

THE ALCOVY PROTECTION PLAN: A REGIONAL APPROACH TO WATERSHED PROTECTION

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REFERENCE: *Proceedings of the 2001 Georgia Water Resources Conference*, held March 26-27, 2001, at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, the University of Georgia, Athens, Georgia.

Abstract. The Alcovy River Watershed Protection Project is the first comprehensive regional land use and water quality study of the Alcovy River watershed. Multiple regulatory requirements created the need for a watershed study that overlapped jurisdictional and political boundaries. Current and future land use information and hydrologic and water quality data were obtained for the watershed. A water quality model was developed to estimate future water quality as a function of anticipated land use changes. The model was run for existing and future (2020) conditions. Various implementation options were superimposed onto the default future scenario to predict the effect that certain policy tools would have on water quality. Model results suggested that the single most effective tool for protecting water quality is an improved stormwater ordinance that has provisions for downstream water quality and channel protection. An ideal watershed protection plan is recommended that includes a combination of policy and incentive-based land management tools.

INTRODUCTION

The Alcovy River Watershed Protection Project, a regional watershed and source water assessment, was conducted by Brown and Caldwell in association with Limno Tech, Inc. and the University of Georgia's Institute of Ecology Office of Public Service and Outreach between fall 1999 and winter 2001. The Alcovy is a 284 square mile watershed located east of Atlanta, Georgia within the Upper Ocmulgee Basin spanning four counties from its headwaters downstream to Jackson Lake (Figure 1). The system is a source of drinking water for thousands of people in the surrounding area, provides a multitude of recreational opportunities, and is home to some of the most unusual alluvial swamps in the Georgia Piedmont.

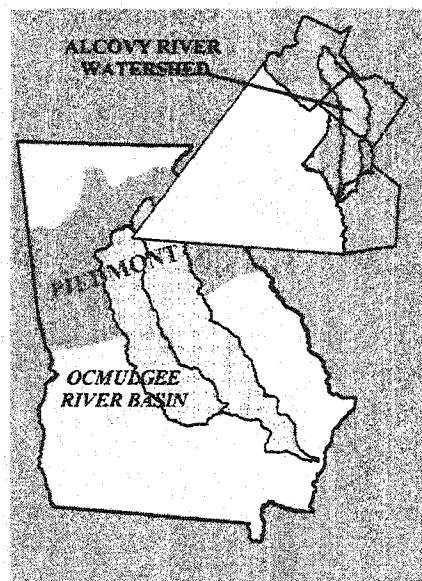


Figure 1.1 Monitoring Station Locations.

Recognizing the benefits of a regional, watershed-based approach, four counties (Gwinnett, Walton, Newton, and Jasper) and 11 municipalities agreed to cooperate to fund a comprehensive watershed assessment. From the outset, the project was designed to address multiple regulatory requirements. Source water assessment and watershed protection measures are required for water supply watersheds above four drinking water intakes; watershed assessments are required for new and expanding wastewater discharge permits; land uses draining to streams that are not meeting their designated uses as determined by the state will be subject to pollutant loading restrictions; and individual construction sites are faced with new regulations for stormwater management.

The major goals of the project were to: Identify workable strategies to meet regulatory requirements for watershed protection;

- Develop and implement an economical, basin-wide approach for water quality protection with flexibility for individual jurisdictions;
- Provide local governments with policy tools to protect water quality;
- Provide a working water quality model and long-term monitoring plan;
- Preserve the Alcovy's unique ecology and protect Jackson Lake; and
- Involve the public in watershed protection planning, education and implementation.

To meet these goals, the project included a number of related components. A program of chemical and biological monitoring was conducted to assess the present health of the river system. These results, along with data collected from other sources, provided the inputs for a model that predicted future water quality based on land use trends. The modeling also examined the relative benefits of policies and other "implementation options" for protecting water quality. Finally, based on all this information, a watershed protection plan was developed.

The project scope of work involved six major tasks:

- Development of goals,
- Data collection,
- Water quality monitoring,
- Watershed modeling,
- Formulation of implementation options, and
- Development the watershed protection plan.

The Northeast Georgia Regional Development Center (NEGRDC), a state-funded resource center for local governments, facilitated the process. Four counties, 11 cities and 4 utilities participated in the study. The Policy Committee, which consists of elected and appointed officials, guided policy elements of the project and acted as a voice for local constituents. Additionally, two individuals were selected from each county to serve on the Technical Advisory Committee (TAC). The TAC met with the consulting team on a monthly basis to oversee technical aspects of the project and to communicate project progress to county officials. Public involvement was key to each step of the process, shaping the project and helping to create more informed communities.

DATA COLLECTION

The approach for water quality monitoring for the Alcovy watershed included:

- Gathering existing water quality and flow data in the basin,
- Evaluation of the watershed for addition data needs,
- Identification of sites for additional field data collection, and
- Collection of additional hydrologic and physical, chemical and biological water quality data.

MONITORING

Water quality and flow data were collected to characterize existing conditions in the Alcovy River watershed and to supplemented existing data for model calibration. Monitoring occurred in the Alcovy over a 10-month period from October 1999 to July 2000 and included baseflow and stormflow sampling. A subset of sites was selected for biological monitoring. Two sites in the nearby Apalachee Basin were selected as high-quality reference sites for the biological assessment.

Monitoring showed that like most Piedmont river systems, the Alcovy is impacted by sediment originating both from the channel itself and from land disturbing activities in the watershed. Much of this impact can be attributed to the legacy effect of historical farming practices. Effects are most pronounced downstream of urban areas where increased runoff accelerates channel erosion and sediment re-suspension and in streams that were historically channelized. Ammonia toxicity was identified as a problem in Big Flat Creek, downstream of Loganville's wastewater discharge. Assessment data confirmed its continued 303(d) listing for impairment until plant improvements, which are underway, are brought on line.

Phosphorus levels were sporadically elevated at a number of monitoring sites. Elevated levels were reported during stormflow and were associated with sediment suspended in the water column. Fecal coliform was elevated across sites, particularly during wet weather. Concentrations below some urban areas were also high during dry weather, indicating a potential source directly upstream. Stream habitat was adversely impacted to some degree at all but one of the seven biological study sites. Impairment was due mostly to large and widespread deposits of sediment in the observed study channel reaches and less from riparian vegetation degradation. Bank stability scored low at the smaller Alcovy sites, indicating that bank sediments in

these reaches likely contribute to downstream sediment loadings.

The abundance, diversity and sensitivity of aquatic macroinvertebrates and fish were gauged against nearby reference streams. Most Alcovy sites scored in the "poor" to "very poor" range. The Alcovy River at Newton Factory Mill Road scored the highest for macroinvertebrates, due to an increase in habitat conditions attributable primarily to river gradient. Habitat and biological degradation at study sites was attributable to sedimentation, with the exception of Big Flat Creek that is impaired from ammonia toxicity.

WATERSHED MODELING

The BASINS/HSPF computer model was used to better characterize present conditions, identify sources of degradation, and predict water quality under future land use patterns. The model was calibrated using available climate, hydrologic, water quality and land cover data, along with data from the project monitoring program. Sources of hydrologic and water quality data included nearby weather stations, USGS gauging stations, water treatment and reclamation facilities, Georgia EPD water quality investigations and lake studies, and the recently completed Gwinnett County watershed assessment. Current land cover was obtained by classification of 1999 satellite data. A future (2020) land use GIS coverage was also developed from future land use maps and was further refined upon consultation with local planners.

Modeled constituents included sediment, phosphorus, and fecal coliform, which were judged to be the pollutants of greatest concern and were also considered to be useful surrogates for other pollutants. Water quality targets for pollutant loading rates and concentration exceedance levels were developed based on regulatory requirements and published studies. The model showed that under current conditions, these targets were generally met. However, under projected future (2020) land use conditions, sediment loads were projected to increase by 137% and 152% over current loads at AR-2 (above Lake Jackson) and AR-6 (near the Walton/Newton line), respectively. Similar trends were observed for the other constituents.

The primary cause of this degradation was determined to be urban and suburban development. Much of the Alcovy Basin has experienced rapid

growth in recent years, and this trend is projected to continue over the next two decades, resulting in dramatic land cover changes. Consequently, agricultural and forestry activities were determined to be relatively small contributors to water quality degradation, since both of these are expected to decline greatly in the basin in coming years. Based on these findings, additional modeling was conducted to assess the effectiveness of various policy tools used to manage growth and protect water quality. The modeled tools included:

- Conservation subdivisions,
- Riparian buffers,
- Impervious surface restrictions,
- Stormwater management for water quality control,
- Improved enforcement of erosion and sedimentation laws, and
- Combinations of the above controls.

Modeling showed that no single policy tool was effective at preventing increases in pollutant loads above current conditions. The stormwater management ordinance (designed for downstream channel and water quality protection) offered the highest degree of water quality protection. The total effect of such a measure would be to reduce total suspended solids in surface water by 28%, total phosphorus by 28%, and fecal coliform by 46%, in comparison with the default future. This reduction was greater than the combined reduction from all other modeled policy tools.

THE WATERSHED PROTECTION PLAN

The Watershed Protection and Implementation Plan was developed to provide a framework for implementation of water quality protection policies, incentive tools, and other protection measures. Some areas of the Alcovy watershed have grown rapidly in recent years and others are projected to continue to develop at an accelerated pace. Because the problems are both complex and variable across the region, a cookie-cutter approach that emphasizes a few simple solutions will not meet this goal. The Alcovy Watershed Protection Plan recommends that the jurisdictions in the Alcovy Basin implement a combination of tools. Some of these, such as an improved stormwater management ordinance, should be considered necessities, but others are optional or can be modified. It is possible for jurisdictions to substitute tools according to public input and local political considerations. The test is whether the selected

combination of tools will meet the water quality goals set in the project.

The assessment portion of the Alcovy Watershed Protection Project revealed that the major threat to the basin over the course of the next 20 years will be urbanization. Accordingly, most of the recommendations were designed to manage growth to minimize its impact on water quality. Most of the recommendations were in the form of ordinances or policies to be implemented by the local governments within the watershed. Other recommendations included watershed protection measures that may be achieved on an administrative level or through partnership or cooperative agreements. These are summarized below.

Improved Stormwater Management Ordinance

Modeling showed that this is the single most effective tool for protecting water quality available to the local governments of the Alcovy Basin. It would encourage low-impact development and require control and treatment of stormwater discharges to prevent flooding, stream channel erosion and water quality degradation.

Riparian Buffer Ordinance

A buffer ordinance protects land along streams, rivers and lakes and is essential for maintaining aquatic habitat and protecting stream channels. Ideally, the buffer width should be based on site-specific factors, such as slope, width of the floodplain and presence of wetland areas. Alternatively, a fixed 75' width (each side of the stream) on all permanently flowing streams should provide a high level of protection. The buffer should be maintained as undisturbed, native forest.

Conservation Subdivision Ordinance

Conservation subdivisions are developments in which houses are clustered and open space is permanently protected. This ordinance is a useful tool that gives developers an additional design option while helping to protect water quality.

Conservation Planning

Planning for efficient development patterns on a regional scale can have a large impact on water quality and is recommended for all jurisdictions. Furthermore, infrastructure costs are reduced, thus saving taxpayer money.

Transferable Development Rights (TDRs)

TDRs are a tool that makes conservation planning more effective and fair to property owners. It is a system whereby landowners in regions zoned for low-density development can sell development rights to landowners in regions zoned for high-density development.

Water Conservation Programs

The implementation of water conservation programs protects water quality and aquatic habitat primarily by maintaining instream flows. Decreasing water demand lengthens the duration of supplies and helps to protect the natural hydrology of streams. Furthermore, a decrease in water consumption translates to less wastewater that is treated and discharged outside of the Alcovy River watershed.

Land Acquisition Programs

By purchasing land or the development rights of the land, greenspace acquisition can help to protect water quality, particularly if pursued on a large scale. Maintaining the natural condition of land around streams and rivers is one of the most cost-effective approaches to water quality protection.

Alternative Wastewater Management

Evaluation of existing treatment facilities and planning for future wastewater treatment needs is critical for long-term protection of local water resources. Much of the residential areas in the Alcovy are served by septic systems. It is recommended that governments permit the use of small centralized or "cluster" treatment systems, which can often provide a more environmentally protective and cost-effective alternative to waste treatment in non-sewered areas.

Continuous Watershed Monitoring and Model Calibration

Continued monitoring and updating of the model is particularly important for refining the predictions of the relative contributions of non-point source pollutants, especially as development in the watershed increases. The full benefits of the model can be realized only after at least five years of additional data are collected and the model calibrated accordingly.

Stream Restoration and Urban Retrofit

There are many areas throughout the Alcovy watershed that have degraded, unstable stream channels. While complete restoration is not possible across the

watershed, areas may be prioritized according to need, feasibility and cost. Likewise, stormwater management problems may exist in urban areas. Identification and prioritization of areas suitable for additional stormwater BMPs (Best Management Practices) is the first step to remediation for long-term protection of water quality.

Incentives for Agricultural Best Management Practices

There are many rural areas throughout the Alcovy River watershed. Several government programs exist to assist farmers in preserving riparian buffers. Local governments can take an active role in setting priorities and coordinating water protection efforts with farmers and representatives of the Natural Resources Conservation Service (NRCS), the local Soil and Water Conservation District and the local Resource Conservation & Development agency. A cooperative approach will allow local governments to work towards their water quality goals while minimizing the regulatory burden on the agricultural community.

Improved Enforcement of Existing Erosion and Sediment Control Ordinances

A review of erosion and sediment control (E&SC) ordinances indicated that existing laws are sufficient for long-term water quality protection. The critical and perhaps most challenging component of an effective E&SC program is enforcement. A survey of local programs found that there are a sufficient number of enforcement officers in each county and that the enforcement mechanisms are in place and have been utilized. Training and certification is recommended for code enforcement staff. Identification and protection of all environmentally sensitive areas is critical from the planning phase to project completion. A comprehensive evaluation of local E&SC programs involving field inspection of a variety of on-going projects is recommended. As development activity increases, additional E&SC staff may be necessary.

Community Education and Partnering

Considerable time and effort were invested in public involvement in the Alcovy Watershed Protection Project to provide stakeholders with information necessary to make informed decisions concerning water quality protection. These community stakeholders can become key leaders for influencing public opinion, and are a tremendous resource for creating a springboard for long-term citizen action. Local governments

can partner with existing watershed interest groups to sustain the open lines of communication established throughout the course of the project.

PUTTING THE PLAN INTO ACTION

Regional cooperation coupled with local government action is essential to successful implementation of the watershed protection plan. If one or more jurisdictions choose not to participate in the plan, all or parts of the watershed may be ineligible for certain state permits, especially those that relate to water withdrawals and discharges. Accordingly, the final component of the Alcovy Watershed Protection Project has been to lay the groundwork for a cooperative organization to ensure implementation of the recommendations by the various local governments. This "Alcovy Watershed Council" will continue the successful partnering effort begun with the Alcovy Watershed Protection Project between regulatory agencies, local officials and community groups and will act as a steering committee to direct future water quality monitoring and model development efforts.

Many of the incentive-based and other implementation tools are recommended across the board for all counties. However, not all policy tools are recommended for all jurisdictions. The Alcovy Watershed Protection Plan is based on implementing a combination of solutions tailored to each jurisdiction. Full implementation of the Watershed Protection Plan will provide a range of other benefits for the residents of the Alcovy Basin. It is far more effective and economically efficient to prevent aquatic degradation through good planning and enforcement than it is to restore degraded streams and retrofit stormwater controls once development has occurred. Proper planning and regulation of development will provide for a healthy local economy, protect natural resources and ensure a high quality of life for future residents of the Alcovy Basin.

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