

WATER MANAGEMENT FOR THE FUTURE -- STATE PERSPECTIVE

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INTRODUCTION

The State of Georgia-Environmental Protection Division (EPD) has managed the state water quality program since the early 1970's. Not until the 1980's did water quantity aspects escalate in importance. Today, the main focus of water issues in the State is toward proper management of both quantity and quality for continued growth into the future and protection of the water resource base. Georgians became acutely aware of Georgia's finite water supplies during the droughts of 1981 and 1986-1988. Expecting continued population growth and the need for additional water supplies, Georgia is rapidly seeking solutions to its current and future water shortage problems.

EPD has completed the data collection and analysis of a State water budget. This budget determines the reliable water supply available at specific sites throughout the State using "Water Availability and Use Reports" (EPD, 1984) for each of the State's fourteen major river basins. These reports developed for the first time a comprehensive inventory of the State's water resources and uses made of those water resources, both from surface and ground waters.

After the 1986 drought, a "Water Resources Management Strategy-Summary Document" (EPD, 1987) was prepared for Governor Joe Frank Harris, who presented it to the General Assembly at the opening of its 1987 legislative session. The "Summary Document" articulated the four key components of State water management in Georgia:

- 1) water withdrawal permitting for users over 100,000 gallons per day;
- 2) public water system supervision;
- 3) emergency water shortage planning; and
- 4) statewide water budget, mentioned above.

The "Summary Document" also identified areas affected by the 1986 drought for further consideration. Thirty-one different areas of the State north of the Fall Line were identified for analysis. EPD subsequently prepared "Regional/Local Water Supply and Fishing Lake Reports" which sited potential water supply sources to serve the drought stressed areas. The reports make water demand projections for the year 2020 and examine potential water supply

reservoir sites and sizes under a drought flow regime. One hundred eight reservoir sites were considered throughout the entire study process. An estimated thirty reservoirs may be built in the future. Currently, seventeen reservoirs have been selected for further study by local governments.

Entangled in the process of supplying water to drought-stressed areas are the following issues: 1) existing and projected growth patterns; 2) water quality chemistry; 3) watershed protection of reservoirs and upstream drainage basins; 4) loss and mitigation of wetlands; 5) financial constraints; and 6) intergovernmental cooperation in sharing costs, protecting watersheds, and managing water supply operations. To address these and other issues Governor Harris appointed a Growth Strategies Commission in 1987. Composed of a wide range of public and private sector interest groups, the Commission studied the complex issues mentioned above and other issues related to growth. In its final report the Commission proposed legislation authorizing the State to prepare minimum standards for watershed protection, wetlands and aquifer recharge areas. Local governments would adopt these standards as a foundation upon which to protect the quality of drinking water supplies of the State. Also, the Growth Strategies Commission has recommended that the State build larger, regional reservoirs and recoup the monies invested by selling raw water to various water producers in the reservoir service area.

The Commission's recommendations became law during the 1989 Georgia Legislative session. EPD is now working with several task forces to develop the minimum planning standards for the Growth Strategies Commission's recommendations.

STATE WATER BUDGET

The Georgia Environmental Protection Division (EPD) uses the water withdrawal permitting process to implement water management actions which are based on information in the State water budget. The Groundwater Use Act of 1972 requires permits for ground water withdrawals greater than 100,000 gallons per day (gpd)

and the 1977 Surface Water Statute (Amendments to the Georgia Water Quality Control Act) requires permits for surface water withdrawals greater than 100,000 gpd on a monthly average. While the State water budget was being prepared (1982-1986), agricultural use was exempt from the permitting process. The State water budget consists of "Water Availability and Use Reports" individually prepared for the State's fourteen river basins. Each report provides the following information:

- 1) Identification of the current use of water resources in the State and comments on the resources available for allocation.
- 2) Development of water use projections through the year 2000.
- 3) Consideration of federal, state, local and private planning and water resource management for water supplies.
- 4) Identification of the areas within the State which are currently experiencing or may potentially experience problems in meeting their current or projected water supply needs.
- 5) Recommendations for management criteria that promote the best interests of the state's water users, consistent with protection of the resource.

Information from virtually every program of EPD is included in the "Water Availability and Use Reports". Also, other agencies, such as the State Office of Planning and Budget, which prepares growth projections, and the U.S. Geological Survey, which has stream flow data, contributed to the reports. In compiling information, each river basin was broken into hydrologic subunits for reporting all the available information concerning that area of the State.

The Level-of-Service Index (LOSI), developed by EPD Staff, quantifies the past reliability of surface water supply sources. It is used throughout the state as a general indicator of water supply conditions over the available period of record. The LOSI utilizes the following four items of information: 1) a representative flow-duration curve at the facility; 2) a value for the minimum streamflow requirement; 3) a withdrawal rate for the facility being considered; and 4) an estimate of the cumulative impact of all upstream withdrawers and dischargers on the facility in question. Since the LOSI uses a flow-duration curve over an entire period of record, the results are not necessarily representative of an individual drought situation. Rather, the LOSI gives a general indication of water supply source reliability.

COMPREHENSIVE WATER MANAGEMENT

During the 1986 drought, areas throughout the State saw their drinking water supplies diminish. With this information and the accumulated river basin water budgets, a "Water Resources Management Strategy - Summary Document"

was prepared for Governor Joe Frank Harris and presented to the Georgia General Assembly in 1987. The "Summary Document" articulated the four key components of State water management in Georgia:

1) Withdrawal Permits

Associated with the water withdrawal permitting rules and regulations is the protection of source streams. For surface water sources, new or expanded withdrawals may not reduce the flow in a stream below the 7Q10 flow at the withdrawal point. The "7Q10" is the average lowest flow over a seven-day period that will occur on the average of once every ten years. The 7Q10 is accepted by the State as the minimum flow necessary for maintaining fisheries and for water quality protection, in the absence of detailed, site-specific studies.

The practical effect of requiring passage of the 7Q10 flow is that some sort of water storage must be provided to maintain a water user's source reliability during drought periods (such as 1986). Reservoir development is the principal means of providing storage to assure reliability while also allowing the 7Q10 flow to pass downstream of the withdrawal.

Also associated with Georgia's water withdrawal permitting has been the issuance of Ground Water Use Permits (since 1972) and Agricultural Water Use Permits (since July, 1988) for both ground water and surface water. However, these topics are not the subject of this paper.

2) Public Water System Supervision

The purpose of the Public Water System Supervision program is to assure a high and safe quality of drinking water to the public. There are 2740 public drinking water systems in Georgia. EPD maintains a comprehensive regulatory program that reviews and approves engineering plans and specifications for wells, water treatment plants, and water distribution systems prior to construction.

3) Emergency Water Shortage Plans

The Georgia Water Quality Control Act and the Rules and Regulations for Water Quality Control authorize the EPD Director to issue emergency orders to protect the health and safety of water supplies during emergency water shortage periods. The Emergency Water Shortage Plan consists of the following steps: 1) Enforced Outside Water Use Restrictions; 2) Enforced Outside Water Use Bans; and 3) Water Use Bans for Non-Essential Purposes. For example, during the 1986 drought, EPD notified 103 communities using surface water and 350 using ground water to restrict outdoor water usage (Step 1). Of these, 29 communities went to total outdoor water use bans (Step 2) and 5 communities needed to ration water (Step 3).

The "Summary Document" also identified areas affected by the 1986 drought for further consideration. EPD subsequently prepared "Regional/Local Water Supply and Fishing Lake Reports" which sited potential reservoir water

supply sources to serve drought-stressed areas. Currently, seventeen reservoirs have been selected for further study by local governments.

In the development of the "Regional/Local Water Supply and Fishing Lake Reports" (Reservoir Reports), EPD used the following study method: 1) analysis of the study area, and its current water systems; 2) projection of water demands to the year 2020; 3) feasibility of using ground water or surface water; and 4) water supply alternatives, which usually considered various alternative reservoirs sites. Balancing the need for reservoir sites and the potential environmental issues associated with any surface water supply, EPD ruled out building reservoirs in the following areas: 1) primary/secondary trout waters; 2) known areas of endangered species; 3) areas with an abundance of wetlands; and 4) present and future growth or development areas.

Also, EPD established a new criterion in evaluating minimum flows that must be passed by any new or modified request for surface water. This new criterion is called Non-Depletable Flow (NDF). NDF simply refers to the 7Q10 plus a prorata share of all the downstream surface water uses by drainage area ratio to the proposed upstream site. Currently, the NDF is being applied over the entire state. Surface water permit applicants must release NDF before any water can be withdrawn; also, they must release a NDF to accommodate long range plans of downstream users.

EPD uses what are termed "windows" to protect future downstream withdrawers. The following example describes the use of NDF and "windows": A local government has an existing withdrawal of 8 million gallons per day (mgd) from river x. An application for a new withdrawal is requested by an upstream local government (applicant) of 6 mgd. The applicant must allow a NDF of 7.8 mgd to flow by the intake before any pumping can take place. The 7.8 mgd is comprised of the 7Q10 (4.1 mgd) plus a prorata share (by drainage area ratio) of the existing downstream withdrawal of 8 mgd. The applicant then requests an increased withdrawal from 6 mgd to 12 mgd. Using the long-range plan developed for river x, EPD would allow the applicant to pass the NDF of 7.8 mgd then pump up to 6 mgd as the river increased in flow. Then the applicant would have to pass a "window" of the prorata share of the long range planned withdrawals for the same time period as the requested increase of 6 mgd. In this example, we use 10 mgd as the window. Once the river has enough water to sustain the window then the applicant can withdraw up to 6 mgd additional water from the river as the streamflow increases. The following streamflows in the table and Figure 1 represent the above example.

WITHDRAWALS	STREAMFLOW
(mgd)	(mgd)
None	0.0-7.8
0.0-6.0	7.8-13.8
6.1-12.0	23.8-29.8

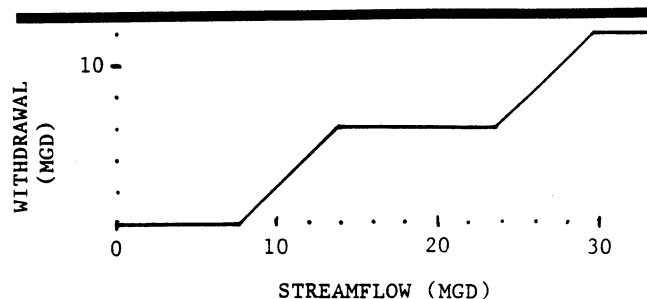


Figure 1. Streamflow in river and related withdrawals.

To accomplish this, the applicant must develop an extensive low flow monitoring plan to indicate low flows in river x according to its stage height. Also, off-stream storage must be provided by one or more reservoirs to supply the customers of the local government's jurisdiction during times when the withdrawal cannot be made. In the above example, the applicant chose two methods of low flow protection acceptable to EPD. The first was to install a continuous streamflow monitoring station upstream of the intake. The second was to install the withdrawal pumps at a river stage such that NDF would pass below the pumps' intake pipes. The window relies on the gaging station's recorded flows. The applicant already has one off-stream reservoir and proposed to build another to insure the reliability of distributing 12 mgd to its customers. Without this second reservoir, EPD would not allow the applicant to increase its withdrawal from the river. EPD analyzed the river and raw water storage capacity using the 1954 drought streamflow records, NDF windows, requested withdrawal rates and the usual evaporation, sedimentation, and seepage calculations for reservoirs. A mass diagram/rippel method approach was used to calculate the maximum cumulative deficiency (i.e., required storage) for the requested withdrawal. Without the second (proposed) reservoir, the applicant could withdraw 12 mgd when available but the dependable supply of water to the service area would be 8.8 mgd. This is due to the existing reservoir not being large enough to meet the extreme hydrologic conditions of the 1954 drought. The above example indicates that a second reservoir would be needed to supply the applicant a reliable supply of water through a drought period.

Most communities in Georgia have only a small reservoir (pond) or no reservoir to meet the water demands during droughts. Currently,

Georgia is addressing the water supply problem through the efforts of EPD and the Governor's Growth Strategies Commission. The Commission has recommended a nine-point strategy that addresses human needs, building capacity for growth, safeguarding the environment, strengthening local communities, and coordinating state and local efforts. The concept of regional reservoirs built by the Georgia Department of Natural Resources is within this framework. Protection of the environment, cooperation among local governments, and financial considerations are other aspects of the program. The Commission's recommendations became law during the Georgia legislature session in 1989. EPD is proceeding with several local governments on reservoir projects throughout the piedmont area of the state.

LITERATURE CITED

- Georgia Environmental Protection Division, 1984. Water Availability and Use Reports. State of Georgia, Atlanta.
- Georgia Environmental Protection Division, 1987. Water Resources Management Strategy-Summary Document. State of Georgia, Atlanta.