Desalination – A Texas Perspective

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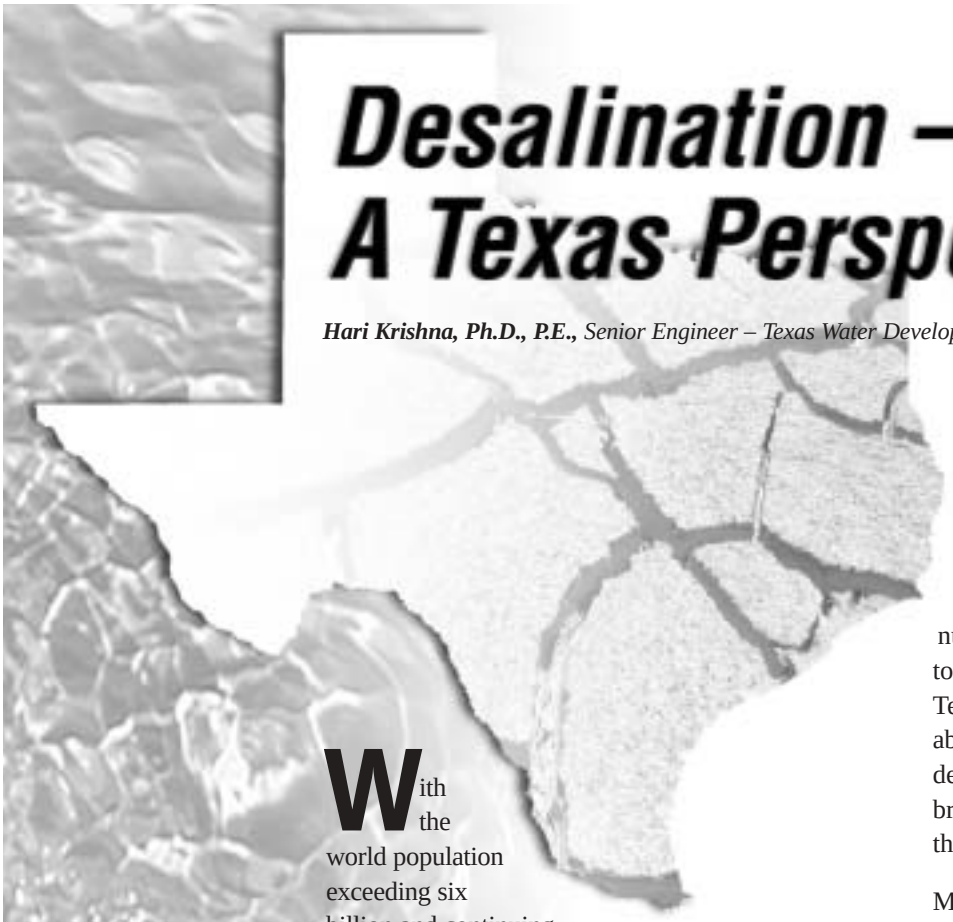

With the world population exceeding six billion and continuing to grow rapidly, there is ever increasing pressure to satisfy the growing municipal, agricultural and industrial water demands of society. Since fresh water resources account for less than three percent of the entire global water budget, it is becoming necessary in many regions of the world to explore seawater desalination to meet future water demands.

Closer to home, the population of Texas is expected to double in the next 50 years. The 2002 Texas Water Plan indicates that about 900 cities and water user groups in Texas, representing nearly 38 percent of the state's population, could face water shortages during droughts within the next 50 years unless they reduce demand or develop additional water sources. According to the 2002 Texas Water Plan, supplies from existing water sources in Texas are expected to decrease 19 percent, from 17.8 million acre-feet per year (mafy) in the year 2000 to 14.5 mafy in 2050. While the available supplies are expected to decrease, municipal demand is projected to increase by 67 percent, and manufacturing demand is expected to increase by 47 percent over the next 50 years.

Desalination Solutions Widespread in Texas

The gap between diminishing supplies and increasing demands can be met through conservation strategies, by producing new supplies of water such as desalinated water, or through a combination of both methods. According to the International Desalination Association, the United States is ranked as having the second largest total desalination capacity of any country in the world. This is due to the numerous inland desalination plants that are used to treat brackish surface water and groundwater. In Texas, more than 100 desalination units produce about 40 million gallons per day (mgd). All desalination plants in Texas currently use either brackish surface water or brackish groundwater as their raw water source.

Municipal desalination in Texas accounts for 23 mgd while industrial desalination is approximately 17 mgd. Prominent municipal desalination sites in the state using surface water as their raw water source include Sherman (Lake Texoma), Robinson (Brazos River), and Lake Granbury, while Ft. Stockton and Kenedy use brackish groundwater.

Reverse Osmosis (RO) desalination systems are currently the most commonly used systems in Texas. Regardless of the technique employed, desalination offers many benefits and advantages over other conventional forms of water resource development. The most important advantage is that desalination provides a relatively drought-proof water resource. There is no need to build expensive dams or reservoirs nor deal with issues such as land submergence and flooding.

In Texas there are currently several private and public partnerships in desalination projects. In West Texas, the City of El Paso Water Utilities and Fort Bliss are collaborating to build the country's largest brackish groundwater desalination plant for municipal use. The 29 mgd Eastside Brackish Groundwater Desalination Plant will treat brackish groundwater from the Hueco Bolson aquifer and will provide about one-fourth of the city's water requirement. The Texas Water Development Board (TWDB) is partnering in the project by providing a $1 million low-interest loan for

the planning and preliminary design. There is likely to be an additional federal contribution for this project.

In North Texas, the City of Wichita Falls plans to complete this year a 15 mgd microfiltration and RO plant using water from Lake Kemp. In the Lower Rio Grande Valley, Harlingen has been using an RO plant to produce 3 to 4 mgd of good quality water for the local garment industry, using wastewater as the raw water source. The Southmost Regional Water Authority in Cameron County is currently building a 7.5 mgd desalination plant using brackish groundwater.

In the 2002 Texas Water Plan, desalination is recommended as a water management strategy to produce additional water supplies in four regions. The Far West Texas Region and the Coastal Bend Region use desalination of brackish groundwater as a strategy, while the desalination of coastal waters is recommended by the South Central Texas Region. Region B includes desalination in two recommended water management strategies. In addition, four other regions – Plateau, Rio Grande, Lavaca and Region H – include topics such as research and development of desalination and conducting feasibility analyses for new desalination projects. Thus, a total of eight out of 16 regions in Texas have expressed their interest in desalination-related projects.

Upcoming Desalination Projects

As demand for water increases and fresh water resources are depleted, desalination is likely to become increasingly important. Texas Governor Rick Perry tasked the TWDB in April 2002 with developing a recommendation for a large-scale demonstration seawater desalination project. His initiative paved the way for the state to gauge the level of interest and willingness from key municipalities and private developers in implementing desalination projects, and to identify potential sites for seawater desalination.

The TWDB, with input from members of the Regional Water Planning Groups and other water-industry representatives, created a process to formulate screening criteria and develop recommendations. In September 2002, the TWDB issued a request for Statements of Interest (SOI) and provided screening criteria for public and private entities to submit proposals for consideration.

In response to the request for SOIs, the TWDB received 10 project proposals, including one research-only proposal. In addition to those, three in-house proposals were prepared. A team of seven technical staff from the TWDB and the U.S. Bureau of Reclamation carefully reviewed all SOIs.

After review, the TWDB recommended the following three proposals:

1. The Freeport Desalination Project, submitted by Poseidon Resources and the Brazos River Authority, for a 25 mgd seawater RO desalination facility, to be located at the Dow Chemical complex in Freeport. The proponents requested state financial assistance to cover only the cost of product water conveyance.
2. The Corpus Christi project, submitted by the City of Corpus Christi, for a 25 mgd plant.
3. The Lower Rio Grande Valley project, submitted by the Port of Brownsville, Brownsville Public Utilities Board, and the Southmost Regional Water Authority, also for 25 mgd.

For Corpus Christi and the Lower Rio Grande projects, the TWDB recommended site-specific feasibility studies of a regional water-supply nature. Specific recommendations included:

1. Assessing combined uses of seawater and brackish groundwater sources to enhance the cost competitiveness of a desalination project.
2. Identifying and assessing regional partnerships that could include local entities with experience in desalination research.
3. Identifying and assessing water transfers resulting from net new water created by a desalination project that could enhance project benefits to other large water users or municipalities throughout the Coastal Bend, Lower Rio Grande, South Central and Lower Colorado planning regions.
4. Identifying and assessing power sources, expected costs and, if from a co-located facility, describing the impact of current and proposed regulations on use of this source, plus costs.
5. Assessing project funding and development alternatives.

Additional information on the demonstration desalination proposals and the recommendation report to the Governor is available on the TWDB web site, www.twdb.state.tx.us. Contact Hari Krishna at Hari.Krishna@twdb.state.tx.us