

TENNESSEE GROUND WATER CONDITIONS

Importance of Ground Water: More than half the population of Tennessee relies on ground water for its drinking water supplies. West Tennessee relies almost exclusively on ground water. Community public water systems withdraw approximately 291 million gallons of per day of water, with Memphis accounting for 168 million gallons per day average production. There are additional withdrawals by industry and noncommunity public water supplies. Of the population relying on ground water, one in five Tennesseans relies on a private well or spring.

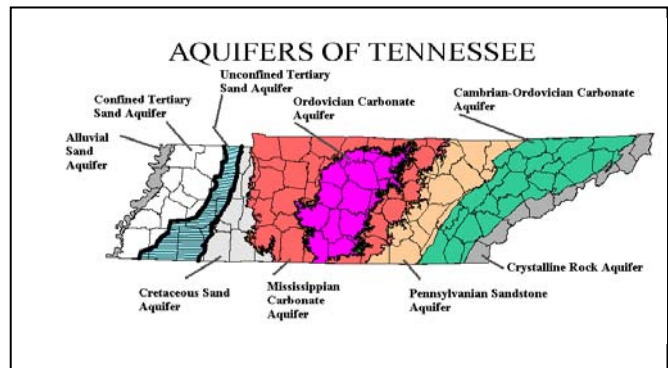
Ground Water Quality: Ground water was once thought to be safe from contamination, but there is increasing awareness that ground water needs to be protected as a valuable resource. It can be quite vulnerable to contamination, particularly in karst terrain or in unconfined sand aquifers. This vulnerability is particularly true for contamination from the highly mobile and widely used volatile organics (chlorinated solvents and gasoline components). Aquifer vulnerability is a complex set of issues, not the least of which is the varying geology and hydrogeologic conditions across Tennessee (Figure 1). The two major aquifer types in Tennessee are the sand aquifers of West Tennessee and the karst limestones (carbonates in Figure 1) of Middle and East Tennessee.

Once ground water becomes contaminated, it is extremely costly and sometimes impossible to clean up. The unconfined sand aquifers of West Tennessee are a problem in that there are no protective confining layers overlying them to

inhibit downward migration of contamination.

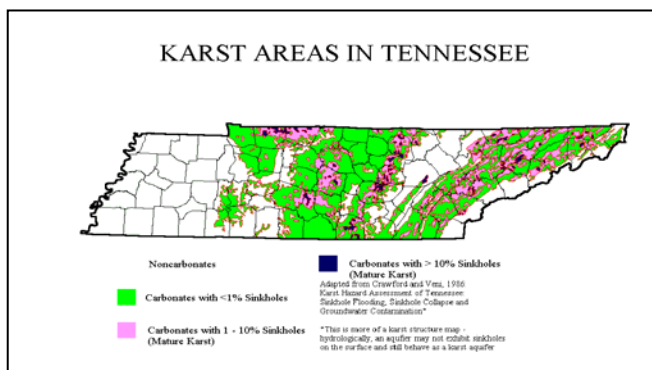
Tennessee also has an abundance of karst (Figure 2) which is highly susceptible to contamination. Karst is characterized by sinkholes, springs, disappearing streams and caves; as well as by rapid, highly directional ground water flow in discrete channels or conduits. Transport times across entire karst flow systems may be as short as hours or weeks, orders of magnitude faster than that in sand aquifers.

Ground Water Quantity: Drought impacts on water supplies are not solely a western states' issue. Within the past five years, there have



been several public water systems relying on ground water in Tennessee with that have suffered the effects of drought (Figure 3). A number of counties in Tennessee are struggling to come to grips with solutions to water problems in Tennessee from rapid growth woes as well as drought conditions (Figure 4). Along the Mississippi-Arkansas-Tennessee border near Memphis, an interstate regional aquifer study is proceeding as the states and local government try to assess the impacts of sustainable water withdrawals and future growth.

What is Needed: There is no systematic ambient water quality monitoring in Tennessee. Public water systems are required to monitor their finished water but not their raw water. There is no monitoring of private wells and springs in Tennessee. Testing of private supplies is the responsibility of the homeowner. The most common contamination is



bacteriological in the form of fecal coliform from failing septic tanks. Failing septic tanks are particularly common in karst areas.

Costs associated with water quality improvements are complex, and not readily available for developing a complete cost/benefit assessment. There is a major gap between threatened susceptible ground water resources and implementation of resource evaluation and pollution prevention programs. Additional resources are needed to fill the gap to better understand ground water quality and implement needed protection programs.

Further resources are needed to:

- ◆ Perform ambient water quality monitoring and ground water evaluations across the state
- ◆ Provide assistance to small community water systems to develop local ground water/wellhead protection programs
- ◆ Monitor and assess ground water contributing to ecologically vital and sensitive ground waters
- ◆ Consistent funding to assess sustainable water withdrawals and future growth in the MS-AR-TN area in the vicinity of Memphis, TN and Tunica, MS.
- ◆ Statewide/regional water supply planning to assess sustainable yield and future growth.

