LOWER MISSISSIPPI RIVER BASIN (LMRB)

LTAR Network and USDA Climate Hubs are working to develop knowledge and technology for sound resource management **via research with partners.** The goal is to ensure **sustained crop and livestock production and ecosystem services** from agroecosystems, and to forecast and verify the effects of environmental changes, public policies, and emerging technologies.

Location and Climate

The Lower Mississippi River Basin consists of the alluvial plain of the Mississippi River and the loessal bluff hills along the alluvial valley. Located within the USDA Southeast Climate Hub, the climate of the LMRB is considered humid subtropical.

Historic Temperature

Historic average annual temperature in Washington County, MS (1901-2000) is 63.7°F. Mean maximum temperature is highest in July (91°F) and mean minimum temperature is lowest in Jan (43°F).

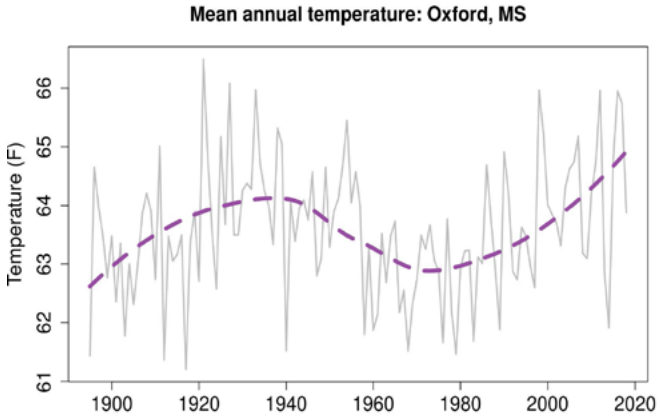
Historic Precipitation

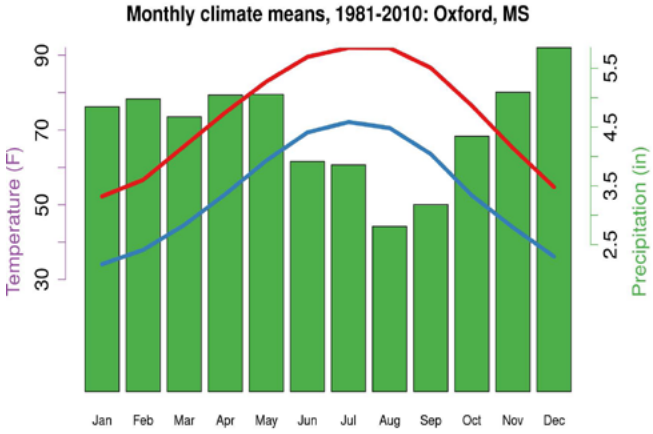
Long-term average (1901—2000) annual precipitation is 53 inches in Washington County, MS. Lowest rainfall occurs in August with a monthly historic mean of 3.2 inches and the highest rainfall is typically in December with a monthly mean of 5.7 inches.

Growing Season

The effective growing season, when both precipitation and temperature are favorable, is normally April through October.

Average annual temperature variation as compared to mean temperature 1895-2018. Credit: Sarah Goslee





Maximum (red line) and minimum (blue line) temperature and mean precipitation (green bars) 1981-2010 credit: Sarah Goslee (data source: gridMet).

Measuring Weather and Climate

The humid LMRB is characterized by short, mild winters and long, hot, and humid summers. High temperatures above 90F are typically reached over 100 days each year. Rainfall is highest in winter and spring, and dips from June through October, during most of the growing season. Southerly winds prevail during the summer and provide the potential for violent thunderstorms. Both droughts and floods are common in the region.

Impacts to Agriculture

The combination of high temperatures and lower rainfall occurring during the growing season result in the need for irrigation to maintain high crop yields. The region also receives some of the most intense rainfall in the US, according to the rainfall erosivity index, which leads to high rates of erosion and nutrient transport from agricultural fields. High temperatures and short frost seasons lead to weed and pest management issues.

For more information visit https://ltar.ars.usda.gov/sites/lmrb/

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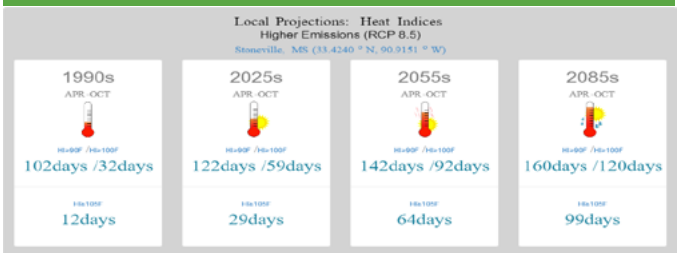
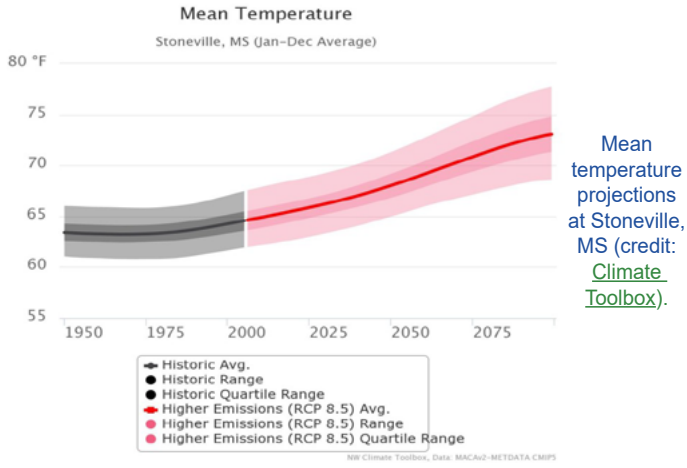
Climate and Climate Change

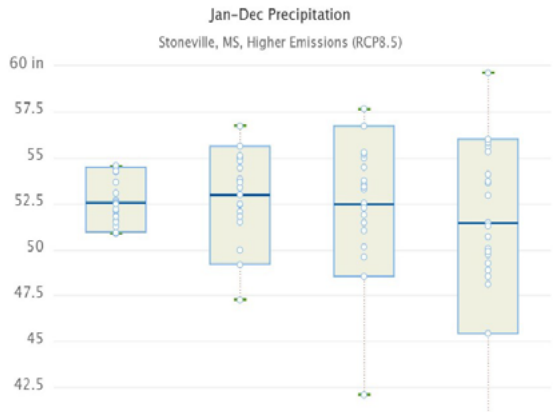
Average temperatures are projected to increase in Stoneville, MS and across the LMRB. Annual precipitation is projected to become more variable, with a slight decrease in mean precipitation by 2070–2099. Despite greater uncertainty in annual precipitation totals, available water in the region will likely decline as increased temperatures lead to increased evaporation and evapotranspiration. The number of hot days (>100F) and length of the growing season are projected to progressively increase over time (MACA, RCP8.5).



Future climate projections dashboard for Stoneville, MS (credit: Climate Toolbox).



Mean temperature projections at Stoneville, MS (credit: Climate Toolbox).



Projection of annual precipitation at Stoneville, MS (credit: Climate Toolbox).

To manage land sustainably, consider weather and climate.

Crop Management

- Staple crops in the region, like cotton, corn, soybeans, and rice will likely suffer decreased yields from higher temperatures. Although timing of extreme heat will play a large role in yield reductions; for example, heat stress occurring during the flowering phase for cotton (McNulty et al. 2015).
- Crops are likely to face greater pressure from pest and weed populations due to a longer frost-free season.
- With high rainfall erosivity, soil erosion is already problematic in the region and could increase with climate change (Yasarer et al. 2016).

Water Resources

- Many producers rely on groundwater irrigation for optimal yields. Groundwater resources are declining as demand for irrigation increases. Utilizing surface water sources for irrigation and implementing more water efficient practices may be required (Reba et al. 2017).

Extreme Events

- Excess moisture and drought conditions are already the greatest cause of crop loss in the LMRB. With projected temperature rising and precipitation becoming more uncertain and extreme, managing for these extremes will become critical (McNulty et al. 2015)

Latitudinal Climate Gradient

- As the LMRB extends from southern Missouri to the tip of Louisiana, there are climate gradients present within the region.
- The northern LMRB site in Portageville, MO has an annual precipitation around 52.3 inches and monthly patterns similar to Stoneville, MS.
- The southern LMRB site in Houma, LA has annual precipitation around 63.6 inches and experiences higher monthly precipitation during the growing season when temperatures also peak.

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