

USGS Capabilities to Study the Impacts of Drought and Climate Change in the Southeastern United States



In the Southeast, U.S. Geological Survey (USGS) scientists are researching issues through technical studies of water availability and quality, geologic processes (marine, coastal, and terrestrial), geographic complexity, and biological resources. The USGS is prepared to tackle multifaceted questions associated with global climate change and resulting weather patterns such as drought through expert scientific skill, innovative research approaches, and accurate information technology.

The Southeastern United States embodies a treasury of natural resources from ancient mountains to the Coastal Plain. A “Region of Rivers,” the Southeast is renowned for a remarkable diversity of amphibians, fishes, mollusks, crayfishes, and insects found nowhere else on Earth. Currently (2009), a steady increase in human population has led to the designation of the Southeast as one of the two fastest growing regions in the country.

Heightened concerns about the projected consequences of global climate change are justified by the occurrence of recent weather events, such as the severe drought in 2007. Summer temperatures are expected to increase substantially during the 21st century in the Southeast, and the effects of drought and climate change on factors such as rainfall and soil moisture are uncertain. Some climate models suggest the duration and frequency of droughts will intensify in this region during La Niña phases as atmospheric carbon dioxide (CO₂) increases. Global climate change could lead to more periods of severe drought conditions.

This fact sheet summarizes the USGS capabilities to provide the science necessary for managers to effectively allocate limited water resources.

Availability and Management of Water

Drought conditions directly affect streamflows, surface-water levels, ground-water levels, and ground-water/surface-water exchanges that sustain river and spring flows. For example, extreme droughts have greatly reduced daily flows, cutting them to nearly half of the normal dry season flows for portions of the Chattahoochee and Flint Rivers in Georgia, and the Apalachicola River at Chattahoochee, Florida. These drought-related water flow and level declines, in turn, affect the economy and environment throughout the Southeast. During extreme drought conditions, there is insufficient water to meet demands for drinking water and irrigation, to provide adequate power generation, to support healthy populations of fish and other aquatic organisms, and to maintain floodplain forest and wetland habitats.

As flows decline in streams during droughts, pollutants and other contaminants become more concentrated causing a decline in water quality. Coastal environments are also harmed by drought. For example, sufficient freshwater inflows are required for maintenance of low-salinity waters in estuarine areas. If freshwater flows are insufficient to create brackish conditions, then downstream fisheries in estuarine areas such as Apalachicola Bay are negatively impacted.

The USGS has a long history of working cooperatively with other Federal, State, and local agencies to provide important science and data concerning water availability and drought. For example, the USGS currently operates over 1,600 streamgaging stations in the Southeast that report data in real time, and hundreds more that provide surface-water, ground-water, and water-quality data at daily and monthly intervals. USGS geographers and hydrologists have also compiled water withdrawal information and documented changes in water use patterns in various areas of the Southeast. USGS hydrologists