CONSERVATION AS A CRITICALLY NEEDED WATER SUPPLY SOURCE

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Abstract. Despite increasing controversy over water supply and water quality in Georgia, there is no state-mandated approach to conservation. Since three sectors (agriculture, power production, and industry) dominate water demand, using over 80% of the total (billions of gallons of water a year), even marginal improvements in water efficiency by these sectors could reap huge economic and environmental benefits. Yet, the state's emphasis on water conservation promotion is in domestic use, which has limited potential compared with uses for industry, agriculture, and power production. The feasibility of achieving such advancements is unknown, but given the costs and environmental risks of meeting accelerating water demand, comprehensive exploration and assessment of conservation alternatives is amply justified. The paper further develops this argument and proposes policy initiatives for achieving much needed water conservation measures in Georgia.

INTRODUCTION & BACKGROUND

Surface water, ground water, and wetlands are interconnected resources that are vital to our ecosystems. There are many indications that these water resources are already being overused. For example, on the coast, by dedicating too much groundwater for one type of user (industry), we have greatly reduced the capacity of the Upper Floridan aquifer to provide potable drinking water for continued population growth. This increases the costs of providing water from other sources needed to sustain growth, while also jeopardizing aquatic and marine ecosystems that suffer from the loss of fresh water outflow from artesian wells, especially during drought.

Similarly, the dominance of power production as a user of surface water is staggering – at least half of Georgia's non-agricultural water use is allocated for this single purpose. And, although conventional fossil fuel power plants 'consume' a relatively low portion of that water by conversion to steam, nuclear plants return as little as 40% of the water used for cooling to the source from which it is taken. Given the volume of water in question, the total amount consumed in energy production is hundreds of millions of gallons daily – representing a tremendous savings potential if sufficient conservation efforts are made.

Because such massive amounts are pumped for industry and energy production, if more efficient methods could reduce water use by just 10%, enough water could be saved to support population growth for years, without over-exploiting water resources. Conserving water allocated to major users could greatly reduce risks to aquatic life and help enhance water quality by improving ecosystem functions. The extent to which these benefits are realized depends on: (1) whether new water demands are located in areas that have sufficient water supply from sources that are well above ecosystem requirements, and which may be replenished by such conservation, and (2) if water conservation plans and pollution controls are rigorously applied. At the same time, benefits to public health and nature-based jobs could be gained, if development is carefully guided by locational decisions and sites designs that favor water conservation and protection. Further, it is quite likely that the cost of realizing these conservation improvements would be substantially less than testing, tapping, and treating water from other sources, like deep aquifers and sediment-laden surface waters.

CONCERTED CONSERVATION LACKING

Given current priorities, the absence of a strong commitment to water conservation in state policy is conspicuously puzzling, if not worrisome. Before moving to further exploit our rivers and aquifers as water supply sources, surely it is in our interest to carefully examine the feasibility of achieving more efficient use among the major water-using groups. Existing state policy makes very weak allusions to conservation, which must be corrected with more follow-through and fact-finding, using a reliable, comprehensive approach.

While state law requires conservation plans as part of the withdrawal application process for all major users (over 100,000 GPD), these plans are seldom if ever used by EPD in making permitting decisions. As a result, there seems to be little discipline applied in implementing or monitoring such plans.

Likewise, significant amounts of state funding have been dedicated to needed research on the Floridan aquifer, developing criteria for surface water pollution discharge, and other aspects of water resource management. But no comparable investment had been made in study of conservation feasibility. County water-supply planning requirements imposed by the state through the Interim Strategy for the Upper Floridan Aquifer include a conservation element, but here again, EPD makes no effort to evaluate or advance plan implementation in the permitting process

To date, state-sponsored conservation efforts have been primarily limited to education promoting more responsible water use, primarily targeted at residential (domestic) users, a relatively small segment of total water demand. To its credit, the Pollution Prevention Assistance Division of DNR provides water efficiency services for businesses and institutions, but these are no substitute for wide-ranging water conservation feasibility study across all major user groups. Similarly, current research on methods for improving efficiency of agricultural irrigation is encouraging, but in itself insufficient.

There has been no comprehensive study of water conservation alternatives, nor any analysis of the feasibility of achieving improved efficiency in water use by those sectors using the lion's share of our resources. Investment in even marginally upgraded processes for agriculture, industry and power producers could conceivably generate benefits far greater than any comparable policy intended to help meet growing water demands.

Due to their massive combined demand, even modest improvements in the efficiency of water use in these sectors would achieve far more effective results than proportionally larger conservation gains made by other user groups. Based on the most recent state data and estimates, a 10% advance in efficiency by power companies, agriculture and industry could be equivalent to as much as a 75% improvement by municipal, residential and non-industrial commercial users, depending on respective 'consumption' factors that would be disclosed by study being recommended.

SOME EXAMPLES & CONSIDERATIONS

Cooling water is needed in large quantities for conventional power generation methods (fossil and nuclear fuels) and for many industrial processes.[A] For years, hybrid cooling systems have been available, which combine water and air to extract waste heat, thereby reducing water needed for cooling. Also potentially feasible are multiple-stage water recycling processes that recapture and filter water after it has been used in industrial operations. In agriculture, much progress has been made with drip irrigation, but the type of equipment used in tilling, planting, and harvesting limits the application of this method.

Like all such technology, new processes with improved water efficiency can have considerable initial cost for capital and set-up. The degree to which it is feasible to use such technology depends on several parameters that are dynamic and often case-specific. Some of these variables are subject to the influence of public policy, which can therefore be used to induce or accelerate improvements in the efficiency of water use. Consider the following:

- Cost of capital (interest) – Lower interest rates favor borrowing to invest in new equipment *if* market and public incentives are sufficient.
- Cost (or value) of water – Placing increased priority on water management can justify tax rebates as incentives for reducing water use, or a surcharge could be adopted as a penalty for excessive use. If policy makers are resolute in their commitment to improving water-conservation efficiency, they could adopt a combination of incentives, including outright subsidy through grants, or a combination of loans and tax incentives.
- Lifespan of the new equipment – The longer the new equipment will last, the less the annualized cost of installing it. Due to changing technology, however, determining equipment lifespan may be complicated by the emergence of still newer, better alternatives that, in effect, may make the selected improvements prematurely obsolete. Once again, public policy could be structured to provide incentives to industry for upgrading when public benefits and costs justify it, based on periodic reassessment of feasibility.
- Adaptability of existing equipment (retrofitting) – Some equipment lends itself to being modified to achieve improved water efficiency at a much lower cost than replacing it altogether. This may prove to be an acceptable intermediate option to attain improvements sooner without the cost burden of major investments in complete retooling.
- Incentives for switching to new processes – Both profits and public policies can induce desired results by providing the means to pay for upgraded technology that reduces water use. But without appropriate public policy, it is unlikely that management would give priority to re-investing profits to reduce water use.

Table 1. Georgia Water Use By Sector

Amounts Shown in Millions of Gallons a Day

Supply Source	Municipal[1]	Industrial	Agriculture[2]	Total
Surface	1,087	7,291 power plants 360 other	695	9,433
Ground	199	276	902	1,377
Total Sector % of Total	1,286 11.9%	7,927 73.3%	1,597 14.8%	10,810

[1] *Includes certain industrial uses; quantities used by different customer groups on municipal water systems are not available.*
[2] *Estimated, assuming 10 inches per year per acre irrigated.* **Source: Georgia Department of Natural Resources, 2003**

- Although water pricing could be used to encourage investment in water conservation, this is an area of policy that can lead to undesired outcomes. Unless water use (or withdrawal) fees are explicitly tied to a specific user segment (and avoids any penalty for small users), it could create unintended advantages for those having greatest ability to pay.

A NEEDED STEP

Based on the experience of other states and nations, we are amply justified in pushing for aggressive state policy supporting alternative energy generation methods, which use little if any water. By replacing steam-generation plants with wind and solar technology, we could drastically reduce water demand. At the same time, we would be improving air quality by proportionate reductions in various pollutants (including mercury and sources of acid rain) as well as greenhouse gases. Moreover, this conversion would be a boon for economic activity driven by investment in new technology, further justifying state policy in its support.

In the meantime, Georgia should adopt a policy of denying permits for speculative ("merchant") power plants, which are primarily intended to serve the energy needs of other states and the profit motives of outside investors. Such projects use Georgia's increasingly scarce water resources, pollute our air, and generate only a handful of jobs. As a general policy, Georgia must reconsider how it allocates natural resources to serve the public interest. We can no longer afford to make erroneous assumptions about the benefits of private investments without more discerning assessment of their true costs and benefits to Georgia citizens. Such evaluation is both fiscally and environmentally responsible, and essential to our state's future.

CONCLUSIONS & RECOMMENDATIONS

Until a comprehensive assessment is completed, it is impossible to accurately predict the potential public benefit that is feasible by reducing water use in agriculture, industry and energy production. More investigation must be done to evaluate the technical alternatives, their costs, and the most effective means to implement the desired changes though public policy. At the very least it seems evident that additional permitting for major water withdrawals should be withheld until this investigation is carried out and policies consistent with its findings are adopted. We need to get smarter about water management in Georgia – sooner rather than later. This makes good sense for both our environment and economy.

Steps needed to achieve this include:

- Adopting and enforcing an aggressive water conservation policy by <u>requiring</u> applicants to demonstrate how they will improve water-use efficiency through implementation of conservation plans.*
- The state should adopt tax incentives, loans, and/or grants consistent with findings of a comprehensive statewide assessment of conservation feasibility by major user group,
- We must choose economic development options that are compatible with our natural environment while preserving our quality of life within the sustainable capacity of natural systems. To ensure

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(A) The amount of water 'consumed' (i.e. converted to steam and not returned to the same source) varies widely depending on the type of process used. Nuclear plants consume as much as 60% of water withdrawn; other processes consume as little as 3%.

*Conservation plans are adopted in the 24 counties that use the Floridan Aquifer, but EPD does not refer to them in making permitting decisions.

that this happens we should adopt criteria for investing state loans and grants for job creation in ways that are environmentally responsible – as indicated by water use, water protection, and other dimensions of sustainability.

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