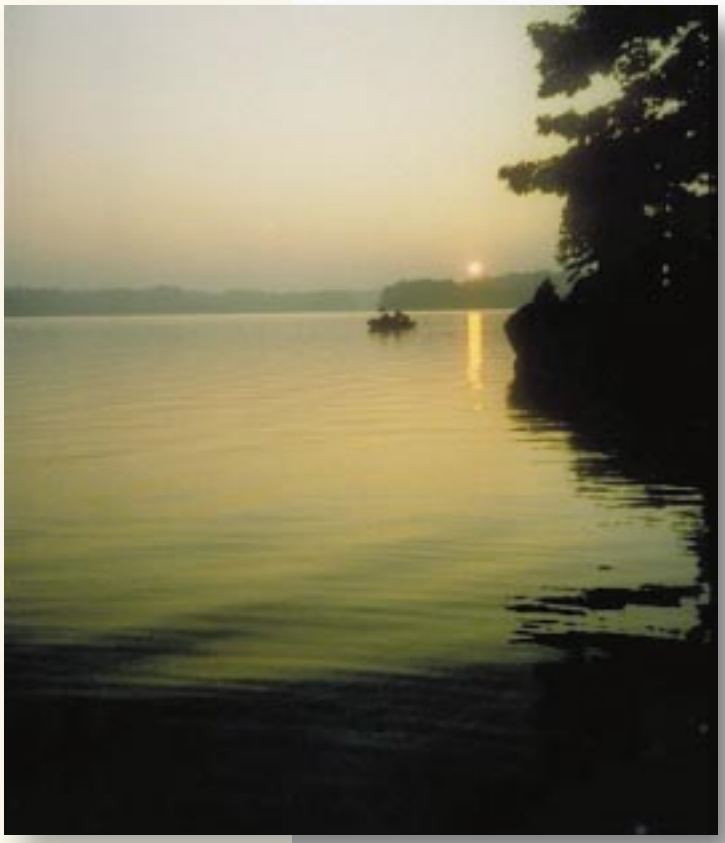
Watershed Management Tools Safeguard Lake Lanier

Lake Lanier is vital to the vigorously growing north Georgia area, and Brown and Caldwell has helped ensure its water quality.



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The team developed a comprehensive set of analytical tools to address concerns, including stormwater runoff, rapid development, adequate potable water supply, wildlife protection, and appropriate watewater discharge levels. During this process, Brown and Caldwell helped plan, coordinate, and present a detailed community relations and public information program.

BACKGROUND

Lake Lanier Reservoir is the primary source of potable water for millions of people in the north Georgia area, including Atlanta—one of the nation's fastest-growing regions. Fed by the Chattahoochee and Chestatee rivers, the reservoir was built in 1956 by the U.S. Army Corps of Engineers for hydroelectric power and flood control. Lake Lanier has since become not only a critical reservoir but also a popular recreational area; it was the site of the rowing and canoeing competition in the 1996 Olympics.

Concerns over stormwater runoff, rapid development, adequate drinking water, wildlife protection, appropriate wastewater discharge levels, and other water resource issues led local governments and interest groups to form the Upper Chattahoochee Basin Group (UCBG) in 1994. UCBG, which protects water quality and promotes efficient use in the face of growing demands, advises local and state authorities on resource management issues. It contracted with Brown and Caldwell, Limno-Tech Inc., and Katz & Associates to study Lake Lanier and its watershed and develop water quality management and forecasting tools.

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Solutions

The team developed a comprehensive set of analytical tools that included a lake-wide eutrophication model, a mixing model, and a watershed model. The tools consist of mathematical models and supporting data that:

- Describe the present water quality of Lake Lanier
- Delineate pollutant inputs from the watershed
- Predict the impacts of reclaimed-water discharges
- Predict changes in water quality due to changes in land use and management practices

The project scope also called for developing and modeling eight alternative watershed management scenarios to describe future watershed conditions, including maximum development, tempered development, and full implementation of best management practices (BMPs). The scenarios used in the model included combinations of:

- Degree of sewer and septic service
- Land use and development changes
- Changes in point-source discharges
- Implementation and enforcement of BMPs

The modeled results include data on maximum chlorophyll-A, summer average chlorophyll-A, total sedimentation, and near-field mixing-zone concentrations of pollutants. A "no action" simulation predicts pollutant changes associated with the scenarios compared to existing conditions.

Eutrophication Model

A lakewide eutrophication scenario was developed to address a wide range of related causes and effects. The model CE-QUAL-W2 was selected for this application because of its ability to accurately portray water quality processes, spatial resolution, and hydrodynamic transport.

Mixing Model

Two U.S. EPA-supported modeling packages, CORMIX and UM/PLUMES, were used to assess pollutant concentrations near potentially submerged point-source discharges. Both models consider near-field (discharge-induced) and far-field (ambient-induced) mixing processes, using different assumptions.

Watershed Model

Nonpoint sources in the Lake Lanier watershed were identified as potentially significant contributors of phosphorus, nitrogen, sediment, and bacteria. Water resource planning studies required estimates of the contributing nonpoint sources of various pollutants as well as how the contributions might change with shifts in land use. The estimates were made using a watershed nonpoint source model that incorporated factors such as soil erosion and runoff volume.

As part of the water resource planning study, Brown and Caldwell identified nonpoint sources in Lake Lanier as potentially significant sources of phosphorus, nitrogen, sediment, and bacteria.

These factors were incorporated into a Lake Lanier-specific model that directly reads watershed information in a geographic-information-system format. The model interface estimates all loading sources and allows input of changes in land use assumptions. Results are formatted for direct input to the CE-QUAL-W2 model.

Public Education

Brown and Caldwell helped plan and execute a community education program to effectively address stakeholder concerns and demonstrate the validity and impartiality of the study. An introductory video, fact sheet, list of study participants, graphic presentations, and result summaries were prepared for community forums and briefings for stakeholders and media.

(800) 727-2224 ■ www.brownandcaldwell.com

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P-587-0301a