

Groundwater

Our Unprotected Resource

Charlottesville/Albemarle County League of Women Voters

The James River is at its lowest level in 100 years. A large County subdivision has had to resort to hauling water in, and rural families all across the County have heard the cry, " Our well is dry!" (*summer 1999*)

The current drought has had a devastating effect on the supply of underground water upon which about half of the County's rural population depends (12,600 families). Everyone else in the County and Charlottesville depends on the treated surface water of the Rivanna River, Totier Creek (Scottsville) and Beaver Creek (Crozet) reservoirs.

Most rural homes have individual wells, but others depend on 16 community water supply systems in subdivisions such as Earlysville Forest and Peacock Hill. There are 49 non-community systems serving facilities such as schools, motels and restaurants. In many cases these systems are distant from the public water lines of the Rivanna Water and Sewer Authority (RWSA) and the Albemarle County Service Authority (ACSA) and will always depend on groundwater.

How much do we know about the groundwater for all these wells? Not a lot. Because we know so little, we are in danger of thoughtlessly contaminating, depleting or otherwise abusing this source of water. However, we do know enough to understand that groundwater is a precious resource that needs protection just as surface waters do, and that it is up to local jurisdictions and their citizens to ensure this protection.

The Nature of Groundwater

In our location, beneath the eastern slopes of the Blue Ridge Mountains, groundwater percolates downward through forest litter, soil and rock layers and enters fissures in the underlying bedrock. The geometry and density of the bedrock fractures in Albemarle County determine the amount of groundwater available, but the unpredictability of these fractures makes the possible yield difficult to evaluate on the surface. Flowing slowly through the bedrock, groundwater may emerge as a spring or may drain swiftly away into streams that lead to lakes, pond or reservoirs. Unlike other regions across the country, our area has no well-defined underground aquifer that stores large quantities of water.

The Interrelationship of Groundwater & Surface Water

Groundwater and surface water are closely related: groundwater provides the base flow of many streams. The two recharge each other, and the polluted water of one can pollute the other. Both are affected by the human use of the land above and/or adjacent to them.

Although the two systems are interrelated, Virginia's Riparian Doctrine (surface water) and its Old English Doctrine for groundwater do not recognize that relationship. The Riparian Doctrine discourages water users from depleting the supply of a user downstream. But nothing prevents a user of groundwater from withdrawing any amount even if doing so causes his neighbor's wells to go dry.

Groundwater, like surface water, is vulnerable to literally hundreds of subsurface events, such as leaky underground storage tanks and malfunctioning septic systems. Surface activities such as application of road salts, fertilizers and livestock wastes can also impact groundwater. But unlike surface waters, individuals domestic wells are only

indirectly protected by the Clean Water Act (CWA) or the Safe Drinking Water Act (SDWA). Both federal and state agencies have expanded their efforts to prevent groundwater contamination, such as the 1998 amendments to the SDWA. However, by and large, the responsibility to protect groundwater, especially in individual domestic wells, is left to local jurisdictions. It is a community's responsibility to prevent its contamination, depletion or misuse.

Wells as Water Supply Sources

We know that, historically, groundwater in this area has not been a long-term reliable source for drinking water as population density increases. Charlottesville abandoned its wells over 100 years ago when increased population caused a combination of over-pumping and overflowing privies. City fathers went to the County to buy land and build the first of its mountain stream reservoirs at Ragged Mountain. This was followed later by the Sugar Hollow reservoir on the Moorman's River and the Rivanna Reservoir on the North Fork Rivanna River.

Almost from the day it was created, the ACSA has had to extend water lines to County subdivisions when their community water systems failed to keep up with development. A former county engineer wrote that every one of those systems "was a troublemaker, a worry and a vexation as a supplier of water!" Several subdivisions with their own well systems periodically have problems meeting demand, especially during summer months. While there are arguments in favor of central wells, the ACSA does not encourage proliferation of privately owned systems, because experience has shown a possibility that they will fail and have to be taken over by the Authority. This is a costly procedure. Random central systems are also considered to be contrary to County efforts to guide development to designated growth areas.

We do not have reliable data on the quantity and quality of Albemarle's groundwater. We do not know how much groundwater is available, how much is being pumped out daily from the hundreds of domestic wells, whether all of it is safe to drink and whether over-pumping is depleting the supply. Owners of private wells and septic systems pay for their design and installation and for permits from the State Health Department. Thereafter, usage is subject to no fees or record keeping, there is no metered measurement of the volume of water withdrawn or wastewater discharged, and there is no further oversight by the Health Department.

The Impact of Growth on Water

There is concern that an increased population can adversely affect the both the quality and quantity of groundwater. Despite County policy to discourage residential development in the rural areas, the number of homes with individual wells and septic systems continues to increase rapidly. Estimates for the 1983-1998 period indicate a 20% increase in the number of people dependent on that fragile source of water. Due to the particular geology of Albemarle, well yields may be good in some areas. But in other areas there may be low yields or none.

Continued development depending on groundwater will create some troublesome public policy issues. No matter whose estimates one uses, the potential development based on current land use policies, plans and ordinances is staggering. For instance, the Thomas Jefferson Planning District projects a potential build-out in Albemarle County of 74,023 units. In other words, 59,140 more dwelling units could be built beyond those that now exist. Granted that those figures represent the extreme scenario and that current trends may not continue, there is concern that the region may not have the water to sustain that level of development. Without conservation and efficient use of water, increased withdrawals will jeopardize rural wells and deplete the essential groundwater recharging of streams and rivers.

Are We Protecting Our Groundwater?

Considering such a substantial potential for additional development in areas dependent on groundwater and its vulnerability to contamination, groundwater protection should be a major local concern. Yet local governments were not directly involved in protecting groundwater until 1989 when state law recognized groundwater as a basis for zoning decisions.

As a result, prior to 1989, Albemarle's Comprehensive Plan did not even mention groundwater protection. The current plan (1999) includes the following goals: "Protect and conserve the County's surface and groundwater supplies for the benefit of Albemarle County, the City of Charlottesville, the Town of Scottsville, downstream interests and ecological communities within the region."

A 1990 Groundwater Protection Study by the County contained twenty options for addressing groundwater issues. The options included measures for information gathering, voluntary actions, policies and regulations. In 1993, the County's Water Resources Committee revisited the original study and stated several high priority recommendations. These included: (1) educating the public and homeowners about responsible stewardship of groundwater resources, (2) promoting voluntary well testing, (3) developing a database of groundwater information, and (4) encouraging better communication among the eleven state agencies whose responsibilities include some that affect groundwater. State and local agencies responsible for water management do not always share information important to others, a situation that is a source of frustration at the local level as officials try to develop data about the County's water resources.

In 1994, the County completed a pilot groundwater study in the Hardware River watershed, and in 1995, co-sponsored a Countywide voluntary well-testing and education program in conjunction with Virginia Cooperative Extension. Approximately 500 County households participated in the program, which was the highest number of any county served by the Extension program. This attests to the interest that County residents have in groundwater issues.

Regardless of the amount of either surface or groundwater available, it is lost to human use if it becomes polluted. The Groundwater Protection Strategy for Virginia (1987) identified five potential sources of groundwater contamination: landfills, septic systems, underground storage tanks, waste lagoons, and pesticides and fertilizers.

Of these, septic systems have been targeted for attention as the leading contributors of waste directly to the ground. About half of Albemarle's households have this method of wastewater treatment and disposal. It also makes septic systems a large source of recharge to groundwater. In times of prolonged drought, it may be the only source.

The Trouble with Septic Systems

Not all soils are suitable for septic systems, which require careful siting, construction and maintenance. The Soil Conservation Service (SCS) classifies soil for septic drainfields as those with "slight limitation," "moderate limitation" and "severe limitation." Any soil with more than 15% slope is considered "severely limited, regardless of soil type. According to the SCS, most of Albemarle's soils are in the moderate to severe categories.

Instead of being operated by trained staffs as public water supplies are, those domestic wells and the accompanying septic systems become the responsibility of homeowners who may or may not know how to take care of them. Often they are newcomers to the rural way of life and have never experienced providing for their own basic utilities. They may not understand how their septic system works and, since this on-site sewage treatment system is underground and does not require daily attention, many homeowners rarely think about it. Often, they do not have a clue as to the location of their septic tank. Haplessly, they may pour grease down the sink, use the toilet for a wastebasket, and fertilize heavily the grass and trees they planted over the drainfield. It might be news to them that neither the tank nor the drainfield should be under a patio, garage, storage building, driveway, sidewalk or other paved surface. They may never wonder whether their septic system, installed years ago, is adequate to handle the amount of water used in modern appliances. They may not check to see if the system had been expanded when a bedroom or two were added to the house, or the drainfield increased by 50% when a garbage disposal was installed. And they never pump out the septic tank until wastewater bubbles up in the yard or backs up in the basement.

If properly sited, constructed, and routinely pumped out (every three to five years), a septic system can last for years. The drainfield is the most fragile part of the system. Its failure to treat the year-round liquid waste load can contaminate not only the owner's well but that of his neighbors also. There are several reasons why septic systems fail, but one of the most common is plain ignorance, misuse and neglect.

An Ounce of Prevention

The most effective and economic protection of groundwater is prevention of contamination. Because polluted groundwater is out of sight, it is far more difficult and expensive to restore to health than polluted surface water. Albemarle County cannot afford to wait until there is widespread evidence of pollution. Other communities across the country have learned the hard lesson that a bit of prevention would have been worth many pounds of cure.

Most people understand the value of prevention and will support educational and volunteer efforts as strategies for a groundwater protection program. Opposition may arise, however, when officials or citizens move into the sensitive realm of increased regulation. An example is the 17-year long battle in Virginia over septic system regulations. Controversial when adopted in 1982, Virginia's requirements remain among the weakest in the nation. The current regulations were never meant to protect groundwater. Their required minimum distance between the bottom of a drainfield and the seasonable high water table is only two to three inches, depending on soil type and percolation rate. This was designed for the quickest possible disposal of sewage, not for its treatment by giving soil time to filter out pollutants.

Because any proposal to increase restrictions on rural development generates considerable controversy, it took an act of the General Assembly in 1990 to authorize the Health Department to take groundwater into account in developing septic regulations. To implement that authority, the Secretaries of Health and Human Resources, Natural Resources and Economic Development appointed a Task Force on Septic Regulations. It was facilitated by the University of Virginia Institute for Environmental Negotiation.

The Task Force found that "Research consistently shows that high water tables are the major factor contributing to phosphorus, bacteria and viral groundwater contaminants from on-site wastewater disposal systems." Therefore, it recommended that the minimum two to three inch distance be increased to 24 inches. Additional proposed changes to strengthen regulations included: increasing separation distance from rock, certifying septic system contractors and well-drillers, establishing water availability before issuing a building permit, and requiring maintenance agreements for regular "pump-out" of septic tanks.

Because future development in many areas of the state will depend upon on-site disposal systems, the Task Force also examined the economic impact of septic regulation changes and alternative technologies on site development, housing costs, and industrial and home development. Well aware of the potential for opposition, the Task Force attempted to produce a balanced consideration of all these issues. For example, they concluded that the only way to make changes in separation distances without unnecessary restrictions on development in certain areas is by encouraging broader, more responsible use of alternative technologies not widely used in Virginia.

It is possible that the Task Force never realized the power of the opposition, for, to this day, political pressure has kept the proposed regulations bottled up in Richmond. They have never been adopted. Therefore the 1982 regulations are the ones still used to site and construct septic systems in Albemarle.

Localities can adopt more protective regulations, as counties in the Piedmont and elsewhere have done. Albemarle has additional requirements for replacement area, set back and slope, but has gone no further than that.

The State Department of Health has more recently advanced regulations that would increase the minimum distance between the bottom of the drainfield and the top of the water table to 18 inches. This would be an improvement. However, experience has indicated that localities are more effective in instituting changes. The new Albemarle County Comprehensive Plan calls for a study of state regulation and additional measures to adequately protect groundwater from septic systems.

The Role of the Health Department

The key to development in the County beyond public water and sewer lines is having access to adequate, safe water and to soils that meet septic regulations. The persons responsible for determining if a water or septic system application meets state or local requirements are the state's Department of Health Sanitarians. Water Resources Administration in Virginia: Analysis Evaluation had this to say about their responsibility for groundwater protection: "Administration of septic tank controls is a difficult task because such regulations serve as a direct restraint on land use development. Since septic tanks provide the only feasible system of domestic disposal in many areas, denial of a septic tank severely limits the potential for development."

It is well known that "The power to extend water and sewer lines is the power to extend growth." Not so well recognized is that this power to approve septic systems is also the power to extend growth. Therefore it is in the County's interest that sanitarians be well trained and committed to enforcing regulations. Pressure to approve a

septic system application under marginal circumstances could prove disastrous for the property owner and expensive for the County to remedy.

Septic failures in subdivisions sited on unsuitable soils before state regulations were adopted present problems for sanitarians. There is often no place to site a new drainfield that would meet the current (1982) regulations. Rather than condemn the property, small lot sizes are frequently overlooked and replacement systems installed.

Some Remedies

The Groundwater Protection Study's "grab bag" of ideas suggests identifying places unsuitable for either well development or septic construction. To do this, we need access to good hydrogeologic information for the Charlottesville/Albemarle area. The establishment of a hydrogeological database will require adequate staffing for collection and analysis of data and improved information sharing among agencies that deal with water. The data would benefit both public and private interests by pinpointing locations where groundwater is more available and soils more likely to "perk," and, conversely, where development would be unwise. This information could serve to avert future economic and environmental catastrophes.

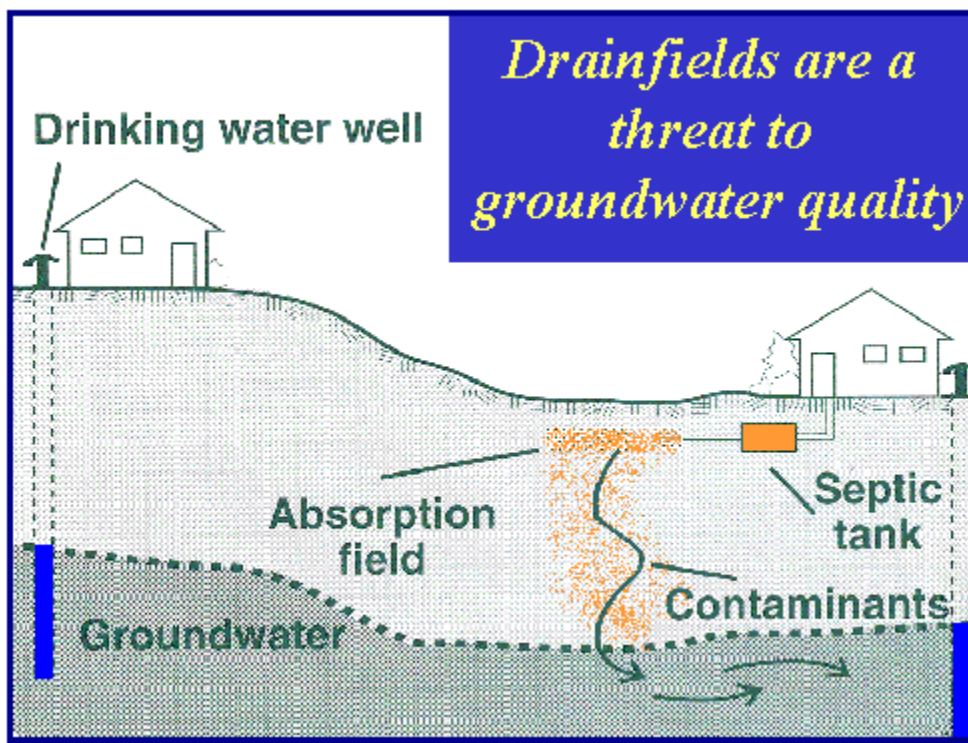
The Study also suggested considering a policy of stating on plats that the County will not provide water or sewer service to the lot if the well and/or septic system fail. This would put purchasers on notice that the County will not bail them out.

It may take several years to carry out the principal recommendations of this study.

However, as much as we need standards, regulations and strategies to protect the quantity and quality of such a limited resource as groundwater, we must do a better job of opposing those zoning and land use decisions that result in mismanagement, overuse or degradation of water and other vital resources.

The ultimate goal of a groundwater protection program is to make sure that we have enough water and that it is not contaminated. The possibility of septic systems polluting groundwater is not exactly as attention grabbing as siltation depleting reservoir capacity, but it can be equally devastating. As long as we permit disposal of sewage directly into the ground with regulations that were never meant to protect groundwater, we are putting current and future water users at risk.

One should keep in mind that protection of groundwater is a local responsibility. The County has the authority to strengthen the state's weak septic regulations and tailor them to its own requirements. Such action will mean moving from educational and voluntary approaches to increased regulation. Until citizens become informed and insist on a "prevention is the best protection" policy, there will be little or no support for groundwater protection. We

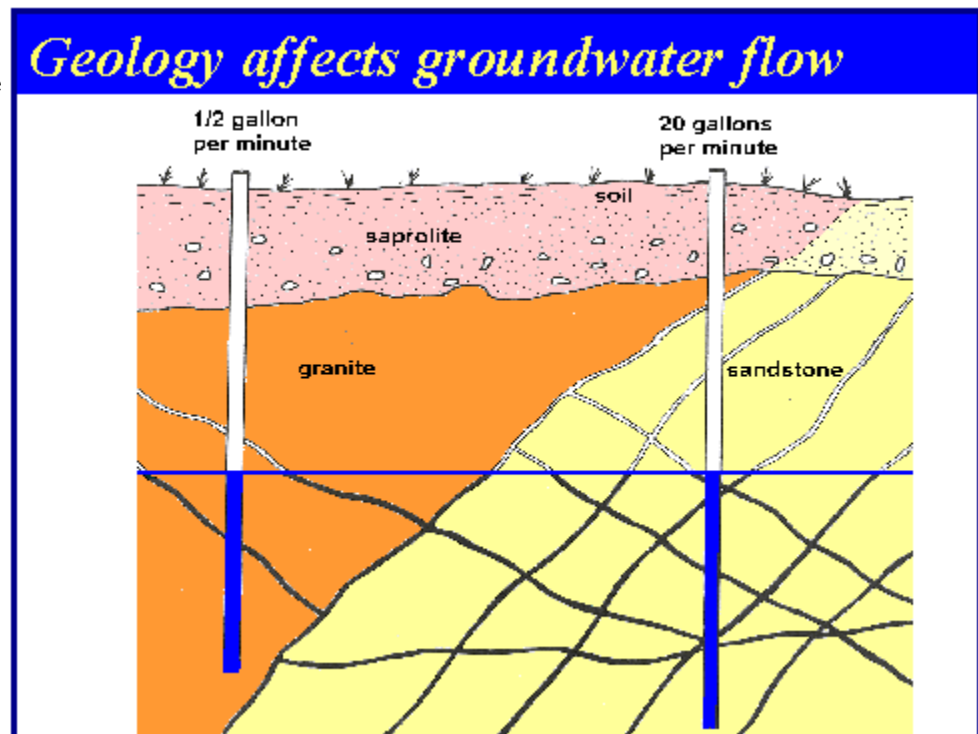


will just muddle along and groundwater will remain the unprotected, undependable lifeblood of rural development.

Septic Systems: Potential for Pollution
Virginia's septic system regulations are among the weakest in the nation and were not meant to protect groundwater. Depending on soil type and percolation rate, their required minimum distance between the bottom of the drainfield

and the seasonable high water table rate is only 2 to 3 inches.

**Well Water:
Unpredictable
Lifblood of Albemarle**
*About half of the
County's rural
population depends on
groundwater from wells,
but we do not have
reliable data on its
quality or quantity.
(Small yield well
intersects few fractures;
large yield well
intersects many
fractures. Thin line
indicates water table.)*



Acknowledgments

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League of Women Voters of the Charlottesville Area

PO Box 2786

Charlottesville, VA 22902