

# DEVELOPING A FRAMEWORK FOR REGIONAL WATER PLANNING IN SOUTH CAROLINA

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**Abstract.** Population growth and economic development, coupled with recurring droughts and uncertainties regarding climate change, are highlighting the need for improved management of South Carolina's water supplies. Because water use, availability, hydrology, and growth patterns differ throughout the State, a single, statewide water-resources management strategy is likely to be too broad to effectively manage the water resources everywhere in the State. More effective water planning could be accomplished by dividing the State into several water planning regions and developing a comprehensive water management plan customized for each planning region.

The South Carolina Department of Natural Resources (SCDNR), as part of its effort to update the South Carolina Water Plan, is in the process of developing a framework that describes how this regional planning process might be accomplished, what the planning regions should be, and the composition and duties of the various groups involved in the planning process.

SCDNR recommends that South Carolina be divided into several regional water planning areas, each having its own water-management plan customized for that particular area (Figure 1). These regional water planning areas should be aligned with the eight regions used in the Watershed Water Quality Program administered by the South Carolina Department of Health and Environment Control (DHEC). This will enhance the opportunity to integrate water-quality and water-supply planning and management programs and will result in a more comprehensive approach to statewide water planning. Further subdivisions of planning regions may be warranted in the future, as additional data and information are collected and if refinements become necessary to account for changes in water use and source development.

SCDNR recommends a bottom-up approach to regional water planning that allows for collaboration with the general public and stakeholders who have a vested interest in the water resources of the region. Involving citizens and stakeholder groups in the planning process will likely improve the plan and result in a more widely acceptable outcome. SCDNR recommends the establishment of regional water

planning groups for each planning area. At a minimum, SCDNR recommends that the following interest groups be represented in the regional water planning groups:

- 1) general public,
- 2) counties,
- 3) municipalities,
- 4) industries,
- 5) agricultural interests,
- 6) environmental interests,
- 7) small businesses,
- 8) electric generating utilities,
- 9) water utilities.

The natural planning unit for surface water is the river basin; however, the natural planning unit for ground water is the aquifer. To address those differences, SCDNR recommends that ground water be managed at the aquifer level. Water assessments of each aquifer should be made and ground water should be managed cooperatively among all regional water planning groups whose planning areas overlie the aquifer. Because aquifers often cross regional planning boundaries, effective ground-water management may necessitate a higher level of statewide planning and coordination among neighboring water-planning regions.

Before water plans can be developed, assessments of surface-water and ground-water availability will have to be made for all regions of the State. For surface water resources, computer-based hydrologic models that simulate flow conditions of the major rivers and tributaries will have to be developed for each basin. Streamflow data collected from past and present U.S. Geological Survey (USGS) stream gages located in the basin will be the main source of data for the models. Models will be used to predict the magnitude, frequency, and occurrence of future surface-water shortages and will be used as decision-support tools to formulate supply and demand strategies to meet future demands of the basin. Ecological flows and local drought management plans can be incorporated into the model to evaluate the effects that withdrawals have on the ecology and to evaluate the effectiveness of drought plans.



**Figure 1. The recommended eight initial water-planning regions in South Carolina.**

SCDNR recently obtained State-appropriated funding to support the development of surface-water models for each of the eight major river basins in the State and will be working with DHEC to oversee their progress. Model development is expected to begin in late 2012 and be completed by the end of 2014.

Ground-water flow models will also be needed to assess ground-water availability of the major aquifers and to predict impacts of future pumping scenarios. These models will be developed from an analysis of current and historic ground-water data obtained from monitoring wells, aquifer tests, and other hydrologic analyses. SCDNR and the USGS recently (2010) completed a statewide ground-water flow model of the Coastal Plain that may be used as a foundation for more localized and detailed ground-water

modeling.

The value of the modeling is that it will provide planners and stakeholders with an important tool to evaluate future demand scenarios and future management practices to determine how best to manage and optimize the water resources of the basin. An accurate assessment of water availability is one of the keys to successful water planning and should be done prior to the commencement of water planning. Another important component that should be undertaken prior to the actual planning process is the development of water-use projections. Water-use projections are used in conjunction with the hydrologic models to determine where and when potential shortages will occur in a planning region. Water demand forecasting is a challenging task, but projected water use is an integral part of a regional

water plan. Accurate water projections are needed to determine if a region's available water will meet present and projected demands.

Future water demand will be dependent on a variety of future economic and demographic conditions including growth or decline in industry, the conversion from industry to commercial enterprises, increased energy needs, population growth, changes in average income levels, climatic conditions, and future water pricing structures. Water-use projections should also take into account appropriate water conservation practices that could be implemented in the future as well as improvements in water use efficiency. Forecasts should be recomputed periodically at some predetermined interval, every 5–10 years for example, and should extend out to a 30–50 year period. Updating the forecasts every 5–10 years allows for the validation of computed water-use projections and for any appropriate revisions or adjustments to be made.

Water-use projections are typically made for four categories of water use: public water supply (which may include commercial and industrial users connected to a public water supply) and self supply (private wells); industry; irrigation (agriculture and golf course); and energy. Because South Carolina shares three of its four major basins with its neighboring states, South Carolina will need to work closely with Georgia and North Carolina to determine water-use projections for those planning areas that border or extend into those other states.

After the surface- and ground-water models are developed and water-use projections are made, the technical information will be available on which to make informed water-planning decisions. Areas likely to experience potential water shortages or other problems can be identified, and the regional water planning groups can work to develop and evaluate proposed management strategies that will address these anticipated problems.