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## Local land use planning for rural groundwater protection in Vermont and northern New York

By Leslie A. King and Glenn R. Harris

**ABSTRACT:** An exploratory survey was conducted of land use planning for rural groundwater protection in 41 towns in Vermont and northern New York. Most communities have experienced contamination and/or supply problems but lack the information necessary to take action to prevent problems in the future. Federal and state governments should improve communication with local governments in rural areas and provide more usable groundwater information. Planning officials perceive existing regulations to be ineffective for protecting groundwater. In view of local resistance to state intervention and new regulations, we recommend an incremental approach, incorporating groundwater protection provisions into existing zoning or site plan review ordinances.

**N**ORTHERN New York and Vermont have experienced increasing growth pressures in the past 20 years—pressures that threaten environmental quality throughout the region. Assisted by such state measures as Vermont's Act 200 and Act 250 and the New York State Coastal Zone Management Act, local officials generally have been strengthening land use controls to protect the environment and quality of life (17).

Our research identified and evaluated specific measures for local groundwater protection in rural areas and sought to answer several questions: To what extent do local

planning officials consider groundwater in land use decision-making? How aware are local planning officials of groundwater problems in their communities? What existing local ordinances currently protect groundwater? What obstacles exist to implementing groundwater protection measures and how might they be overcome? What information would help local governments better protect groundwater?

Survey data from local planning officials may aid in identifying knowledge of, actions regarding, and information needs about groundwater. Such information, we hope, can assist local communities to protect groundwater through more effective use of existing land use controls, particularly by incorporating new groundwater-specific measures into local regulations. Land use controls are preventive measures and should contribute significantly to avoiding the costs and environmental impacts of groundwater contamination and remediation.

Professional planners and academic re-

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searchers have written a great deal about the current groundwater "crisis" in the United States. They have documented sources of groundwater degradation and depletion (6, 19, 22) as well as incidents of industrial contamination of drinking water through the improper disposal of hazardous wastes and related health effects in such communities as Love Canal, Woburn, Silicon Valley, Times Beach, and others (3, 5, 9, 20). Other researchers have suggested methods of mapping groundwater as the basis for decision-making concerning the protection and clean-up of contaminated aquifers (8, 29). Much also has been written in law and policy fields about the need for national and state groundwater policy and programs (1, 4, 7, 14, 28).

With the passage of the Resource Conservation and Recovery Act amendments in 1984, Comprehensive Environmental Response, Compensation, and Liability Act (Superfund Amendments and Reauthorization Act) amendments in 1986, and Safe Drinking Water Act amendments also in 1986, researchers have focused on methods for determining groundwater contaminant standards and developing state monitoring programs (14, 18, 25). While many people have argued strongly for the use of local land use controls to protect groundwater and for the importance of preventive measures (2, 16, 21, 27), few have conducted empirical investigations of the existence, use, and effectiveness of such measures. A limited number of case studies are useful in identifying innovative local measures to be investigated and evaluated (11, 16, 26). Agencies at the state and federal levels have published handbooks for local groundwater protection (13, 23, 24), but these documents rarely are based on research and fail to give specific guidance about what techniques have proved effective in different locations or about the feasibility of implementation at the local level, especially in rural areas.

Building on the actual experience of a number of towns in rural New York and Vermont, we hope our research suggests reasons why rural communities have not acted to protect groundwater. Our conclusions should also provide local decision-makers with a sounder basis for recommending and instituting specific land use measures to protect groundwater in small towns and rural areas.

### Study methods

We conducted our survey of planning commissions in three counties in Vermont (Chittenden, Franklin, Lamoille) and planning boards in two counties in New York (Jefferson and St. Lawrence) between Sep-

tember 1988 and April 1989. We selected these counties because of their hypothesized reliance on groundwater, their predominantly rural character, and their similarity to other counties in the region. The populations of the study towns generally were less than 10,000 in areas ranging from 50 to 100 square miles. Most of the population is scattered across the countryside, with one or two small villages of 3,000 to 5,000 people in most towns.

We administered a structured questionnaire on a face-to-face basis at a planning commission meeting in each town. Chairs of planning commissions were contacted in advance and the survey was placed on the agenda of a regularly scheduled meeting open to the public. Each question was discussed by all planning commission members until the response could be agreed upon by the group. Planning commissions were assured that data would be analyzed and reported anonymously. All commissions were offered copies of the final report.

Questions in the survey investigated community reliance on groundwater and explored the knowledge of local planning officials about groundwater problems. We also asked questions about the extent to which groundwater was considered in land use decision-making and the existence and perceived effectiveness of current land use regulations for protecting groundwater. Other questions addressed the nature, availability, and adequacy of information about groundwater resources and the willingness of the community to implement new groundwater protection measures. We combined the answers to each question into a single data pool to obtain a composite picture of local planning for groundwater protection in this rural region.

We surveyed a total of 41 planning commissions, 17 in northern New York and 24 in Vermont. Planning commissions in this area generally are composed of community volunteers making decisions on the basis of consensus agreement. Most commissions review proposals for development under rudimentary land use controls enacted within the last two decades. Eighty-five percent of the communities had zoning laws, 76% had subdivision regulations, and 78% had site plan review. All but one of the towns have a sanitary code or other laws regulating the size and location of septic tanks.

### Results

Not surprisingly, most commissions indicated that residents rely heavily on groundwater for water supply. In 88% of the towns, respondents reported that 98% or more of the residents that were not on municipal water relied on groundwater as

their water supply. Furthermore, many of those towns that provide some of their residents with municipal water draw it from wells; 83% of the towns provide some sort of municipal water service to residents living in clustered areas; and of these municipal water services, about two-thirds draw upon groundwater. Thus, we verified the importance of the groundwater resource in rural areas, and our results correspond with other published sources (4, 22).

We also found that groundwater was a major concern of planning commissions when making land use decisions. Almost two-thirds (61%) of the commissions reported that they always consider groundwater when deliberating development proposals, and an additional 22% indicated that they consider groundwater often. The members of planning commissions in northern New York and Vermont are environmentally conscious, according to previous research (12), so the high level of concern we found for groundwater reflects the general predisposition of planning officials as well as the importance of this resource to the communities. Furthermore, most of the planning officials (90%) we surveyed reported that their communities had faced groundwater problems within the last decade. Problems included inadequate supplies, as a result of both increased demand and the paving of recharge areas with impermeable asphalt, and pollution from a variety of sources, including road salt, sewage, underground gasoline storage tanks, hazardous waste sites, and agricultural pesticides and fertilizers. We were surprised at the high percentage of communities reporting groundwater problems, and in light of the importance of groundwater as a source of water supply, it seemed both appropriate and encouraging that a large number of planning commissions raised groundwater issues in land use deliberations.

This high level of concern, however, has not been translated well into specific regulatory or other protection action. Rural communities in our study practice relatively informal and elementary land use planning. Moreover, the degree to which groundwater protection has been incorporated into such measures as zoning and site plan review is limited. Fewer than one-third (29%) of the planning commissions reported that current regulations were effective in protecting groundwater, and only one board reported that its regulations were very effective.

The inability of planning commissions to institute specific activity that reflects their concern is a two-fold problem. First, planning commissions reported that they have little information about groundwater resources

in their towns. Less than half (44%) indicated that they had information related to the size and location of aquifers and groundwater recharge areas. In addition, less than one-third (29%) of the respondents indicated that they had sufficient information related to known sources of groundwater pollution. Without adequate data on groundwater resources, planning commissions may be reluctant to take firm action rejecting proposals for land development, particularly when the perceived financial implications of denial are great. Information on groundwater resources is, therefore, an important need perceived by many local officials.

This difficulty, in our opinion, could be overcome with a substantial increase in basic scientific and technical data to locate, measure, and map groundwater resources. The funding for such research and information transfer to rural areas must come from state and federal sources. Given the high costs of acquiring basic groundwater information, coupled with the relative poverty of most rural areas, it is unreasonable to expect local governments in rural areas to contribute substantially, if at all, to this needed task.

When available, information on aquifers and recharge areas usually was in map form, but rarely was the map of a scale appropriate for inclusion in the formal inventory of natural resources that is normally part of the master plan for small towns in rural areas. Among the towns in the survey, natural resource inventories usually are at scales of 1:24,000. It would be useful if groundwater information could be presented on maps at this scale so it would be compatible with other map overlays.

The second reason that local planning commissions have had difficulty translating groundwater concerns into concrete action is even more problematic. As a relatively recent activity of government in rural areas, land use planning often is viewed skeptically. A long tradition of self-reliance and independence has contributed to a reluctant acceptance of measures that might restrict individuals from complete freedom to do with their land as they please. In the past, resistance to basic methods of land planning like zoning often has been vocal and emotional. Any attempt to implement additional land use laws is apt to be received unenthusiastically, and this fact is recognized by local officials. Thus, we found that only 46% of the respondents were interested in passing and implementing regulatory measures to protect groundwater.

So while planning commissions are very concerned about groundwater, they are unsure what to do about it. Rather than separate ordinances addressing groundwater

exclusively, a better approach in our opinion is the integration of groundwater protection into existing laws related to zoning and site plan review.

The most effective law used by local planning commissions at this time is a sanitary code or sewage ordinance to regulate domestic sewage. Usually, such statutes place restrictions on the size and location of leach fields for septic tanks, depending upon soil conditions. While the ordinances have proven to be useful for minimizing the degradation of groundwater by septic effluent, their scope is limited for the variety of pollutants that contaminate groundwater in rural areas. Furthermore, sanitary codes simply govern the construction of septic systems. They do nothing to address the larger issues related to the extent and location of development itself, nor do they deal with problems of supply that might result from building in groundwater recharge areas. The sanitary code, therefore, is an effective but limited first step for protecting groundwater, and we found such laws to be widely employed by local planning commissions.

Finally, the planning commissions we interviewed were confused about what federal and state laws protect groundwater in their communities, as well as what role, if any, they might play in implementing those laws. When questioned on the subject of applicable laws, most planning commissions usually were unable to cite any relevant statutes or programs, identifying instead programs that they had dealt with in other contexts but did not apply to groundwater, such as the federal flood insurance program. About one-third of the towns in New York correctly observed that state laws protecting wetlands contributed indirectly to groundwater protection. Overall, however, federal and state policy on groundwater has been communicated poorly to local officials; there is a need for some improvement in communications.

### Implications and a strategy

Based on the survey results and on extensive interviews with selected planning officials, several approaches were identified for communities in rural areas to protect groundwater. It is at the local level that most land use decisions that have impacts on the quality and quantity of groundwater take place. And it is at the local level that effective action to protect groundwater is needed most and, as our results show, often most lacking. Little or no help is available to local communities struggling to preserve groundwater resources. Many people advocate either strong state action or new groundwater ordinances at the local level. Some

researchers have advocated comprehensive groundwater management, planning, and regulatory programs, including the development of separate groundwater protection ordinances (16, 21, 26). These specialized ordinances have been proposed for large- and medium-sized urban areas, for example, Schenectady County, New York; Dade and Broward Counties, Florida; and Austin, Texas, which already have complex land use regulations.

We doubt that small rural communities, that have only recently and reluctantly adopted zoning and subdivision regulations, will rush to enact separate groundwater protection ordinances. Specific "source controls" have been recommended where "political support for comprehensive groundwater management planning and regulation is lacking" (16), but such pollutant-specific measures fail to address the problems of growth and development that are characteristic of the rural Northeast. Specific source controls, in addition, often require specialized knowledge unavailable to typical rural planning commissions.

Research we have conducted in the region regarding environmental protection at the local level leads us to believe that strong state directives would also prove to be unacceptable at the local level (12). The Vermont state groundwater strategy, for example, depends upon communities petitioning the State Agency of Natural Resources to reclassify groundwater resources to Class I as a basis for strict groundwater protection measures in that zone. To date, no communities have so petitioned. The agency is taking the initiative, on a trial basis, to reclassify nine areas and is anticipating a great deal of resistance from local landowners. Several members of planning commissions surveyed were adamant about not wanting "heavy-handed state regulation," nor did they want to be "tied down by state regulation."

As well as opposition to state directives, local communities have expressed lack of confidence in the state's ability to protect local resources, as illustrated in a recent case in Charlotte, Vermont. A developer of a commercial subdivision proposed a septic disposal area in an identified wellhead protection area. The state agency was asked to review the proposal and responded that they saw no problem with the development. The planning commission was frustrated by what they saw as a lack of state guidance concerning groundwater protection at the local level.

Thus, even in a region with a tradition of strong local home-rule and environmental concern, it is doubtful that either of the prevailing prescriptions for groundwater protection will be effective. We, therefore,

would recommend a more incremental approach to local groundwater protection—an approach we believe is more realistic and acceptable to rural communities in this and other regions of the country.

We suggest that small towns in rural areas obtain information on aquifers and groundwater recharge areas. Consistent with policy recommended by the U.S. Environmental Protection Agency, a method has been developed for towns to map groundwater recharge areas based on information about soils and surface geology (11). But federal and state governments will have to play a strong role in developing groundwater information for rural communities. Rural towns do not have the financial resources necessary to collect detailed information without assistance. Information on aquifers and recharge areas should be incorporated into natural resource inventories for the towns and should, therefore, be mapped at an appropriate scale. If groundwater is included in the natural resource inventory, it becomes one of the several factors that would be considered by towns to protect areas of ecological sensitivity. Equipped with a map of groundwater resources, planning officials could use it as one criterion for siting special projects, such as waste disposal facilities, which pose a particular threat of contamination (10). A map of groundwater resources also would be a useful data base for more conventional deliberations on proposals for residential and other developments.

To make consideration of groundwater a meaningful activity, we believe that towns in rural areas should incorporate groundwater protection into existing land use controls. While a simple amendment to an existing regulation may cause attention to groundwater to dissipate, such an approach is at least likely to be implemented. Most of the towns in our study use zoning or site-plan review. To amend a basic zoning ordinance, planning officials should establish an "aquifer recharge overlay district" that embraces aquifer recharge areas of concern. Then, within this district, specific land uses can be permitted and prohibited, and standards established for minimum lot size and coverage by impervious surface area. Such an overlay district can be superimposed over other districts already included in the zoning ordinance. An aquifer recharge overlay district in Adams, New York, permits only agricultural and residential land uses with a minimum lot size of 2 acres and a maximum impervious surface area of 20%. Chester and Manchester, Vermont, have similar ordinances (13), as do other towns throughout the nation (16).

Towns with site-plan-review laws should

establish groundwater as one of the specific standards by which proposals for development will be evaluated. The site plan law for the town of Lisbon, New York, includes 14 different standards that serve as the basis for evaluating site plans. This law could be amended to include groundwater as a fifteenth item. The planning board of that town could then review site plans in terms of impact specifically on groundwater, in addition to other considerations already included in the law.

Regional and county planning offices in rural areas often can assist town officials wishing to modify land use controls to incorporate groundwater protection. Model ordinances and technical assistance were provided to some of the towns in our study through regional planning commissions (13, 15). A regional planning agency, The Temporary State Commission on Tug Hill, for example, provided guidance for some towns in New York (15).

These proposals are modest. They do not require radical rewriting of existing land use controls, nor do they require the passage of separate groundwater laws that are likely to be resisted as yet more intrusions on private property rights. Nevertheless, they provide local planners with sufficient regulatory power to take action to protect groundwater at the local level. The more difficult component of this proposal is the development of adequate information about the size and location of aquifers and recharge areas so that local governments have full knowledge of what they are specifically trying to protect.

Groundwater has emerged as one of the most significant environmental issues of the past decade. Although it is generally recognized that cleaning up contaminated groundwater and finding alternative water supplies is an exceedingly expensive and often ineffectual undertaking, preventive measures, such as local land use controls, only recently have begun to achieve priority in groundwater strategies. While there are many reasons for this, lack of readily usable groundwater information, resistance to land use planning, and inadequate understanding of the potential of land use techniques appear to be the most salient. The problem of preventing future contamination of rural groundwater supplies is increasingly critical. The serious and often irreversible impacts of groundwater contamination make inaction at the local level an extremely costly option.

Yet, as our research showed, in a rural area heavily dependent on groundwater, where incidents of groundwater contamination are rapidly accelerating, planning commissions often lack the information and confidence to take action to protect groundwater

resources. Some planning officials also are frustrated by the lack of guidance and technical expertise available to them. Federal and state officials should focus efforts on providing usable, understandable information to rural local governments. Local officials should use that information to institute groundwater protection measures in the most expedient and acceptable ways available. Those measures need not involve costly, comprehensive regulatory and management strategies, nor protracted political battles. After action has been taken at the local level, research should be done to determine its effectiveness. The seriousness of the groundwater problem requires wise land use decisions and should be a major reason for strengthening local planning in rural areas.

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