Climate Change Assessment for the ACF River Basin

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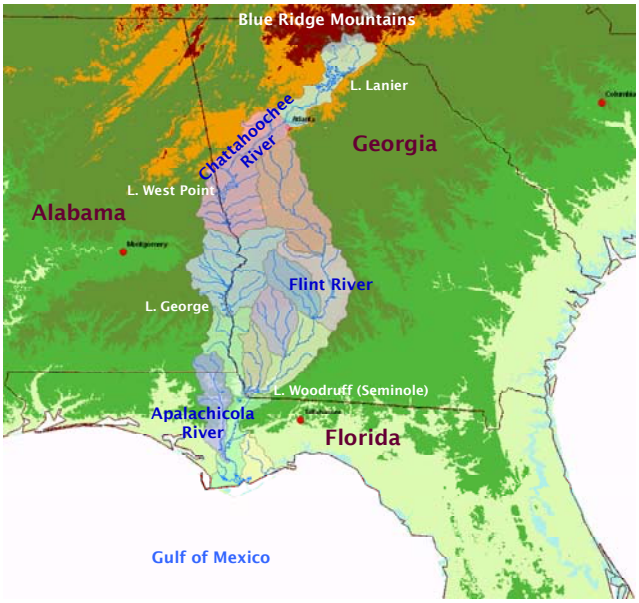

The Apalachicola-Chattahoochee-Flint (ACF) river system originates from the Blue Ridge Mountains, flows southwest and then south along the Georgia-Alabama border, and ends in the Apalachicola Bay, Florida. The ACF river basin has an area of 19,600 square miles and is shared by the states of Georgia, Alabama, and Florida. The ACF river system drains an area of 19,600 square miles and supports many water uses including agricultural, municipal, and industrial water supply; hydropower; flood control; navigation; pollution abatement; ecosystem protection; and recreation. In particular, the upper Chattahoochee is heavily relied upon to provide drinking water for Atlanta, one of the fastest growing metropolitan areas in the US; the primary water use in the Flint river basin is to supply water for nearly 900,000 acres of irrigated cropland, and the critical water need in the Apalachicola river and bay is the provision of sufficient instream water quantity and quality to support the rich ecosystem and thriving fishing industry. Industrial withdrawals are mainly used for the cooling of six fossil fuel and one nuclear power plants. Georgia has made significant investments and headway in mitigating point source pollution from urban and industrial facilities. However, non-point source pollution remains a major problem.

In the late 1980's, the ACF river basin was the subject of an unfortunate and divisive dispute over water allocation and management among the three riparian states and the US Army Corps of Engineering (Corps), the agency responsible for the operation of four federal reservoirs. The states and the federal government agreed to seek resolution of this dispute through a comprehensive study and negotiation process that begun in 1987. The aims of the comprehensive study were to (a) conduct a comprehensive assessment of the demands for water resources, (b) conduct a comprehensive assessment of the historic and future availability of water resources, (c) develop implementable strategies to guide water management decisions, and (d) recommend an adaptive drought regulation policy. In the end, the comprehensive study largely focused on objectives (a) and (b) but failed to support the negotiation of a shared vision water allocation and management compact. As a consequence, the compact negotiation process was terminated, and the case awaits litigation in federal courts.

A more positive development is the recent passage of the Georgia Water Plan which, for the first time in Georgia's history, advocates the adoption and implementation of a statewide, proactive, and comprehensive planning process (Georgia EPD, 2008). The work presented in this seminar is part of this on-going effort.

The ACF climate and demand change assessment is based on an integrated modeling framework including consideration of all available IPCC GCM scenarios, downscaling of precipitation and temperature fields, physically based hydrologic modeling of the ACF watersheds, and river and reservoir simulation and optimization. The assessment shows that significant climate changes are likely to occur in the forthcoming decades in the southeast US with definitive implications for the currently formulated water, energy, and environmental management strategies. More specifically, 70% of the GCM scenarios lead to adverse water resources impacts including lower lake levels, water supply shortages, reduced firm energy generation, and lower instream flows. Future droughts are likely to be more intense, with the potential to exacerbate stresses and water use conflicts. Areas where additional scientific investigations are needed to improve the understanding of the physical ACF response and associated socio-economic consequences are highlighted, but in no way diminish the urgent need for technical and institutional solutions that mitigate and adapt to climate and demand change.