

TR-162

Water Supply Planning Using an Expert Geographic Information System

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An expert geographic information system (expert GIS) for long-term regional water supply planning has been developed. This system has been evaluated through a case study examining a 19-county study region in South Texas with several water supply sources and demand centers. The planning system is comprised of an expert system, which contains the logical rules and expertise of water resources planning experts; a geographic information system, which stores and analyzes spatially distributed water supply and demand data; and a network flow solver, to balance the flows in networks developed by the expert GIS with input from a water resource analyst. Commonly available water demand forecasts and water supply data are used in this new planning tool in an attempt to follow more rapidly the logic of current methods and permit plans to be updated and alternatives to be analyzed. Given annual yields for reservoirs, water demand forecasts and institutional requirements, the expert GIS calculates potential water supply deficits or excesses and suggests efficient and cost effective alternatives for developing additional water supplies in the event that deficits occur. The expert GIS system has been developed so that it can be expanded to include additional constraints and handle large water resources planning regions. Eventually, the system will be capable of analyzing entire river basins, given appropriate information concerning the supply and demand for water. The system has been successfully applied to the TWDB Coastal Bend planning region. The existence of generic categories of rules for regional water planning is evident from this case study. The categories include rules applicable on a statewide basis, a regional basis or a local basis. The local scale rules are specific to individual arcs in the network model representation and need to be entered individually. However, the application of the small sets of statewide and regional rules is sufficient to generate relatively realistic solutions.

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