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THE CHALLENGE OF MEETING SOUTHWEST FLORIDA'S WATER SUPPLY NEEDS

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Safeguarding Florida's water is assigned to the five water management districts that collectively encompass the state. The Southwest Florida Water Management District, with jurisdiction in 16 of Florida's 67 counties, concentrated during the past decade on cataloguing and regulating groundwater use which meets approximately 90 percent of the District's needs (excluding power generation, much of which uses brackish water) [15]. Ultimately it is the District's responsibility to oversee competition for water supplies. Its strategy centers on preserving the natural features that hold and replenish fresh water and to foster innovations to allow the available supply to serve more people.

The Major Issues

Meeting the water requirements in southwest Florida calls for determining what long-term water demands likely will be and then planning to develop the supply sources to meet those demands. A growing population punctuates this importance. Certain factors help to predict water needs. Public supply is influenced by local zoning policies, economic conditions, and other development incentives. Agricultural water use depends on availability of suitable lands, local rainfall, soil types, and the crop type. Southwest Florida's largest industrial use is phosphate mining and processing, which is just emerging from a severe slump caused by the national economy. Good water supply planning is still in its infancy in much of southwest Florida.

Once water demands have been defined, the problem is minimizing impacts to the resource as well as balancing the limited freshwater supply among users. Major wells and well fields in southwest Florida can cause drawdowns in the deep Floridan aquifer and the shallow water table. In drought or peak demand conditions these can impact neighboring wells, lake levels, and stream flows. Over a long term the stress can harm crops, change prevalent vegetation, or even destroy plants dependent on a high water table. Poorly managed pumping in some coastal areas can allow salt water to seep into the fresh aquifer.

Many of Florida's highly populated coastal communities import fresh

water from areas inland because of coastal saltwater intrusion. This means fresh water is transferred across natural watersheds and political boundaries and is not returned to its original basin. Without proper control, this can cause an imbalance and make future water supply more expensive to the people of the contributing basin. Some coastal cities are supplied by river reservoirs and are concerned about development encroaching on their watersheds. Too much drainage of wetlands, besides upsetting flood management, threatens the area's crucial aquifer recharge that is dependent on precipitation.

Background Information

Between 1970 and 1982, public supply and rural water demands increased by 62 percent in the Southwest Florida Water Management District. Another 48 percent increase in demand is predicted by the year 2000 [16]. Largely because the phosphate industry instituted recirculation systems between 1975 and 1980, industrial use dropped by 38 percent between 1970 and 1982. We also expect to document reductions in phosphate industry water use in 1983 because of reduced production in the wake of a depressed fertilizer market. Agricultural water use, the largest single category, has remained about the same since 1970 [6; 15]. In summary, total water use, except for the brackish water used for power generation, has remained about the same during those past 12 years. In this time frame, reductions in industrial use have offset the increase in public supply needs.

In Pinellas and Hillsborough, the two urban counties surrounding Tampa Bay, and the rapidly growing, water-rich Pasco County to the north, water supply planning is the responsibility of the West Coast Regional Water Supply Authority. While its water use is permitted through the Southwest Florida Water Management District, the Authority develops and operates wholesale public supplies to meet the growing demands in the three-county area [23]. Tampa and St. Petersburg, as well as the three counties, make up the Authority's voting membership. Two other water supply authorities formed by inter-county agreements are picking up similar responsibilities in the northern and southern parts of the District.

We have a better appreciation for the dynamics of coastal hydrologic systems than a decade ago and the knowledge to better manage the resource. The District now has the capacity to statistically analyze information such as rainfall, water level, well construction, and pumping records collected over that decade, forming a regional water picture. The District can foresee problems and prescribe mitigating action. Leading into the districtwide drought of 1981, hydrologic data collection and analyses provided enough warning to trigger a water shortage program before conditions were made worse [17]. Computer modelling allows drawdown predictions around large well fields even before they are built. Still, there are problems mainly where concentrated coastal

populations are competing with other water users in the interior. The competition for water will keep growing unless innovations for assuring adequate supply are pursued.

Options for Resolving the Problems

Water supply problems vary throughout the 10,000-square-mile District. The search for solutions shows some under way and others in need of investigation. Discussed here are specific options which might also work elsewhere.

- *Water Conservation and Reuse* — The city of Orlando has demonstrated that retrofitting existing homes with inexpensive water-saving devices reduces household water use by about 18 percent and offsets the need for multimillion-dollar water supply and treatment expansion [10]. Through reuse, the phosphate industry cut its water requirements by 47 percent from 1970 to 1983 while production increased by 32 percent, reflecting industry growth despite the economic slump [9]. Leak detection and repair in many public utility systems has resulted in substantial savings, though much more is still needed. Systems leaking 10 to 15 percent are not uncommon. In a major reuse effort, the city of St. Petersburg has installed a secondary water system, supplied by highly treated waste water, for non-potable needs such as lawn irrigation. Agriculture continues to experiment with low-volume irrigation systems and watering at night to cut evaporation. Conversion costs must be considered here, and research necessarily centers on each crop type. The Water Management District's consumptive use permit program is an important tool to prompt water conserving activities by means of stipulations attached to permits. State and federal financial incentives also would help. Utility rate structures other than those encouraging high water use could be a major breakthrough. Water conservation education is important, especially in light of the tremendous influx of residents who are unfamiliar with southwest Florida's water resources. Water conservation is one option that has not been taken very seriously in some areas but has a great potential to offset some of the climbing water demand.

- *Long-Range Planning for Needs and Sources of Water Supply* — Perhaps the single greatest error water managers can commit is waiting until a water need is upon them before beginning to search for solutions. Often this means the *easiest* solution is sought as opposed to the *best* solution. A regional water supply authority can serve as the seat for planning. A strong consumptive use permit program requiring long-term plans and periodic updates from users big enough to impact the resource is a very important tool in our District. The use of the lowest quality water appropriate for a given end — such as using brackish water in cooling towers — preserves clean water for drinking.

One of our most significant long-range planning activities is buying land for various water management purposes including natural recharge protection and future wellfield development. The District is matching state "Save Our Rivers" money to buy land along the Withlacoochee, Hillsborough, Braden, and Myakka Rivers [18].

In the past two years the Florida Legislature has passed significant water protection measures. The Water Quality Assurance Act of 1983 and the Wetlands Protection Act of 1984 were centerpieces of the past two sessions. The first addressed ground water protection and hazardous wastes; the second recognizes the importance of our wetland areas in maintaining both quantity and quality of the entire water regime.

A state and regional growth management planning framework was mandated this spring. The state's Local Government Comprehensive Planning Act of 1975 needs teeth to protect water and land. Local utilities should be required to plan ahead and to use local water supplies as efficiently as possible before being allowed to consider outside sources.

- *Converting Salt Water to Potable Supply* — Reverse osmosis is expensive because of energy requirements, but strides have been made to reduce the cost of treating highly mineralized water for potable use. The common sense approach has been to treat brackish ground water having a lower mineral concentration than sea water [1]. This makes the cost more competitive with conventional sources. Government funding for test facilities could help. Successful reverse osmosis plants are used in the cities of Sarasota and Venice and by numerous private suppliers. As this source becomes more economically competitive with conventional sources, demand may be eased on limited freshwater supplies.

- *Building Flexibility into Water Supply Systems* — Unforeseeable problems such as drought or unusual seasonal demands often ruin the best laid plans for adequate water supply. This makes system flexibility highly desirable. There are several innovative techniques for such flexibility. Manatee County has built a "recharge/recovery" system to augment its water supply. When the Manatee River Reservoir is high after the summer rainy season, water is recharged through a well to the underground limestone formation which stores water high in natural elements such as sulfates and chlorides. The "bubble" of fresh water can be recovered months later since groundwater movement is very slow. This eases peak demand on the reservoir during the dry season [2]. The city of Tampa is drawing drinking water from the Tampa Bypass Canal, which was built for flood control but is now serving a supply function, too. The city is experimenting with diluting treated wastewater in the canal, and then withdrawing like

amounts from peripheral wells. Such local standby options minimize the need to import water across hydrologic or political boundaries.

● *Improved Regulation and Coordination* — It is difficult to separate water quality from water quantity. For example, increasing the permitted withdrawal from a river may change the wasteload allocation permitted downstream. Two different agencies issue the permits involved in this example. Coordination between Florida's water management districts and the Department of Environmental Regulation has grown into shared office space, cross use of people and equipment, and permanent, mutual liaison positions. Every attempt is being made to standardize new wetlands protection activities. Some water quality duties have been delegated to the water management districts, and this District is under contract to design groundwater monitoring to safeguard wells against pesticides and other hazardous wastes. The District has adopted increased surface water management regulations to help protect the state's water resources against permanent damages from encroaching development. We plan a refinement to handle the demands of strip mining and land reclamation by this time next year. Also under consideration for next year is the common sense approach of consolidating regulation of various water-related activities, sometimes with conflicting priorities, so that all aspects are viewed on one permit application.

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WORKSHOPS

WATER QUALITY EDUCATION

WATER ALLOCATION

**WATER DEVELOPMENT -
A POLICY EXERCISE**

