A HYDRO-ECONOMIC MODEL FOR INTEGRATED WATER RESOURCES ASSESSMENT

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REFERENCE: *Proceedings of the 2011 Georgia Water Resources Conference*, held April 11–13, 2011, at the University of Georgia.

Abstract. This article presents a detailed hydro-economic modeling tool used to assess potential economic tradeoffs of alternative water resources management policies and development options under different climate scenarios. The tool leverages the strengths of detailed hydrological, water resources, and economic models to accurately represent the complex and multi-objective physical, management, and socio-economic decision processes in a basin.

On the supply side, detailed hydrological and water resources assessment models (including operational Turbine Load Dispatching Models, Short and Long Range Reservoir Management and River Simulation Models, Inflow Forecasting Models, Climate Change Assessment Models, and Scenario/Policy Assessment Models) are used to simulate the spatial and temporal water availability in different parts of the basin subject to inflow variability and potential climate change, water use withdrawals and returns, and system constraints imposed by different management policies. On the demand side, detailed economic models based on inductive and deductive water valuation techniques are used to derive marginal economic benefit functions for different water use sectors.

The tool is applied to the Apalachicola-Chattahoochee-Flint (ACF) basin in the Southeast US (**Figure 1**) to assess the economic tradeoffs of two alternative water resources management policies under current and potential future climate conditions. The alternative management policies are the Interim Operations Plan (IOP) used by the US Army Corps of Engineers (US ACE) and a new operational plan proposed by Georgakakos, 2010 (GT-IOP). Preliminary results (**Figure 2**) show that (a) GT-IOP clearly outperforms the current ACF water resources management policy under both historical and future climates; and (b) the ACF basin is likely to experience significant water related economic losses due to potential future climate change unless appropriate mitigation measures are implemented.

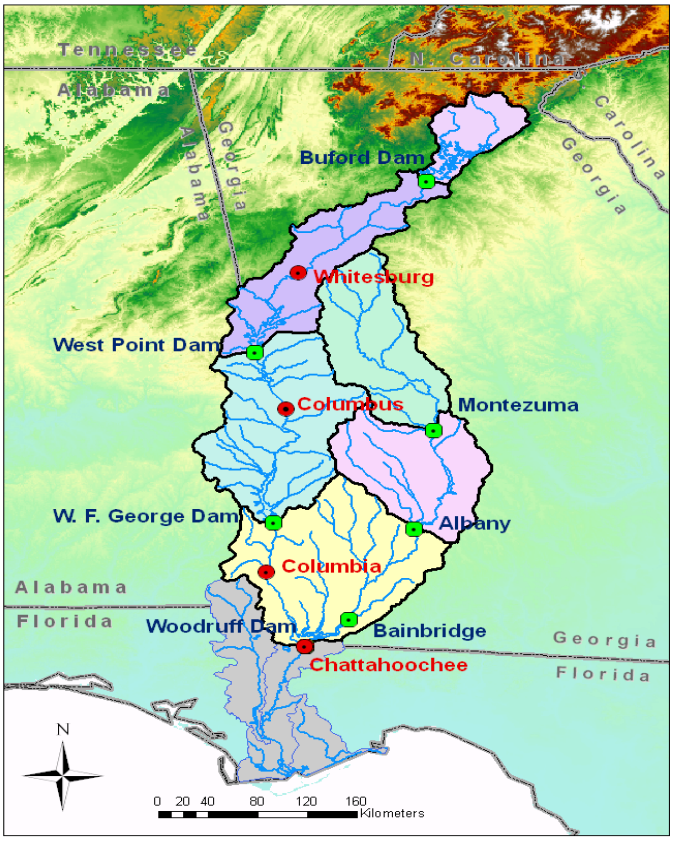

Figure 1. ACF Basin

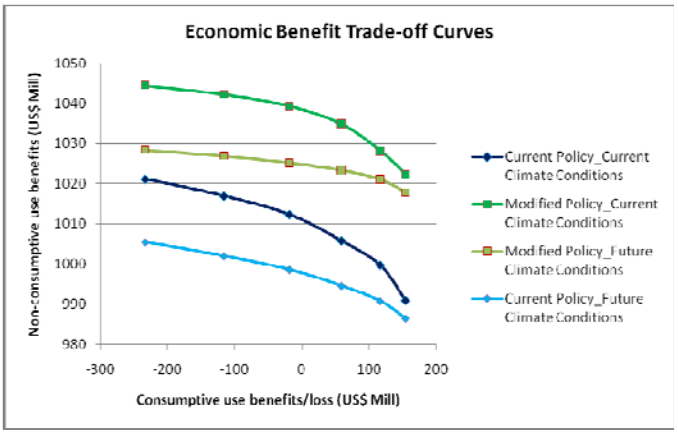

Figure 2. Economic Tradeoff Curves of consumptive and non-consumptive ACF water uses under (a) Historical vs. Future Climates and (b) Current (IOP) vs. Improved (GT-IOP) Operational Management Policies.