

# Climate change in MISSISSIPPI



While climate change is often talked about in the future tense, our climate is already changing in both averages and the number and intensity of extremes. Mississippi experienced record-breaking heat, increased drought and flooding, and rapid sea level rise in recent years. As global temperatures continue to rise, Mississippi is expected to experience more heat waves, droughts and floods, continued sea level rise and intensified hurricanes. The Southern Climate Impacts Planning Program (SCIPP) is a climate hazards research program whose mission is to help Mississippi residents increase their resiliency and level of preparedness for weather extremes now and in the future.

## Climate Change: Observations

### Temperature

While “global warming” implies rising temperatures, climate change isn’t quite that simple. During the last 30 years in Mississippi, temperatures have increased, but not as steadily as in the rest of the country. For Mississippi, climate change has created a trend of fewer freezing days in winter, hotter nights in summer, and less relief from long-lasting heat waves (NOAA).

Mosquito-borne illnesses, like Malaria and Dengue fever, spread in the southeast during the last decade as freezing days and annual frosts gradually decreased (CDC). Since 1970, freezing days have declined by an average of 10-16 days per year in some parts of Mississippi (NCA).



The rate of annual heat-related illnesses and deaths in the U.S. has tripled in the last 20 years as heat waves have become more common and more intense. Each year, high temperatures kill more people than hurricanes, floods, tornadoes, blizzards, and lightning combined (CDC).

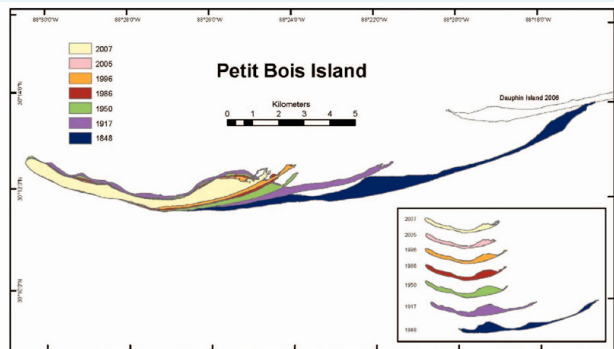
All of the environmental changes observed in the last 150 years resulted from a 2 degree global temperature rise. Temperatures in the U.S. Southeast are projected to increase another 4-8 degrees by 2100 (NCA).



### Sea Level Rise

One of the biggest threats of sea level rise has been higher storm surges and disappearing barrier islands (NOAA).

In the last 50 years, Mississippi’s barrier islands have begun to disappear. Ship Island, just south of Gulfport, has lost about 40 percent of its total area since 1972 (USGS). The barrier islands play an intricate role in shielding the densely populated coastal areas, like Gulfport and Biloxi, from storm surge.



Petit Bois Island, located south of Pascagoula, Mississippi, has lost more than 60 percent of its original surface area. The rate of erosion has accelerated since the 1970s in response to an increase in hurricane intensity and storm surge. Hurricane Katrina set a 28-foot record storm surge near Biloxi in 2005 (Morton 2008).

Try out the USGS Sea Level Rise Visualizer by visiting <http://gom.usgs.gov/slr/> to see how your community will be affected by sea level rise.

### Precipitation

Rainfall amounts range from more than 65 inches a year along the Mississippi coast to less than 35 inches in the northern parts of the state (SCIPP).

In recent years, rainfall along the coast has increased, partly because of increased storm activity and also because of more evaporation caused by higher temperatures (NOAA).

In the delta, throughout central Mississippi, and into the north, droughts are becoming more frequent. Dry heat and long periods without rain resulted in the losses of \$810 billion across the southeast in 2011 - the biggest drought in American history (University of Texas).



Similar droughts hitting the Southeast cost the U.S. \$8.7 billion in 2008. Corn, cotton and wheat accounted for 70 percent of the losses, followed by soybeans and grain sorghum (USDA).



### Quick Fact:

Hurricanes get their energy from the warm waters of the Atlantic Ocean and Gulf of Mexico. In years with warmer sea surface temperatures, we see more intense hurricanes (NOAA).

For more information visit [www.southernclimate.org](http://www.southernclimate.org)



# Overview

The models scientists use to project future climate change are extremely thorough, consider the unique geography and climate of every region, and look forward 25 and 100 years (NOAA).

In Mississippi, models show more powerful hurricanes and storm surge, continued sea level rise, and changes in rainfall that will likely create more periods of heavy precipitation between long dry spells (NCA).

Climate change acts as a threat-multiplier, loading the dice for more intense hurricanes, heat waves, floods, droughts, and extreme weather.

Droughts will become more frequent, last longer and be more intense. Rains following droughts will often be quick and heavy, causing flash-flooding and destroying aging and vulnerable infrastructure (NCA).

With more dry periods, higher temperatures and more lightning, large wildfires are expected to become more common (Price 2012, NCA).

Global sea level is expected to rise between 1 and 6 feet in the next century (NOAA). At 6 feet of sea level rise, most of Gulfport, Biloxi, Ocean Springs, Pascagoula and Bay St. Louis will be under water (USGS).

Plant growing seasons will become longer, the types of plants that can survive in Mississippi will begin to change, and precipitation events will become more intense, causing more flooding of agricultural areas (USDA).

Hardiness zone changes have already begun changing, and zones will continue to move north as winter freezes become less frequent. Hardiness zones are a way of classifying what kinds of plants can grow in an area based on the climate of the region. As temperatures continue to warm, more tropical plants survive milder winters, enabling invasive plants and insects to take over the local species as they migrate north (USDA).



**Q:** How does climate change affect hurricanes and storm surge?

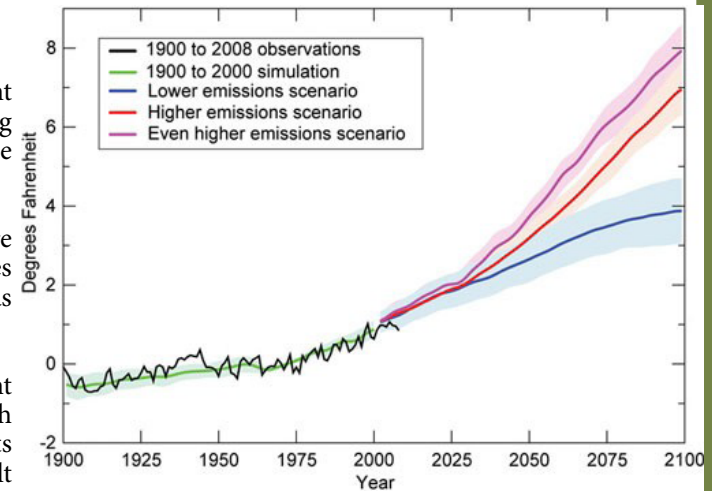
**A:** Warmer ocean temperatures mean stronger hurricanes (NASA). A recent study suggests that hurricanes may become more frequent and more intense - meaning more category 4 and 5 hurricanes forming each year (Emanuel 2013, NCA). Storm surge is also expected to become more severe as sea level rises and hurricanes become more intense (NOAA).

## Temperature

Future temperature rise depends partly on the amount of greenhouse gasses added to the atmosphere in coming decades. Global temperatures are expected to increase another 3-12 degrees Fahrenheit by 2100 (IPCC).

Projections for the U.S. Southeast show a temperature increase of 4-8 degrees by 2100, with projected increases for interior states 1-2 degrees higher than coastal areas (NCA).

Major consequences of warming include a significant increase in the number of hot days (above 95 degrees) each year and an overall decrease in freezing events and frosts (NCA). More heat and less cooling are expected to result in more heat-related deaths, more vector-borne illnesses and a major shift in plant species (EPA).



Global temperature rise depends largely on future emissions scenarios, which range from low, 3°F increase, to high, 12°F or higher (IPCC).

### Biloxi

Biloxi's Hazard Mitigation Plan includes barrier island preservation and restoration, beach nourishment and increased shore-to-home distance laws. Many of these laws were passed following Hurricane Katrina.

### Vicksburg

Operation Watershed manages an entire system of reservoirs and control structures to mitigate flooding through an integrated system of locks, dams, levees, floodways and spillways, created by the USACE following the 2011 floods.

### Starkville

The Climate Literacy Project of Starkville received a \$1 million NSF grant in 2012 to research the effects of and educate leaders about the future impacts of climate change, including sea level rise, flooding and rising temperature (Miss. State).

### Hattiesburg

Energy companies in Hattiesburg are considering switching to renewable fuels, and two solar panel manufacturing plants have opened since 2010, creating more than 1,000 jobs (MEC).

### Jackson

With the Mississippi River at a historic low in 2012 because of nationwide drought, officials in and around Jackson began planning for future droughts by mitigating water travel through tributaries and dams (Clarion-Ledger).

### Oxford

Northern Mississippi spent more days in drought than not in 2012. Scientists expect periods of drought to continue to lengthen, and for overall precipitation to continue to decline in areas like northern Mississippi (U.S. Drought Monitor).