

STATE WATER POLICY ALTERNATIVES FOR WATER CONSERVATION/EFFICIENCY AND REUSE

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REFERENCE: *Proceedings of the 2005 Georgia Water Resources Conference*, held April 25-27, 2005 at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, The University of Georgia, Athens, Georgia.

Abstract. The question addressed is: What should be the state policy for achieving water conservation and efficient water use, including reuse, and how should this policy be implemented? What requirements, if any, should be written into the permits (water withdrawal and discharge) issued by EPD to help implement the policy?

The panelists present their proposals for what the policy should be, and discuss the advantages and disadvantages of the alternative policies. The panel is intended to provide ideas and information useful as background for the public, EPD and the Georgia Water Council in preparing the state policy component of the Comprehensive State-wide Water Management Plan.

Panel Participants:

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Shana Udvardy, The Georgia Conservancy

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Moderator: Gail Cowie, University of Georgia - Vinson Institute of Government

Assistant Moderators: Lauren Burch, Public Administration, and Julia Beckhusen, Agricultural and Applied Economics, University of Georgia

Panel Organizer: Kathryn J. Hatcher, Institute of Ecology, University of Georgia.

INTRODUCTION

State Water Plan Initiative

The 2004 Comprehensive State-wide Water Management Planning Act (HB 237) requires the Georgia DNR Environmental Protection Division (EPD) to develop a comprehensive state-wide management plan for Georgia, and

to submit the draft plan to the state Water Council for review by July 1, 2007. The Water Council may modify the plan and will recommend it for consideration by the Georgia General Assembly for the 2008 session.

Section 12-5-522(a) provides that "The division (EPD) shall develop and propose a comprehensive state-wide water management plan not inconsistent with this chapter and in accordance with the following policy statement:

'Georgia manages water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens.'"

Section 12-5-522(c) provides that "The proposed comprehensive state-wide water management plan shall set forth state-wide water policies not inconsistent with this chapter which shall guide river basin and aquifer management plans, regional water planning efforts, and local water plans."

In the first meeting of the Water Council on March 2, 2005, the Water Council chair and EPD director, Carol Couch, outlined the scope of the 2005 state water plan to include "articulation of state water resources management policy issues" and "recommendations for statutes, regulations, and policies to implement plan" along with guidelines and recommendations for process of sub-state (regional) planning. A list of 42 state water issues to be addressed in the state water plan had previously been developed and recommended by the Joint Comprehensive Water Plan Study Committee (Aug. 2002).

Policy Panels Project

Five panel discussions to address state water policy issues are scheduled for the 2005 Georgia Water Resources Conference. The panels are intended to provide ideas and information useful as background for the public, EPD and the Water Council in considering several of the key state water policy issues facing Georgia. The panels are not intended to reach consensus or to make joint

recommendations....only to provide useful background information about the difficult water policy issues, the policy choices available, and the pros/cons of each choice.

The five panel topics were selected by the EPD director, who also recommended a DNR-EPD staff member to serve on each panel. Each panel consists of five panelists: a DNR-EPD representative; three panelists representing various interest groups to summarize their group's desired policy choice and view of the pros/cons for the policy choices; and a technical or legal expert, plus a neutral moderator acceptable to all the panelists, and an assistant moderator (a graduate student). The panel topics are:

1. Protection of Instream and Downstream Flows
2. Water Quantity Allocation/Reallocation among Users
3. Minimum Aquifer Levels Protection Policy
4. Water Quality Allocation (TMDL allocation policy)
5. * Water Conservation/Efficiency and Reuse Policy

Policy for Water Conservation/Efficiency and Reuse Summary of the Issue

Georgia's citizens, businesses and communities derive both economic benefit and quality of life benefits from the offstream (withdrawal) use of the state's rivers and aquifers. Withdrawal uses include indoor municipal, commercial and industrial water supply, outdoor landscape watering, golf course irrigation, agricultural irrigation, power plant cooling water. However, as population and businesses grow, each incremental increase in water withdrawal causes a reduction in benefits for the existing and future instream uses and riparian owners, and a reduction of water available for other water withdrawal uses including future uses. More efficient water use and reuse will increase the available water and its benefits for other water users, both instream and offstream.

Efficient water use is required by at least two provisions of Georgia water law. (1) Georgia's Riparian Rights doctrine, in Section 51-9-7 of O.C.G.A., provides that a riparian owner is not entitled to diminish the streamflow except for reasonable use. (2) Section 12-2-21(a) of O.C.G.A. declares the state policy that "the water resources of the state shall be utilized prudently for the maximum benefit of the people..." However, the state has not set any standard for what is reasonable use, or what water use efficiency is consistent with "maximum benefit of the people."

Policy Question

What should be the state policy for water conservation and efficient water use, including reuse, and how should this policy be implemented? What requirements, if any, should be written into the permits (water withdrawal and discharge) issued by EPD to help implement the policy?

POLICY #1 - CURRENT REQUIREMENTS FOR WATER CONSERVATION IN GEORGIA

*Compiled by: Georgia Environmental Protection Division;
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Under current statute, rules and regulations and policies, the Georgia Department of Natural Resources ("DNR"), Environmental Protection Division ("EPD") has the authority to require certain actions relating to water conservation. EPD considers water conservation the "beneficial reduction in water use, waste and loss" and a fundamental water management tool to ensure Georgia's water resources are sustainable (Couch 2005, Vickers 2001).

State Policy under Georgia Statute – Official Code of Georgia Annotated (O.C.G.A.)

It is declared to be the policy of the state of Georgia that, "the water resources of the state shall be utilized prudently for the maximum benefit of the people, in order to restore and maintain a reasonable degree of purity in the waters of the state and an adequate supply of such waters, and to require where necessary reasonable usage of the waters of the state ... To achieve this end, the government of the state shall assume responsibility for the quality and quantity of such water resources and the establishment and maintenance of a water quality and water quantity control program adequate for present needs and designated to care for the future needs of the state..." (O.C.G.A. §12-2-21(a)).

Ground-water Use Act of 1972 declares the policy of the state that, "the water resources of the state be put to beneficial use to the fullest extent to which they are capable, subject to reasonable regulation in order to conserve these resources and to provide and maintain conditions which are conducive to the development and use of water resources." (O.C.G.A. 12-5-91) (Ga. L. 1972 p.976, §2.)

The general policy for water withdrawals within the state requires a withdrawal of or in excess of 100,000 gallons of water a day receive a permit from the EPD. Applications for new or increased surface water and groundwater withdrawals shall contain a water conservation plan approved by the director and prepared based on guidelines issued by the director, except for permits solely for agricultural use (O.C.G.A. 12-5-31(d) and 12-5-96(a)(2)). Further, it is determined that applications for surface water withdrawals will be evaluated based on a water development and conservation plan for the applicant or for the region. Such water development and conservation plan shall "promote the conservation and reuse of water within the state, guard against a shortage of water within the state, promote efficient use of the water resource, and be consistent with the public welfare of the state" (O.C.G.A. 12-5-31(h)).

For a groundwater withdrawal permit of or in excess of 100,000 gallons a day to be granted, EPD or the Board of

Natural Resources shall consider a regional water development, conservation and sustainable use plan, where applicable (O.C.G.A. 12-5-96(d)(9)). Such a plan may be developed by the EPD or a party designated by the EPD. It shall “serve to promote the conservation and reuse of water within the state, guard against shortage of water within the state and region, and promote efficient use of water resource...” (O.C.G.A. 12-5-96(e)).

Regional Plans

Metro North Georgia Area. In 2001, the Georgia General Assembly passed the Metropolitan North Georgia Water Planning Act that created a planning entity dedicated to developing comprehensive regional and watershed specific plans to be implemented by the 16-county governments located within the Atlanta-area district. The act calls for the creation of a water supply and water conservation management plan which “... shall build upon and be coordinated within existing watershed planning efforts undertaken by local governments in the district area and plans otherwise developed by the state” (O.C.G.A. §12-5-584(a)). The code elaborates that the director of EPD shall not approve any application by a local government in the district (for water supply withdrawal or wastewater discharge), “... unless such local government is in compliance with the applicable provisions of the plan or the director certifies that such local government is making good faith efforts to come into compliance.” The act also states that if a local government within the district fails to comply with the plan, the entity will be ineligible for state grants or loans for water supply and conservation projects (O.C.G.A. §12-5-584(d)(4)).

Rules and Regulations for Water Withdrawals

Water Conservation Plans

Generally, rules and regulations are developed to govern organizational and administrative procedures to be followed in the administration and enforcement of Georgia statute and policy regarding natural resources. Permit applications for a new or additional non-farm water withdrawal of or exceeding 100,000 gallons per day must include a water conservation plan. According to R&R 391-3-6-.07(4)(b)(8) and R&R 391-3-2-.04(11) a water conservation plan for non-farm uses shall include information regarding: (1) system management, (2) treatment management, (3) water pricing structure, (4) other components (description of plumbing code, water recycling/reuse, education programs).

(1) *System Management.* For overall system management the applicant is required to submit the following information :

- A minimum of twelve consecutive months (within the past 24 months) of data concerning unaccounted for water (UAW). UAW is defined as “the difference between the total amount of water pumped into the water system from the source(s) and the amount of metered water use by the customers of the water system.” It is to be expressed as a percentage of the total water pumped into the system (R&R 391-3-6-.07(2)(n) and 391-3-2-.02(s)).
- A description of any current or planned programs to reduce UAW such as the following:
 - Leak detection and elimination;
 - Availability of accurate maps of the water system;
 - Meter maintenance, testing, replacement, calibration;
 - Prevention of tank overflows;
 - Flushing programs without degradation of water quality;
 - Prevention of unauthorized water use – fire hydrants, fire lines, etc;
 - A list of unmetered service connections including publicly owned facilities, churches, etc.
 - Other;
 - A list of inter-connections with other water systems and a description of any contractual agreements, type (emergency back-up, wholesale sale or purchase) and purchase amounts;
 - Any additional current or planned activities pertaining to system management that will contribute to water conservation. (R&R 391-3-6-.07(b)(8)(i) and 391-3-2-.04(11)(a)).

(2) *Treatment Plant Management.* The applicant is also required to provide the following information regarding treatment plant management :

- The condition, calibration frequency, type, etc. of raw and finished water metering;
- An analysis of in-plant water use for filter backwashing, overflows, laboratory use, etc, as percentage of total plant production.
- Also, the plan must outline any ongoing or planned plant improvements (including schedules for planned improvements) and/or revised operational procedures to reduce in-plant use (R&R 391-3-6-.07(b)(8)(ii) and 391-3-2-.04(11)(b)).
- For groundwater withdrawals, a description of any recycling or reuse of filter backwash water must also be included in treatment plant management (R&R 391-3-2-.04(11)(b)(3)).

(3) *Rate Making Policies.* Conservation plans must also include a general description of the entity’s rate making policies, accompanied by the following details:

- A list of non-billed service connections. Also, if available, a breakdown by number of meters or percent total production

for each class of customer, e.g. residential, commercial, industrial, wholesale;

- A copy of the water rate structure currently in use including any surcharges, demand charges, etc., which may apply to certain customers and a description of the effects of this rate structure on water conservation;
- A description of any system policies concerning second meters for landscaping irrigation and any use of sewer meters for billing;
- Statements regarding the 1) if the system is self-supporting and 2) if the water system expenditures are subsidized by non-water/sewer system revenues (R&R 391-3-6-.07(b)(8)(iii) and 391-3-2-.04(11)(c)).

(4) Other Requirements for Water Conservation Plan.

- A description of the plumbing ordinances and codes under which the applicant functions must be included in the conservation plans. This section requires a description of the codes to ensure compliance with the ultra-low flow plumbing fixtures and any special requirements for outdoor water use (R&R 391-3-6-.07(b)(8)(iv) and 391-3-2-.04(11)(e)).
- The permit applicant is required to also submit a description of any recycling or reuse of treated wastewater (R&R 391-3-6-.07(b)(8)(vi) and 391-3-2-.04(11)(f)).
- The applicant is required to include a description of current or planned education programs designed to promote water conservation (R&R 391-3-6-.07(b)(8)(vi) and 391-3-2-.04(11)(g)).

Reporting Requirements

- EPD also requires any entity that receives a new or expanded water withdrawal permit to submit progress reports every five years. These progress reports outline actions and/or improvements made to conserve water and reduce water loss (R&R 391-3-6-.07(b)(8)(vii) and 391-3-2-.04(11)(h)).
- Once the water withdrawal permit is granted, the permittee is required to submit to the director an annual water use data report describing UAW for the past 12 months (R&R 391-3-6-.07(4)(b)(8)(viii) and 391-3-2-.04(11)(i)).
- Additionally, EPD requires annual reports be submitted to the director describing monthly average and maximum day use for each month of the previous calendar year (R&R 391-3-6-.07(15)).
- The permittee must also describe any additional water conservation activities (other than those are to be described in the permit application) (R&R 391-3-6-.07(b)(8)(x) and 391-3-2-.04(11)(k)).

Long Range Planning

Permittees are required to incorporate water conservation

into long-range planning. This effort involves projecting water demand over a 20 year time period (using methods approved by the director) and incorporating the effects (or demand reductions) inherent in the implementation of new or enhanced water conservation programs (R&R 391-3-6-.07(b)(8)(ix) and 391-3-2-.04(11)(j)).

Small Public Water Systems

The rules and regulations also allow the Director of EPD to request a water conservation plan from public water systems that withdraw water less than 100,000 gallons a day. Specifically, the rule reads, “Any applicant for a permit whose application is pending final consideration shall upon the request of the Director provide such additional information as may be necessary to enable the Director to properly pass upon the application. Such additional information may include, but not be limited to, ... water conservation plan...” (R&R 391-3-5-.17(3)).

Outdoor Watering Schedules

In May, 2004, the DNR Board adopted a drought management plan that contained significant “pre-drought strategies.” These pre-drought strategies are water conservation efforts and establish an outdoor watering schedule to be adopted by all water withdrawers and all drinking water providers. Specifically, the outdoor watering schedule applies to water users throughout the state and limits outdoor watering to no more than three days a week. Specified watering days are established based on the location address: Odd-numbered addresses can water on Tuesdays, Thursdays and Sundays. Even-numbered addresses can water on Mondays, Wednesdays and Saturdays (R&R 391-3-30).

POLICY #2 - POLICY ON WATER CONSERVATION AND REUSE, FOR METROPOLITAN NORTH GEORGIA WATER PLANNING DISTRICT

by Cindy Daniel, Atlanta Regional Commission

The Metropolitan North Georgia Water Planning District (District) was established by the Georgia legislature in 2001 in Senate Bill 130 to address the need for comprehensive water resources management in the 16-county metropolitan Atlanta area. The overall goal of the Water Supply and Water Conservation Management Plan (WS Plan) is to meet projected water demands without compromising environmental and downstream needs.

Water conservation is essential to meeting projected District water demands. Water supply demands could reach more than 1.2 billion gallons per day by 2030 if current patterns of water use continue. In order to reduce water use in the most practical and effective way, the WS Plan applies an aggressive approach to water conservation. Using water

conservation, it is estimated that the District can reduce average per capita water use by 11 percent below today's levels, in addition to the 9 percent reduction expected with existing codes and appliances.

The water conservation measures adopted by the District in the WS Plan include:

Establish conservation pricing by all District utilities. All District utilities were required to implement, at a minimum, uniform price structures by January 1, 2004. By January 1, 2006, all District utilities must implement at least a 3-tiered rate structures using the following guidelines:

(1) The first tier designed to include up to 125 percent of the average winter use. (2) The second tier (defined by the first and third tiers) should be at least 25 percent above the first tier rate. (3) The third tier designed to include the top 5-10 percent of customers who use 10-20 percent of the volume used and should be billed at a rate at least 200 percent of the first tier rate.

Each water provider should perform a rate analysis that includes conservation pricing, to determine what percent of customers and volume will fall into each tier. A revenue analysis would also be needed to determine the rates to assign to each tier, to determine the effect on the revenue stream and to maintain fair and equitable billing rates.

Enact legislation to require plumbing retrofits on home resales. The goal of this measure is to speed the conversion of older fixtures to more efficient, low-flow plumbing fixtures. It requires certification upon the sale of a pre-1993 or older home showing that the plumbing meets current codes for new building. The certificates will be part of the home sale closing process.

Enact legislation to require low-flush urinals for new industrial, commercial, and institutional buildings. This measure would have required new institutional, commercial, and industrial buildings to install 0.5 gpf urinals. This measure has been eliminated due to new research and will be replaced.

Enact legislation to require rain-sensor shut-off switches on new irrigation systems. To reduce wasted irrigation water, establish State regulations requiring rain sensor irrigation shut-off switches on all new landscape irrigation systems – both residential and non-residential.

Require sub-unit meters in new multi-family buildings. Local ordinance or water system policy should be adopted to require that all new multi-family buildings be built with individual water meters or sub-unit meters that bill for water based on volume of use.

Assess and reduce water system leakage. Water providers must identify methods to reduce leakage in their systems, and to reduce unbilled water. Each water provider should perform a distribution system water audit based on the International Water Association (IWA) methodology, in order to maintain uniform assessments and set targets at the economic level of leakage. AWWA is currently rewriting the M36 Manual Water Audits and Leak Detection which will give owners and operators detailed instruction in compiling the water audit methods and launching a loss control program.

Conduct residential water audits. Water providers are to have a program that provides water audits (indoor and outdoor) to residential customers. The largest 25 percent of water users should be targeted to evaluate water savings measures, and audits should be made available to customers who complain about high water bills.

Distribute low-flow retrofit kits to residential users. Water providers are to have a program to distribute low-flow retrofit kits to customers.

Conduct commercial water audits. Water providers are to have a program that provides water audits (indoor and outdoor) to commercial users. This audit will include a feasibility report that outlines changes to process and operations to reduce water usage.

Implement education and public awareness plan. The District and the water providers must increase public education programs. As part of the legislated mandate, District-wide public outreach and education are necessary to reach 75 to 90 percent of the District's population.

Establish oversight and review of water conservation implementation and performance. The District will be responsible for facilitating, guiding, and managing the implementation process by the water providers and others. The goal is to achieve the water savings projected in this plan in a cost-effective manner.

District Policy on Reuse

Indirect potable reuse will become a crucial component of the District's water supply after 2030. Indirect potable reuse has been defined as using advanced treatment technologies to reclaim water and returning it to an impoundment such as a lake, which is used for water supply. The District Long-Term Wastewater Plan (WW Plan) supports this practice as part of the District's solution for its future water supply. Non-potable reuse applications that are economical and offset potable demands are acceptable; however, non-essential consumptive uses are discouraged.

The WW Plan includes reuse of roughly 14% of the total water withdrawn for potable and non-potable purposes. Meeting the reuse in the WW Plan will be achieved by returning reclaimed water to Lake Lanier and Lake Allatoona (indirect potable reuse) and using reclaimed water for irrigation in place of water that would have been withdrawn from surface water sources (non-potable reuse).

POLICY #4

Comments by Shana Udvardy, The Georgia Conservancy
Discussion of Status Quo and Alternatives

Introduction

Humans have changed ecosystems more rapidly in the last 50 years than any time in human history. These changes have resulted in a significant and mostly irreversible loss in diversity on Earth (UN 2005). Freshwater ecosystems have been particularly affected due to demand for clean and plentiful water. Water withdrawals and the construction of reservoirs to meet our insatiable demand for water combined have changed the ecology of our once free flowing rivers to one that resembles a series of lakes with low and regulated instream flow. Low instream flow decreases the streams capacity to assimilate pollution and decreases natural temperature variability. These changes both can affect population levels of sensitive species.

In this time, we have quadrupled the number of reservoirs and withdrawn twice the amount of water from our rivers and lakes so that today, reservoirs hold from 3 to 6 times more volume than our river basins (UN 2005). We can be thankful for the substantial gains in economic development and human well being this growth has provided. However, it has come at unaccounted for costs to our aquatic diversity and an estimated 60 % loss of human services. Although technology can help, human services such as flood mitigation, pollutant filtration, and waste assimilation among others are expensive and need large areas of land.

In Georgia, the water withdrawal and degree of freshwater ecosystem degradation is similar to the world trend. Although we are rich in freshwater capital, our water use is becoming a more critical issue as our population grows, as demand increases, as two areas of the state are under water withdrawal moratoria, and as our aquatic systems are becoming more fragile. Our ever-increasing need for clean water today threatens our ability to have enough water for future generations and to maintain the health of our rivers, lakes, streams, and aquifers. The objective of this paper is to address the need for a strategic water conservation program in Georgia and to suggest mechanisms and measures to reduce water supply demand.

Why Conservation Makes Sense in Georgia

If we compare five southern states, Georgia ranks fourth in the amount of water withdrawn from public supply (Table 1). Reducing our demand for water is an obvious first step in finding “new” supplies of water. Our supply-driven water management relies on technological solutions rather than managing our demand by utilizing little to no cost water conservation efforts. Demand management has the added benefit of not impacting our aquatic resources. Demand management focuses on ways to reduce excessive demand as opposed to looking for ways to increase a finite resource, like building reservoirs.

The Georgia Conservancy believes the state must aggressively implement water conservation measures that get results and offer incentives that encourage implementation of these measures as the state’s first and least expensive supply source. The economy of scale in water supply savings through conservation is clear considering that 41% of water use in Metro Atlanta goes to outdoor use, which can double in the summertime.

In the Atlanta region, the Metropolitan North Georgia Water Planning District (the “Metro District”) predicts the 16 county area around Atlanta will not be able to meet its water supply demands by 2030 if there is no change in our water use. Because of this, the Metro District has estimated an 11% reduction in water use based on cost benefit models. When cost benefit models are not of highest concern, water consumption can be reduced even more. One study by the American Water Works Association (AWWA) Research Foundation found that residential areas can reduce water consumption by 30% by implementing household conservation measures. Smaller local governments can also lead to better water consumption reductions. In North Carolina, the town of Cary’s water conservation program focuses on reducing per capita water consumption by 20 percent by the year 2020. Similar to many of the District counties, their population has doubled within the past ten years. Their program uses a multi-faceted management approach with voluntary, incentive based, and regulatory mechanisms to address both supply-side and demand-side conservation.

Table 1. Comparison of Public Water Supply Withdrawals for Five Southeastern States

State	Public water supply withdrawal
Florida	170
Tennessee	190
North Carolina	198
Georgia	208
Alabama	261

Source: Huston *et al.* 2004

Conservation Planning and Implementation

The Georgia Conservancy believes the soon to be developed comprehensive statewide water management plan must make water conservation a statewide initiative and must consider conservation of both aquifers and surface waters in an integrated way. An effective water conservation plan must involve all sectors of society (residential use; industry; agriculture, landscapes; government; and water utilities) and include seven critical components: 1) political leadership; 2) stakeholder involvement in planning and implementation; 3) detailed policy outlining goals and conservation measures; 4) detailed water use data, demand forecasting, and monitoring; 5) stable funding sources for conservation initiatives; 6) sufficient staff and technical assistance to implement a successful water conservation program; 7) broad-based education and outreach (Keyes et al. 2004). Included here are both mechanisms and measures that can help to reduce water supply demand. Generally, regulation, education and funding are the three main categories that fall within the mechanisms that can encourage a water supply user (albeit by a carrot or stick) to conserve water (Vickers 2001). Measures, on the other hand, are related to hardware or the behavior associated with hardware or technology that reduces that amount of water a particular use consumes.

Mechanisms to Reduce Demand

Regulation. We must strictly regulate our water supplies using tools such as water restrictions and moratoriums on permitting and reservoirs based on sound science and include these tools as part of the statewide conservation plan.

Watering restrictions. Water conservation is more than watering bans and low-flow toilets. Watering bans occur when water conservation and efficiency planning fail. Watering restrictions, such as only allowing watering to occur on specified days of the week, act to reduce our overall outdoor usage of waters. Watering bans that prohibit all outdoor usage are one way to reduce water usage, but they are by no means the only way or even the most effective.

Agriculture and groundwater permitting. We recommend studies be conducted and policies developed before lifting the moratorium on Aquifer Storage and Recovery and that groundwater metering and reporting should be implemented. Additionally, the state should not issue new groundwater use permits, or modifications of existing permits, without examining comprehensively the impact on the state's groundwater resources. Georgia also should bring agriculture permits under the same standards as all other water use permits.

Water audits, metering and rate pricing. Reducing demand can be accomplished by providing water audits, by metering, and by modifying rate structures. Water audits in New York City indicated that faucet, shower, and toilet leaks typically cost residents \$100-200 per leak per year in addition to the water/sewer costs each household must pay. Now, leaky plumbing is billed at twice the average rate. A 2003 assessment of North Georgia Regional Water Supply Needs found that the Metro District can reduce water consumption by 18.04 mgd through audits and leak detection and 13.75 mgd through conservation pricing (CH2MHill 2003). In economic terms, water demand is considered "elastic" because as water prices increase water consumption decreases (Stallworth 2000). Conservation pricing captures this elasticity and can benefit local governments by providing funds needed for the maintenance and construction of wastewater treatment plants, for better water treatment standards, and for the expense of planning and developing new water sources.

There are four basic types of conservation rate structures: 1) uniform rates; 2) increasing block rates; 3) seasonal rates; and 4) marginal cost rates (Vickers 2001). Uniform rates treat water users equally with a set charge per volume of consumption. Increasing block rates encourages conservation by charging higher rates per incremental volume of water used. Seasonal rates will vary with the season with higher rates during summer months to discourage inefficient outdoor use. Marginal cost rates are implemented to discourage excessive water consumption and charge the amount based on the cost of the next incremental volume.

Education and Outreach. It is critical that the State fund comprehensive education programs and staff to implement water conservation programs across the state. The State should establish a clearinghouse for water conservation programs and practices to provide the following: an integrated statewide database for the collection, evaluation, and dissemination of quantitative and qualitative information on water conservation programs and practices and their effectiveness; technical assistance to aid in the development and implementation of water conservation programs and practices; and updates on the effectiveness of water conservation programs and practices. Additionally, the State should implement pilot applications of conservation measures with local utilities that volunteer.

Funding. Funding on the state level should include state revolving funds and innovative financing tools to help local conservation initiatives. Local governments must be innovative in finding federal and state funds and grants and should consider conservation pricing tools to help offset financing conservation programs.

Measures to Reduce Demand

Retrofitting outdated plumbing. It has been over a decade since Georgia adopted low flow plumbing standards for new construction (1.6 gallons/flush toilets, 2.5 gallons/minute showerheads, and 1.0 gallons/flush urinals). The challenge now is to retrofit old plumbing. Although water conservation is more than retrofitting outdated plumbing on resale, in the Metro District alone, this measure can reduce water demand by an average 20 mgd. A grassroots initiative in Atlanta's Brown Village distributed ultra-low-flush toilets, low flow showerheads, and energy conservation information to 340 residents. As a result, water consumption decreased by more than 20 million gallons a year, and community residents should save nearly \$200,000.00 in the next five years.

Reducing consumptive use. We need to reduce consumptive uses (water that is not returned to a water body) by restricting septic tank developments and connecting existing septic tanks to sewer systems.

Efficiency. We know that efficiency is a problem throughout the nation and that Georgia loses approximately 10% of its water through leaky pipes, while Atlanta loses approximately 18%. The metro Atlanta area loss is estimated to be 6-22 billion gallons of water a year. Efficiency measures can also be implemented in agriculture. Typically, only 35-50% of water withdrawn for irrigation reaches crops because of leaky pipes or evaporation. Examples of more efficient irrigation systems that are being tested in Georgia include drip irrigation that can reduce water use by 40-60% and low-energy precision application that can have up to 95% efficiency ratings compared with gravity systems.

Water Recycling. Water recycling is the minimal treatment of wastewater so that it is suitable for a specific and direct use. Several cities throughout North Carolina, Colorado Springs, and many cities in Arizona and California have water recycling programs in place to irrigate golf courses, cemeteries, parks and other landscapes. Florida's average domestic wastewater recycling was 39% in 2003 with recycling in their water management districts ranging from 26 - 79%.

Water recycling initiatives in the Institutional, Industrial or Commercial sectors involve reusing the water before returning it to a wastewater treatment plant. WellStar Health System in Marietta, Georgia for example, installed a filtration system in its Cobb County laundry facility. This \$260,000 high-tech system will disinfect and clean nearly 42 million gallons of laundry wastewater per year, decreasing city water use by 85% and sewer discharge by 95%. Because the recycled water maintains its high temperature, less natural gas and heating costs are required. WellStar expects

to save up to \$355,000 in annual water, sewer, and energy costs.

Since the 1970's, thermoelectric power plants were built with or converted to, closed-loop cooling systems instead of once-through cooling systems. However, it is estimated that only 60% power plants in the United States have implemented this alternative (Fanning 2000).

Conclusion

Comprehensive water conservation planning has the potential to improve water quality and instream flow levels, decrease the need for new capital investments, reduce vulnerability to drought, and provide additional benefits to people and ecosystems. The Georgia Conservancy is committed to protecting the integrity of Georgia's aquatic resources for the long-term benefit of humans and other species. Healthy, naturally functioning rivers, streams, wetlands, aquifers, and estuaries are vital to all life and to the state's economic success.

Now is the time to shift the current water supply paradigm from increasing a finite supply to reducing our insatiable demand. It will take a commitment from our citizens, state and local governments, as well as the private and industrial sectors, to conserve surface and ground waters by reducing our water consumption, by supporting water reuse and recycling, and by providing economic incentives to sustain the health of our population, our economy, and our ecosystems.

POLICY #6 - WATER USE EFFICIENCY TARGETS

comments by Kathryn Hatcher, University of Georgia

Policy #6 allows water utilities to tend to their business as they think best, with minimum reporting to EPD. Policy #6 reduces EPD's workload for checking water conservation plans, it provides clear expectations for water users, and it offers a direct and easily communicated measure of program success.

The proposed policy #6 is that the EPD will calculate a water use efficiency target for each water withdrawal permit holder, for the total withdrawal amount, and will offer rewards (regulatory relief, grant priorities) for water users which meet their target or show good progress toward the target. Good progress means reducing the gap between actual withdrawal and target withdrawal by at least 10% for past year as compared to the previous three years average. The target use has two components: average monthly winter withdrawal and summer peak month withdrawal.

The rewards are: (1) receiving one level higher priority in any state grant or loan program, and (2) regulatory relief in the form of no other conservation program documentation is required for the year of good progress, other than

demonstrating meeting target or good progress for the total water withdrawal. The penalty is that no permit for increased withdrawal will be issued by EPD to any withdrawer who is not meeting its water use efficiency target.

The efficiency target for the total withdrawal consists of a winter use and summer use component. For example, the winter use target may be calculated for efficient indoor use as:

- + population served x 46 gal/day (residential)
- + population served x 15 gal/day (commercial)**
- + population served x 10 gal/day (government)**
- + industry #A x (Q gal/day for its SIC code)
- + industry #B x (Q gal/day for its SIC code) +....
- + 10% for water loss and unaccounted water.

The summer (peak month) use target may be calculated by adding 20% to the winter use target. Note that the target changes each year as population increases or new industry arrives.

The indoor industrial water use component would be calculated for each industrial use according to efficient water use for its specific SIC code. The indoor residential water use of 46 gal/day is possible if currently available efficient household appliances and plumbing fixtures are used in all residences (AWWA/Maddaus, 1985). **The indoor efficient water use per capita for commercial services and government services would need to be researched, with the 15 gal/day and 10 gal/day shown in this example to be replaced by reasonable numbers.

Note that this policy #6 provides considerable incentive for water reuse, since any water recycling and reuse will help the water utility to achieve the efficiency target. Use of greywater and rain cisterns will be help reach the target.

EPD and P2AD will continue to carry out voluntary education and assistance programs to help water users and utilities improve their water use efficiency. EPD could consider setting up a website, listing all withdrawal permit holders, in order of efficiency, and comparing their water use efficiency targets with their actual water withdrawals during the past three years, so that the citizens can see how their local utility is progressing.

This proposal greatly reduces the workload for both EPD and the water withdrawers who are making good progress toward water use efficiency. Those withdrawers only report two new numbers per year (average monthly winter withdrawal and summer peak month withdrawal), and EPD needs only check those two numbers. EPD staff will then have more time to implement the state water conservation program and to work with the lagging water withdrawers, who must continue to provide the water conservation information described in Policy #1 (existing EPD policy).

Overview of Alternative Policies

The selection of a water conservation/efficiency and reuse policy for Georgia is a difficult decision, and one which will affect Georgia's citizens and the future condition of the state. The Georgia EPD intends to involve citizens extensively in the development of the water policies for Georgia, policies which will be applied in shaping the comprehensive state water plan. To aid the lay citizen in understanding and participating in this decision, it may be helpful to summarize the issue using a decision table, such as the example shown in Table 2, to show a range of policy alternatives for water conservation/efficiency and to compare the most relevant effects (pros and cons) of each alternative.

Discussion for this panel topic will continue following the conference, with comments received during and after the conference made available.

<http://www.arches.uga.edu/~hatcher/conserves.htm>

Table 2. Decision Chart for Comparing Water Conservation/Efficiency and Reuse Policies

Policy Choices:	Policy #1	Policy #2	Policy #4	Policy #6
	Present EPD Policy			
Description				
Pros: #a #b #c				
Cons: #a #b #c				

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