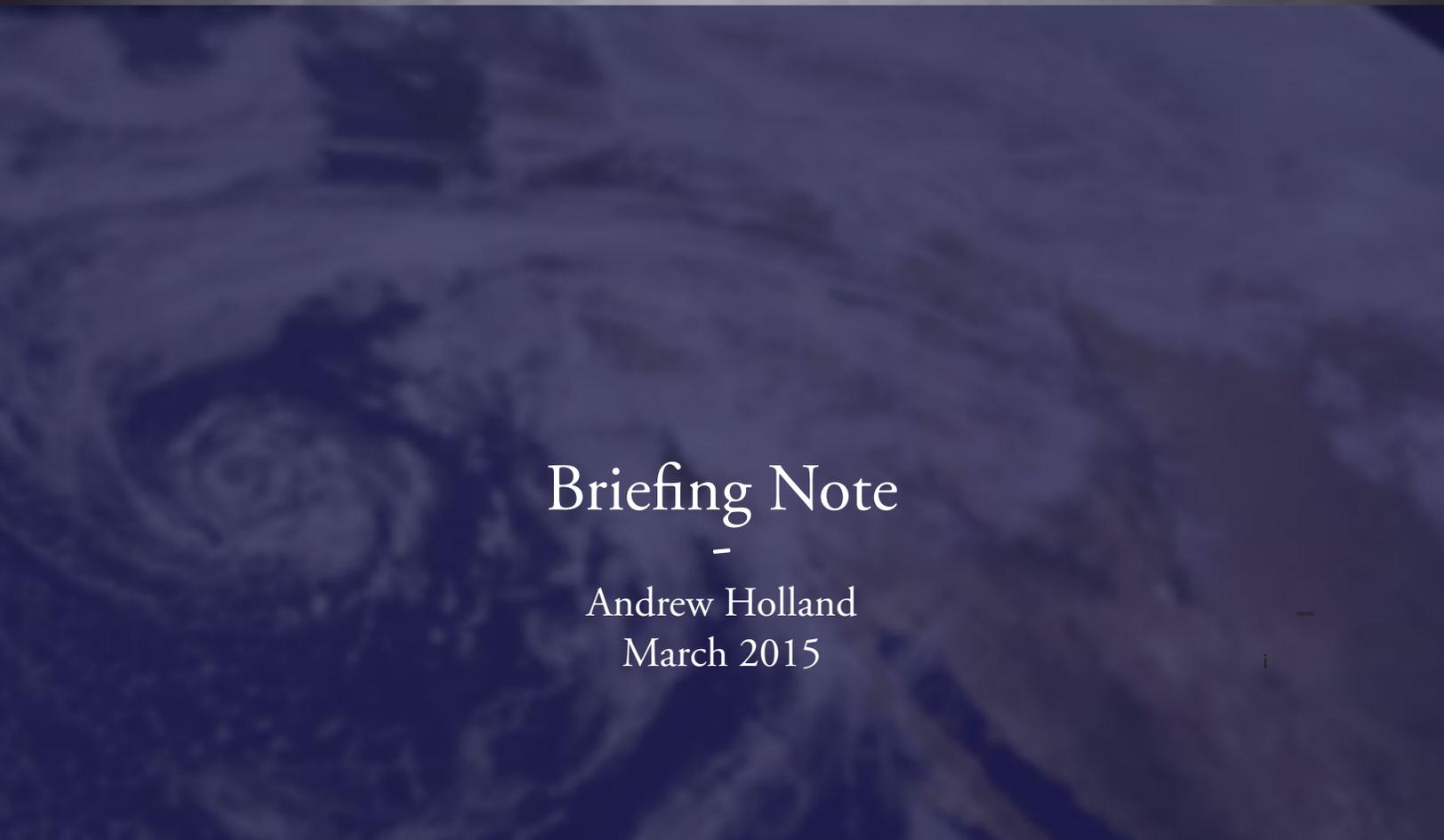




Environmental Threats to Louisiana's Future: *Climate Change*



American Security Project



Briefing Note

—
Andrew Holland
March 2015

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In this Report:

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IN BRIEF

- Louisiana has been vulnerable to a unique suite of environmental risks—land subsidence, sea-level rise, wetland loss, and coastal storms – for generations.
- Climate change is making these environmental threats much more dangerous and unpredictable.
- Because so much of Louisiana’s economy is dependent upon the waters of the Gulf of Mexico and the Mississippi River, any environmental changes that harm these systems will cause disproportionate harm to the State’s economy.
- As one of the centers of energy production, transit, and storage, Louisiana is a hub for the whole country. This ensures that any problems in Louisiana are transferred throughout the country by energy price volatility and uncertainty.

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. He has written widely about energy, environment, and how they relate to geopolitics.

Introduction

Due to a confluence of interconnected threats, Louisiana is uniquely vulnerable to environmental change. The state features 397 miles of coastline fronting the Gulf of Mexico and an economy intimately tied to the sea; greater storm intensity (and possibly greater storm frequency) combined with higher sea levels are the most apparent, most potentially damaging, and least understood climate risks facing Louisiana. In 2005, Hurricanes Katrina and Rita showed how these massive storms can destroy lives, property, and economic activity. Even 2012's Hurricane Isaac, a relatively small (category 1) storm caused great flooding and damage when it made landfall in Louisiana. In addition to acute risks related to extreme weather, more chronic risks exacerbated by a changing climate – like land subsidence, wetlands loss and ocean acidification – carry potentially large costs for Louisiana's economy, property, and environment.



This unique suite of environmental risks – land subsidence, sea-level rise, wetland loss, and coastal storms – have challenged Louisianans for generations. However, climate change is likely to compound and worsen each of those threats. 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 Louisiana, that means towards increased intensity and volatility in weather patterns.

Land subsidence

For millennia, silt flowing down the Mississippi River shaped Louisiana's coast. The shifting river deposited layers of sediment from America's heartland. Land subsidence is typical of delta regions, because rapid accumulation of sediment also traps a great deal of water. Over time, as new layers of sediment are deposited, water is squeezed out of the underlying deposits, causing compaction and the land surface to sink. However, today, the Mississippi has been tamed and its flow directed through protected channels. This allows assured navigation of the river and protects investments from flooding, but it also directs the sediment away from compacting land. As a result, the lands around the Mississippi's delta are no longer being replenished at the rate needed to fight back the tides.

In addition to natural process of land subsidence, accelerated by the channeling of the Mississippi, the toll of decades of oil extraction from far beneath Louisiana's surface has also added to the problems of land subsidence, as petroleum extraction has literally caused the ground above it to drop.¹

The problem of land subsidence has little relation to the amount of greenhouse gasses in the air, but when combined with the problems of sea level rise and coastal storms, it acts as a "force multiplier" that serves to increase loss and damage from other environmental threats.

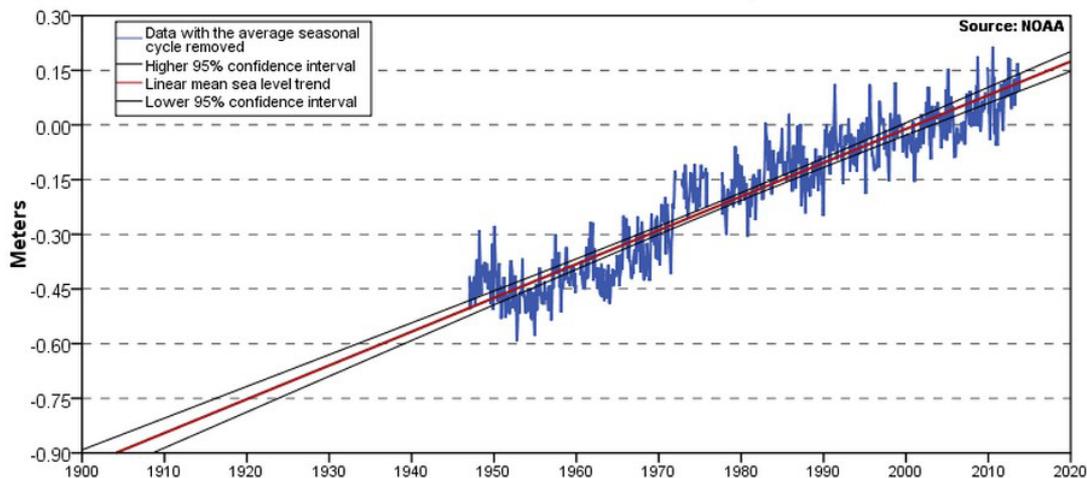
Rising Seas

Because sea-level rise in the Gulf of Mexico is compounded by land subsidence around Louisiana, there may be no place on earth that faces faster encroaching seas than Louisiana.²

Like other bodies of water around the world, the sea level of the Gulf of Mexico is rising. Scientists are confident that global ocean levels rose by about 19 centimeters (7.5 inches) in the last century. They are also confident that the rate of increase has sped up; since 1993, the average rate has nearly doubled, from 1.7 mm (.07 inches) per year to about 3.2 mm (.13 inches) per year.³

There are two drivers of global sea level rise. First, warmer water has a higher volume than cooler water, due to a process called “thermal expansion.” Second, far from America’s Gulf Coast, ice is melting faster than at any time in human history. The ice caps of Greenland, Antarctica, and on glaciers around the world are melting into the sea.

Mean Sea Level Trend at Grand Isle, Louisiana



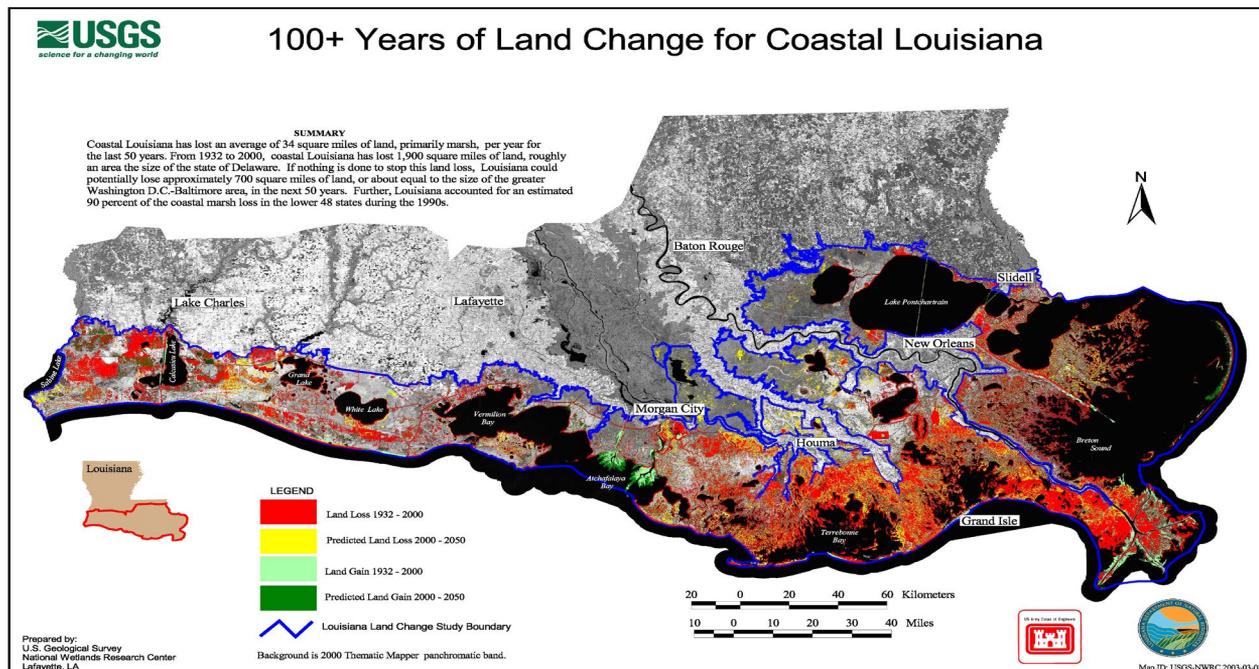
Source: NOAA, “Sea Level Trends,” http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8761724

We know that sea level rise is a problem for Louisiana already, even before future climate change is factored in. Since 1947, when records were first kept, the sea level at Grand Island has gone up by almost two feet, at a rate of one-third of an inch per year. Figure 1, from the National Oceanic and Atmospheric Organization, shows the sea level at Grand Isle over the last 66 years.

Wetlands Losses

The combined result of a rising sea level and sinking land is that coastal Louisiana is rapidly sinking into the Gulf of Mexico. Already, more than 1,880 square miles of Louisiana’s wetlands have been lost since the 1930s and just as much could be lost, again, during this century.⁴ Louisiana’s wetlands today represent about 40 percent of the wetlands of the continental United States, but about 80 percent of the losses.

Coastal wetlands are prime spawning grounds for many of Louisiana's fisheries. In addition, swamps and mangroves provide buffers to storm surge that beaches or seawalls alone cannot match.



Tropical Storms and Hurricanes

The first three threats discussed – rising seas, subsiding land, and lost wetlands – are best understood as long term or “chronic” threats of climate change. However, Louisiana is also threatened by “acute” dangers, especially hurricanes. These are interrelated with the chronic problems: with dwindling wetlands and rising seas, Louisiana will increasingly lack natural buffers against storms. Without changes in these trends, the people of Louisiana will be ever more unprotected from the hurricanes and tropical storms that have struck throughout its history. While there is a tremendous amount of variability in every storm season, even over decade-long time scales, there is emerging consensus among scientists that a warming climate will make storms more powerful. We simply do not know whether it will also make them more likely.⁵

How Climate Change Multiplies the Already Existing Threats to Louisiana

Any assessment of risk has to weigh two components: the likelihood of events, and how severe any potential losses from those events might be. In a changing climate, the probability and severity of many environmental risks are compounding and increasing in Louisiana.

Louisianans have already seen these effects up close. In the last two centuries, New Orleans has sunk well below the levels of both Lake Pontchartrain and the Mississippi River. As New Orleanians know, in much of the French Quarter, you actually have to look up to see the level of the Mississippi River. Even if climate change had zero effect on storm intensity, Louisiana's vulnerability to storm surge is getting worse.

Hurricane Katrina was only the most visible environmental disaster to hit Louisiana. While some environmental activists are very quick to label Katrina as “caused” by climate change, it is difficult to make that link for any particular storm. However, the risk of a catastrophic hurricane strike on New Orleans is ever present. Climate change will serve to “load the dice” by making more dangerous storms more likely.

The federal government has reinforced the storm barriers and levees, but flooding remains a threat. Past disasters have taught us that predictions only last until the storm reaches shore. We may have protected against the last storm, but we cannot predict the next storm. Subsiding land and dissolving coastal wetlands only make New Orleans and surrounding parishes more vulnerable.

Infrastructure at Risk from Climate Change

In addition to assessing the probability of climate change impacts, including the incidence of acute weather events, understanding risk requires an assessment of the severity of potential losses. The coast of Louisiana has a great deal at risk because it is so economically vital to the state and the country. The National Oceanic and Atmospheric Administration (NOAA) estimates that Hurricane Katrina was the costliest storm in U.S. history, costing \$125 billion in 2005; but it was far from the most powerful storm to hit the United States.



Image source: NOAA

These risk equations must include Louisiana’s important waterfront industries. Louisiana’s seafood industry, for example, is responsible for one in seventy jobs in the state, with annual retail sales of more than \$2 billion.⁶

At Risk: Ports and International Trade

Louisiana is home to four of the top ten largest ports in the country, measured by volume handled (*i.e.* Port of South Louisiana, Port of New Orleans, Baton Rouge, and Port of Plaquemines).⁷ These ports and the Mississippi River waterway are among the most important for trade and economic development in the country. The mouth of the river is the world’s busiest waterway, with more than 5,000 oceangoing vessels annually, over 1,800 of which call at the Port of New Orleans. The port estimates maritime activity is responsible for about 160,500 jobs statewide, \$17 billion in spending and \$800 million in taxes.⁸

At Risk: Energy Infrastructure

Additionally, Louisiana’s energy industry is critically vulnerable to rising seas and storm surges. There are more than 100 major energy facilities, including oil, natural gas, and electricity production sites within one foot or lower of the sea level, more than all other states combined.⁹ A report from the Entergy Corp. on the vulnerability of U.S. Gulf Coast energy infrastructure to sea level rise and coastal storms projects that, by 2030, there will be nearly \$1 trillion in energy assets at potential risk from rising sea levels and hurricanes. By 2030, Entergy estimates the Gulf Coast energy sector – of which Louisiana is a central player – will face an average annual loss from extreme weather of \$8 billion.¹⁰

Risks in Louisiana are Felt Throughout the Whole Country

The concentration of energy infrastructure is a threat not just to Louisiana, but to the whole country, because of the sheer concentration of infrastructure on the Gulf Coast. Americans felt how deeply our energy economy hinges on Louisiana when Hurricane Katrina crippled supply infrastructure and sent natural gas prices through the roof, up about \$5 to more than \$12 per thousand cubic feet in 2005. The shale revolution has ameliorated the risk of massive volatility, but Louisiana is still the heart of America's gas market and storm-induced supply constraints are still a real risk.

Similarly, Hurricane Katrina caused a spike in gasoline prices for consumers, as U.S. gas prices jumped by nearly 20% in less than a week, with some areas of the Southeast seeing prices more than double.¹¹ The concentration of oil refining, production and transport infrastructure along the Gulf Coast, much of which is at or near sea level, ensures that this is a concern for the whole nation.

Further Reading:

www.NationalSecurityandClimateChange.org

[Climate Security Report](#)

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

[America's Role in the Arctic: Opportunity and Security in the High North](#)

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

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

Also see ASP Senior Fellow Andrew Holland's writing with Alex Bozmoski in the Pelican Institute's 2014 paper: "[Risk Reward & Revolution](#)"

Endnotes

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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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