The Consequences of Aquifer Pumping

Preston H. Haskell

Among the most important issues facing Floridians today is the threatened condition of state waters and waterways. Polluted rivers, diminished lakes, and disappearing springs place our quality of life and economic vitality at serious risk. Not fully understood, however, is the phenomenon which is causing low water flow from our springs to our rivers and lakes: overpumping of the Biscayne and Floridan aquifers. Overpumping has lowered the aquifer levels and artesian pressures, which in turn have reduced surface water flow from the springs. Diminished springs have correspondingly reduced river flow, which has increased pollution from fertilizer and surface nutrients. Overpumping has also made our aquifers susceptible to saltwater intrusion, increased the potential for sinkholes, and caused damage to our wetlands.

For decades, this phenomenon eroded our aquifers slowly and almost unnoticed, but in recent years has become an alarming condition. Groundwater consumption statewide has grown from 614 million gallons per day in 1950 to over 4,200 in 2005. While this rate of increase has moderated somewhat in recent years due to mostly voluntary conservation measures, the exhaustion of those measures and continued population growth will lead to unsustainable levels of water consumption and even greater environmental damage unless the issue is intelligently and thoughtfully addressed.

Recent attempts to remedy this situation have included both usage reduction measures and new supply alternatives. Usage reduction has been limited to small, voluntary and inadequate measures such as shorter showers, low-flush fixtures, alternate day watering, and eco-friendly plants. Admirable and well-intentioned as these are, they have finite potential, are difficult to enforce, and further consumption decreases resulting from them will be relatively small.

New sources of supply implemented over the past two decades have principally included desalination and wastewater reuse. Both, however, carry high price tags. A desalination plant of moderate capacity costs several hundred million dollars and consumes large amounts of electricity. Wastewater reuse requires extensive treatment as well as installation of distribution piping whose cost is prohibitive except in new subdivisions. Over time, these costs will come down somewhat, but will remain far more expensive than aquifer water.

Sadly, the most effective and efficient dynamic of all for reduction in groundwater use has received almost no debate, discussion, or even mention: market pricing for aquifer withdrawals. In any situation where demand exceeds supply, the pricing mechanism is the most valuable tool available. Charging a price for aquifer withdrawals at the wellhead will discourage waste, incentivize the development of new sources, raise new revenues, and bring discipline and economic efficiency to the allocation of our groundwater resources. This in turn will restore our springs, rivers, lakes and groundwater to their natural condition, while assuring adequate water availability for responsible users well into the future.

Under current policy, virtually any water utility, farmer or industrial concern – even a homeowner – can obtain a permit to drill a well and thereafter withdraw almost unlimited quantities of water from the Biscayne or Floridan aquifer for free. But if charged a market price for consumption at the wellhead, these users will adopt less wasteful practices and seek alternate sources. Technologies and methodologies exist for water use reduction at relatively low cost, but there is presently no economic incentive for implementing them. If faced with either paying a price at the wellhead or undertaking water-saving measures at a lower cost, most will opt for the latter.

Indeed, numerous consumption-reducing methodologies which would be more economically attractive currently exist. Spray irrigation, both agricultural and residential, can be replaced with drip, bubble, soaker, and seepage methods. Process technologies, including water reclamation and reuse, can vastly reduce industrial water use. Commercial buildings, both new and existing, can be fitted with green roofs, cisterns, condensate reuse systems, pervious pavements, and other water reuse and reduction methodologies. Households can reduce lawn watering, car washing, and inside use, as well as detect and correct wasteful leaks.

Studies have indicated that agricultural spray and flood irrigation – which constitutes approximately 40 percent of all aquifer water use - can in most cases be replaced with lower-consumption alternatives for approximately $0.40 per thousand gallons consumed over their useful lives, and other measures cited above would cost up to $1.00 per thousand gallons or in some cases more, depending upon specific circumstances. The lower-cost measures would be exploited first, and even where economic payback is less favorable, usage reduction by commercial and industrial users can be influenced by such factors as image, community relations, and customer expectations.

To incentivize such usage reduction measures, pricing of water in a range of $0.50 to $2.00 per thousand gallons would be reasonable and effective. In this structure, residential usage would be progressively priced, with the lowest rates for basic necessities and higher ones for large quantities; nonresidential users' rates would be determined by economic payback and other financial factors. Both economic theory and empirical evidence suggest that if aquifer water were carefully and analytically priced within this range, a reduction in use of 15 to 20 percent would obtain over a period of three to five years. Indeed, most of this could be accomplished by reducing agricultural irrigation water use by one-third, a readily achievable number. Such a

reduction would return aquifer withdrawals to 1982 levels, which would largely reverse the environmentally destructive effects being experienced today.

The state revenues resulting from such a price on aquifer withdrawals could amount to between $1.0 and $1.3 billion annually, depending upon the exact price structure and actual reductions in water use. This revenue would be available for, among other things, restoration and protection of the natural resources which have been ravaged by unrestrained withdrawals from the aquifers. Up to a certain point, even higher groundwater prices would further reduce consumption and increase revenues.

All of this constitutes a win-win-win for Floridians. First, environmental destruction will be reversed by reduced withdrawals. Second, state revenues for environmental protection will increase by sensibly pricing the remaining withdrawals. Finally, the overall economics of water production and use will ultimately be enhanced as cost savings exceed the price of withdrawals.

Water is a state resource, and our Legislature is responsible for making water policy. However, special interests have long opposed paying a price for this valuable commodity, leading us to the dilemma we face today. Thus the solution lies in galvanizing public opinion to cause legislative action that places a reasonable price on groundwater withdrawals. More than any other solution available, this will rapidly lead to restoration of our damaged rivers, springs, lakes, and wetlands, ensuring good and sufficient water supplies to be intelligently utilized for decades to come. To do otherwise will result in unacceptable impacts upon our unique and precious environmental resources and will make the ultimate cost of resolving these issues far greater than that which immediate and responsible action will.