

FORECASTING COSTS OF MEETING FUTURE WATER DEMAND UNDER CLIMATE VARIABILITY AND SOCIOECONOMIC CHANGE

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Sea-level rise, population growth, and changing land-use patterns will pressure Florida's already constrained groundwater and surface water supplies in the coming decades. Significant water supply and water demand management investments are needed to ensure sufficient water availability for human and natural systems. Section 403.928(1)(b) of the Florida Statutes requires estimating the expenditures needed to meet the future water demand by 2040 and avoid the adverse effects of competition for water supplies. This study considered the 2020-2040 planning period and forecasts (1) future water demands and supplies and (2) the total expenditures necessary to meet the future water demand. We develop an integrated framework that combines statistical and machine learning techniques to forecast future water demand in Florida and expenditures needed to meet the demand. County records and projections on weather, water use, and socioeconomic data from the U.S. Geological Survey, Florida's Water Management Districts, the Florida Legislative Office of Economic and Demographic Research, and the Florida Department of Environmental Protection are used to evaluate the influence of weather and socioeconomic factors on water use and expenditures, with a series of cross-validation and sensitivity tests used to evaluate the robustness of perceived effects. The findings show that the total water use is projected to increase by 843 million gallons per day (+13.5%) by 2040, driven primarily by urbanization. Cumulative expenditures for the additional water supplies by 2040 are estimated at \$1.7 billion, with the projected Florida state expenditure of \$327.5 million. However, the expenditures could be reduced to \$163.8 million when considering the water conservation potential. This study highlights the need to develop effective local, regional, and state funding strategies to finance additional water supply infrastructure. We also show that consistent water demand and supply data available on a regional level can enhance the forecast development across a full range of spatial and temporal scales.

PRESENTER BIO: Dr. Dat Tran is an environmental economist. Before joining the Florida Legislative Office of Economic and Demographic Research, he was a postdoctoral scholar at the School of Public Policy, University of California, Riverside. He has extensive experience with the economics of land use and water management. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of EDR and/or USDA. No official agency endorsement should be inferred.