Julie Shambaugh

Salem Lake Watershed

A Community Asset and Responsibility

At the April 1983 meeting of the Winston-Salem Board of Aldermen, Board members urged the City Manager to develop guidelines for protecting the Salem Lake watershed, a source of 40 percent of the city-county drinking water supply. Board members stressed the importance of protecting this valuable community asset. The Salem Lake watershed is located in the northeastern part of Forsythe County. The watershed is approximately 16,000 acres, or 25 square miles, and is relatively small compared to the areas of Jordan or Falls of the Neuse watersheds. Salem Lake's watershed is situated in three governmental jurisdictions: the town of Kernersville, the city of Winston-Salem, and the county of Forsythe, which have zoning control over 37, 41, and 32 percent of the area, respectively.

History of Water Supply Sources in the Watershed

Use of Salem Creek as a water supply source first began in 1877 when the creek became the main source of water for the town of Salem. The privately-operated Salem Water Supply Company made its first purchases of land and water rights in the watershed in 1902, and in 1907 the water company was purchased by the town of Salem.

As the town grew, Salem Creek was relied upon to an even greater extent to provide drinking water for the community. The town of Salem operated the water works until the 1913 consolidation of Salem and Winston. In 1919 a dam was constructed on Salem Creek by the City of Winston-Salem to create Salem Lake. As water demand increased, the dam was raised five feet in 1921, three feet in 1931, and three feet in 1947 as a consequence of the 1946 drought.

In 1947 it was clear that Salem Lake would not be able to supply the increasing water needs of Winston-Salem past 1956. Consideration of alternate water supply sources resulted in the combined use of Salem Lake and the Yadkin River. Salem Lake presently provides an annual average of nine to ten million gallons per day (mgd), which supplies approximately 40 percent of the drinking water, with the remaining 60 percent coming from the Yadkin River. This combination of water supply sources is believed to be adequate for the city and county needs well into the 21st century.

Salem Lake has always been considered a valuable community water resource. Over the years, the City has acquired property around the 365-acre lake. The City presently owns approximately 900 acres of land which is used as a park for low-intensity recreational activities -- fishing, hiking, and limited boating. The city-owned land around the lake acts as a protective buffer from the more intensive land uses. Because of its topographic setting with respect to the remainder of Winston-Salem, water from Salem Lake can flow by gravity to the main water plant, eliminating operational costs of pumping and electricity. Winston-Salem operates both the park and the water works; and the city has a firm commitment to the long-term use of the lake as a continued source of public drinking water supply and as a recreational facility.

SEDIMENTATION IS A MAJOR SOURCE OF POLLUTION IN THE LAKE AS A RESULT OF CONSTRUCTION AND AGRICULTURAL ACTIVITIES

Sources of Watershed Pollutants

When the town of Salem first began using Salem Creek as a drinking water supply source in 1877, the creek's watershed was mostly wooded. At that time, the water was impacted little by point and nonpoint sources of pollution, fertilizers and phosphorus. Presently, 87 percent of the watershed is zoned residential, although most of the land is in agricultural or woodland uses. Single-family residential development is an ever-increasing use of the land within the watershed. Interstate 40 cuts through the southern part of the watershed and crosses over the lake. More intensive industrial and commercial land uses are concentrated around interstate interchanges and in the Kernersville portion of the watershed.

Sedimentation is a major source of pollution in the lake as a result of construction and agricultural activities, and its primary impact on Salem Lake is a reduction in capacity of its storage volume. In 60 years, the reservoir has

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lost 24 percent of its total capacity. This is not considered to be a critical factor in the longevity of the reservoir given an overall reduction of sedimentation loads, and an expected low future rate of sediment deposition due to the slow rate of development in the watershed. Continued minimization of sedimentation from agriculture and construction activities remains important, however, to overall water quality.

Septic systems are another source of pollution. In 1968, new State Board of Health regulations required a 40,000 square foot minimum lot size for single family development using septic systems in water supply watersheds. In the expectation that 95 percent of the watershed would be sewered by 1979, an exemption to this minimum lot size was granted in the Salem Lake watershed, and 20,000 square foot lots now cover portions of the watershed where public sewer is not available. Only 40 percent of the watershed is presently sewered, and due to economic and geographic constraints, it is unlikely that the watershed will be sewered by the year 2000. Although incidences of septic system failure have been limited in the watershed, septic systems (typically with a design life of 20 to 30 years) are not permanent or fail-safe methods of sewage disposal or treatment.

Watershed Protection Concerns

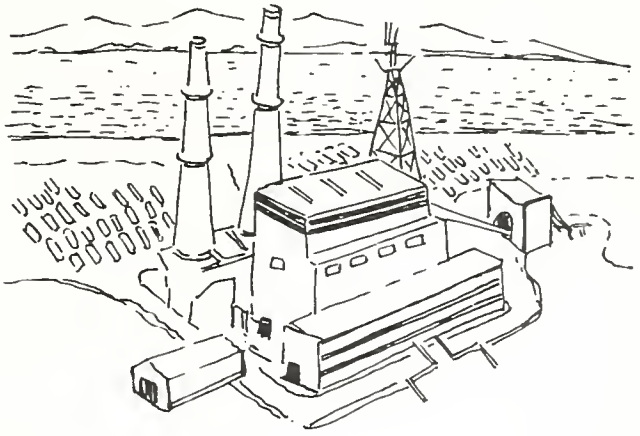
Protection of the watershed has become more important in recent years. Questions have been raised regarding the appropriate type, intensity, and location of development to be permitted in the watershed. Watershed protection measures need to be stricter. In response to the pollution of Kernersville's water supply reservoir and recent controversial zoning proposals in the Salem Lake watershed, local citizens groups and the various governing bodies having jurisdiction in the watershed have promoted watershed planning.

In June 1977 vandals released the contents of Destructo Chemway Corporation's chemical storage tanks into Kernersville Lake. Thirty-eight thousand gallons of chemical waste poured into the lake, the city's main source of drinking water. As a result, Kernersville had to tie into the city-county water supply system and has amended its zoning ordinance to prohibit the location of hazardous waste operations in the watershed.

In August 1982 the City-County Planning Board reviewed a 54 acre subdivision proposal located just west of Salem Lake. Three hundred and seventy-five angry residents from the area

signed a petition opposing the development and requesting that the city purchase the 14 acres of land in the proposed subdivision which drained directly into the lake. In the fall of 1982, the Winston-Salem Board of Aldermen agreed to purchase the 14 acres of land in hopes of protecting the lake as a source of drinking water.

In February 1983 the City-County Planning Board approved a petition to rezone 4.7 acres of land adjacent to Salem Lake from residential to industrial. In May this case was heard by the Winston-Salem Board of Aldermen, who because of their deep concern for the protection of Salem Lake watershed, remanded the case back to the Planning Board for site plan approval. The case has been continued indefinitely.



A Watershed Protection Program for Salem Lake Watershed

The April 1983 request by the Winston-Salem Board of Aldermen to develop guidelines for watershed protection was a result of growing community concern about a valued water resource. The City-County Planning Board staff has drawn up a watershed protection program for the Salem Lake watershed. Elements of the program include:

1. A request to the State Board of Health to revoke the exemption granted in 1969 for single-family lot size in the watershed
2. Creation of a Salem Lake watershed overlay district within which site plan review would be required
3. Development of a county-wide policy for the location and installation of package treatment plants requiring State permits
4. Preparation of a more detailed, long-range development plan for the watershed

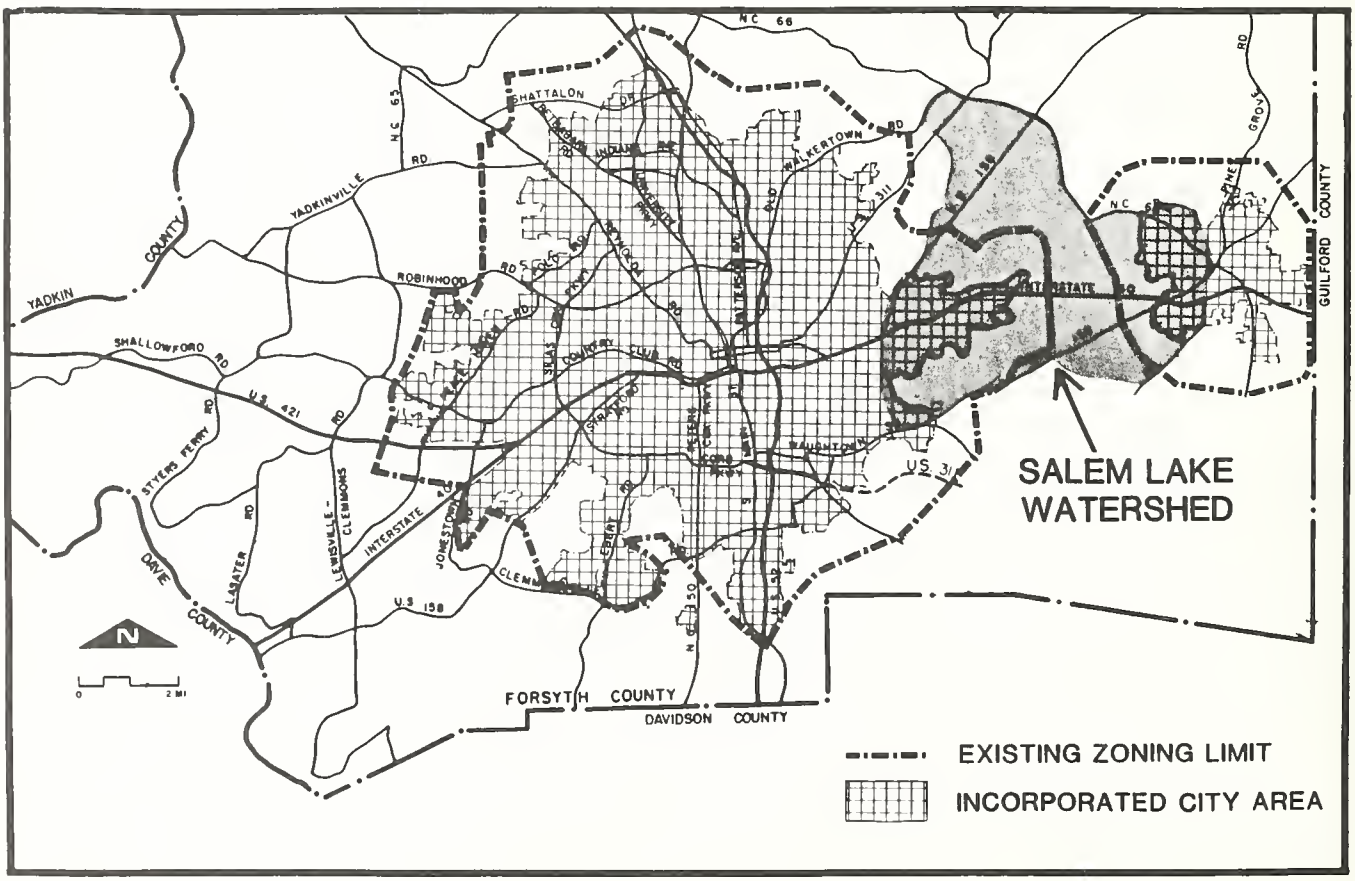
In implementing the three primary elements of the watershed protection program, it is hoped that the three overseeing governmental jurisdictions will each adopt similar requirements and regulations.

In order to achieve the first element of the watershed protection plan, which is to revoke the 1969 lot size exemption, the State Board of Health must receive evidence that there is city and county support for the change. Recently, a proposal requesting a resolution from the city and county managers to reinstate the 40,000 square foot minimum lot size requirement for single-family development on septic systems was approved by the City-County Planning Board, the Winston-Salem Board of Aldermen, the City/County Utility Commission, the Forsythe County Board of Commissioners, and the Kernersville Board of Aldermen.

Now, the state must formally revoke the exemption before the larger lot size will go into effect. Existing 20,000 square foot lots would be grandfathered just as they were in 1968. By reinstating the regulation, single-family development would be in compliance with the intent and content of the 1968 Board of Health regulation. Overall residential density in the watershed would be reduced in order to decrease the risk of septic system failure and nonpoint sources of pollution, and an additional septic system field could be identified on each lot to insure proper septic system functioning should the original system fail.

The second item under consideration is proposed amendments to city and county zoning ordinances adding watershed protection regulations. The proposed amendments were presented at a public hearing before the City-County Planning Board in September 1983. The Board voted unanimously in favor of recommending the ordinance be adopted by the Winston-Salem Board of Aldermen and the Forsyth County Board of Commissioners. It has been requested that the Kernersville Board of Aldermen also consider the adoption of a similar ordinance.

The proposed ordinance creates a Salem Lake watershed overlay district within which land use and development standards are regulated. Within the district, it would be unlawful to proceed



with development or issue building, zoning, or grading permits without required site plan approval. The following two uses, however, would not require site plan approval:

1. Development of a single-family lot in a subdivision with a current preliminary approval, or having final approval granted prior to the adoption of this ordinance
2. Construction of an individual single family dwelling, two family dwelling, or placement of a mobile home on an individual lot

The ordinance would restrict certain land uses in the watershed district. These would include primarily heavy manufacturing and industrial uses, as well as landfills and hazardous material use, storage or disposal. The ordinance would require other land uses such as less intensive manufacturing, restaurants, schools and laboratories to be on the gravity sewer systems within the watershed. A final group of land uses would require a state-licensed engineer to prepare an environmental assessment of any adverse consequences of the proposed use, and to prepare engineering designs showing the mitigation of any such expected consequences. Land uses in this category include less intensive manufacturing, freight terminals, service stations, and storage yards.

PRIVATELY-OPERATED PACKAGE TREATMENT PLANTS ARE AN ISSUE OF GROWING CONCERN

Site plans required in the watershed district would require additional information beyond that already requested on site plans outside of the watershed district. This information includes soils and stream buffer area identification (100 year floodplain). The application of design standards which minimize environmental consequences of development on watershed water quality would also be required.

For approval of the site plans, the following factors would be considered:

- management of stormwater generated by proposed post development design
- control of erosion during and after construction
- fitting the proposed development and minimizing grading
- protection and maintenance of natural drainage ways, stream buffers, and existing vegetation
- minimizing the amount of impervious surface area
- evaluation of the effect of the proposed development upon the water quality of the watershed district
- overall compliance with site plan standards

The third item in the watershed protection program is a recent, but significant, addition. The location of privately-operated package sewage treatment plants in the county, either on the Yadkin River north of the water intake facility or within the Salem Lake watershed has become an issue of growing importance. City and County officials have proposed that a set of guidelines for approving private treatment plants be prepared. Such standards are likely to be stronger than the existing state standards which regulate the amount of sewage a plant may discharge but do not address the cumulative impacts of multiple plant discharges on long-term water quality. Development of a county-wide policy for the location and installation of package treatment plants is likely to meet little state opposition.

The fourth and final task of the program is to prepare a long-range development plan and a set of development guidelines for the watershed. Such a plan would consider the natural features and processes of the watershed; the types of existing land uses; pollutant sources and their impacts on receiving waters; as well as existing ordinances, regulations, programs, and policies affecting the watershed. After analysis of such factors, a land use pattern of appropriate future land uses would be proposed along with land treatment strategies and design guidelines for mitigating watershed water quality problems. The plan would also address such items as: location of major transportation corridors; non-point sources of pollution; rural/agricultural preservation; open space protection; sedimentation and erosion control; stormwater runoff management; type, location and intensity of future development; sewer extension policies; and agricultural pollution. The preparation of such a plan will require the expertise of numerous individuals within the county and its implementation will require continued public support.