WATER QUALITY — EVERYONE'S PROBLEM

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Background

The issue of water quality, more specifically the quality of drinking water derived from groundwater, is one that is much in the news and on the minds of policymakers at all levels of government. In the past, groundwater has been considered pure and clean; recently there has been abundant evidence that this critical national resource can be and is contaminated.

Prevention

Good quality water requires protection of the source, and groundwater aquifer protection requires policy decisions many of which must be made at the local level. Land use decisions are critical to the maintenance of high quality groundwater. Decision makers must evaluate the effects of agriculture, residential development, sewering, industrial siting, and landfills. It is not always obvious which course to take, and the situations can become quickly polarized.

Water bearing aquifers do not fit nicely into political boundaries on the land surface. Poor judgment with respect to an activity on the land can lead to contamination of a drinking water source in the next town or municipality. Agricultural activities could affect a major groundwater source.

Health Effects

The degradation of our groundwater has potential health effects that concern many groups in the population. Individuals and families are faced with uncertainties about what is in their water, what are safe levels of contaminants, and what they should do about it. Local governments and communities are faced with water quality decisions. The agricultural sector is concerned about farm family health, animal health, and continued crop production without contaminating the environment. Fear of negative health effects from contaminated drinking water is an issue that is not easily resolved because there are no easy answers.

One reason for the fear and uncertainty about water quality is that many of the health risks associated with contaminants in water have not been well-defined. The current federal guidelines (Interim Primary Drinking Water Regulations) established by the United States Environmental Protection Agency (USEPA) under the authority of the Safe Drinking Water Act of 1974 cover only a limited number of chemicals. Ten inorganics, four pesticides, two herbicides, trihalomethanes, microbiological contaminants, and radionuclides have had maximum contaminant levels established for drinking water supplies, but many other contaminants known to be in water supplies and known to be harmful do not have such levels established. The USEPA has scheduled the development of Revised Primary Drinking Water Regulations [1], but the process has been delayed many times. The gap between known contamination and established guidelines has made water quality policy issues difficult for state and local governments.

Water Standards

Currently there are no federal maximum contaminant levels (MCL's set for most organic solvents and pesticides. Both of these categories present problems for groundwater quality. The lack of guidelines puts a considerable burden on states that must decide whether they want to set their own guidelines and on communities where contamination situations arise.

The water quality issue is further complicated by the fact that even when standards or guidelines are set by the federal or state government, they apply only to community water supplies. The many individual wells common in rural areas are rarely tested for other than bacteriological contamination. When a contaminant is known to be present above the MCL in a community supply, notification of water customers must take place. If the community supply derives from groundwater, it is very likely that other wells in the area could also be contaminated. Many public policy issues arise with respect to testing of individual wells and/or notification of well owners.

Treatment

There are several choices that a community has when wells are contaminated. Among these are closing of some wells, use of alternative surface or groundwater supplies, and treatment. If treatment is the chosen path, there are other choices with respect to type of treatment and point of treatment. Many available technologies for treating drinking water supplies are still being tested by the USEPA. Often a decision must be made as to whether the treatment should be at the well or at the point-of-use. These decisions are technological as well as economic and require careful analysis.

A study supported by the USEPA was conducted by Temple, Barker

and Sloane, Inc. for the Water Quality Association to evalute point-of-use treatment for compliance with drinking water standards [6]. This study focused on the current list of contaminants with federal guidelines. Others [5] are attempting to compare the effectiveness of treatment methods for toxic organics that do not have federal standards set. The results of these studies will provide background for future policy decisions.

Another significant issue related to groundwater contamination is the question of who pays for alternative water or treatment. Sometimes the party responsible for a contamination incident can be identified and made to pay. More often contamination is not the result of a single incident and/or no one responsible can be identified. Communities and individuals must still find a way to pay for good quality water.

Case Studies

Pesticides

The first incident of large-scale pesticide contamination of groundwater occurred on eastern Long Island in New York State in 1979 [2]. The pesticide aldicarb (tradename Temik) had been used on approximately 20,000 acres of potato fields between 1975 and 1979. The pesticide was particularly effective against two difficult pests, the Colorado potato beetle and the golden nematode. Based on knowledge of nitrates leaching to groundwater in this area, the local cooperative extension staff expressed concern in 1976 and 1977 about the potential for aldicarb to leach. In 1979 some wells near potato fields were tested and found to have detectable levels of the pesticide. In the next year more than 8,000 wells were tested and more than 2,000 had detectable levels of aldicarb.

Several policy decisions had to be made very quickly. The state had to set a drinking water standard for the pesticide. The local health department had to determine what wells should be tested and if they should be tested for other pesticides. The company that manufactured the pesticide withdrew it from use on Long Island, treated water in affected homes, and initiated research to predict how long the pesticide would remain in the groundwater.

From the perspective of the farmers, a very effective pesticide was withdrawn from use, and decisions about future crops to be grown in the area had to be made. They were obviously worried about becoming dependent on another chemical that might be found in the groundwater.

The local cooperative extension association and Cornell were involved in every aspect of this situation. People from all of the interested agencies were brought together to begin working on the many issues. Further investigation of groundwater quality showed the pres-

ence of eight other pesticides. Certain parts of the eastern end of Long Island have had extensive water treatment. Consultants have proposed alternative water supply plans. Some farmland is being converted to alternate crops. Basic policies about future protection of groundwater on Long Island are currently under discussion.

The finding of pesticides in Long Island groundwater was the beginning of a national concern about the compatibility of agriculture and groundwater quality. There is a perception that many agricultural chemicals are present in groundwater. Pesticides are by nature toxic and are deliberately applied to the soil. Research on environmental fate of agricultural chemicals with respect to groundwater is just beginning. A National Survey of Pesticides in Groundwater has been proposed by USEPA's Office of Drinking Water and Office of Pesticide Programs. The focus of the survey will be pesticides in groundwater as a result of agricultural practices. Samples will be taken from private and public drinking water wells.

Even if the amounts of pesticides found in groundwater are minimal and not widespread, there is bound to be concern when anything is found. If, on the other hand, there is widespread or (more likely) significant contamination in hotspots, there will be major questions raised about agricultural practices and the quality of groundwater. Policy decisions at all levels will be made, and cooperative extension must be prepared to work with all sectors to resolve the issues.

Nitrates

A very specific groundwater contamination problem arose in the small rural village (population 2,036) of Clifton Springs, New York [7]. The village had relied on a series of 23 shallow wells for its water for nearly 100 years. The wells are entirely surrounded by active farms. They were an adequate and economical water supply.

From 1970 onward, sampling of the water supply showed increasing amounts of nitrates, varying from 8 mg/l to as much as 20 mg/l. (The state and federal standard is 10 mg/l). In 1980 the New York State Department of Health (NYSDOH) directed the village to correct this situation by bringing the nitrate concentration level down to the federal standard.

Ontario County Cooperative Extension became involved at the request of the regional office of NYSDOH, the mayor in the village, and the farmers in the vicinity. The village was at odds with the state, and the farmers feared reprisal by state regulation or a lawsuit by the village.

The situation posed: a possible health problem; the possibility of high cost to the village if a new source of water had to be developed; politically damaging confrontations between the state, village, and

farm community; and the possibility of loss of income to the farmers if more costly practices had to be adopted.

Cornell Cooperative Extension became involved because of the expertise available in agronomy, the Water Resource Center, and the Community and Rural Development Program. The Water Resource Center agreed to make a preliminary study of the problem with the village contributing the research costs. The local cooperative extension staff attempted to facilitate an informational and educational program for the community. They were immediately involved in a political situation since evidence suggested fertilizer runoff was the primary source of nitrate contamination. Although the ongoing research would examine several potential contamination causes, most people believed agricultural practices would be the major contributing factor.

Cooperative extension's challenge was to keep the people focused on learning facts, forming no premature opinions as to cause and effect, and avoiding debilitating confrontations between villagers and farmers. The staff worked closely with the village mayor in forming an 18-member citizen advisory committee comprised of village residents and concerned farmers. The goal of the committee was to advise the Cornell researchers, keep the village and farmers informed, and submit to village officials recommendations for a solution to the public water supply problem.

A Cornell extension/research team from the College of Human Ecology worked with the committee to ascertain their concerns and perceptions of public information and education needs. Water customers in the village had been notified by mail of high nitrate levels since 1978. The Cornell team instituted a survey, which included a mailed questionnaire and in-depth interviews in 10 percent of the village households [3]. The purpose was to assess the effectiveness of notification in influencing public knowledge of the water problem, the public's concerns about water quality, and the extent of the public's willingness to pay to correct the problem.

The results of the survey indicated that the people had been informed about the problem and there was good understanding of it. The Citizen's Advisory Committee was effective in aiding communication particularly through its newsletter. Those who most needed to know (parents of infants at high risk) were well-informed. People in the community were willing to pay for high quality water.

The final recommendations of the committee to the village included a short-term solution, i.e. to continue to buy water from a nearby village. The long-term solution recommended was an alternative offered by the Cornell research team, i.e. use of a wetland denitrification system. The village received a grant from the United States Department of Housing and Urban Development to attempt remedial action.

Careful work by the cooperative extension agricultural agent and

the regional field crop and livestock specialists from Cornell narrowed most of the nitrate contribution to one farmer. They persuaded him to use different fertilization practices that have shown good yields. Future aquifer contamination should be much less. The current contamination may take as long as 25 years to be removed.

Organic Chemicals

Five counties in the mid-Hudson region of New York State began major educational programs designed to address groundwater and hazardous waste issues during 1983. A series of activities including one county's detailed inventory of hazardous waste disposal sites, projects on inground storage tanks, road salting practices, surface waste impoundments, and the preparation of a groundwater and surface water atlas had begun. Using an educational intervention strategy, an ad hoc group — made up of educators (including cooperative extension), agency personnel, and citizen leaders in the Hudson Valley — set for itself a multiyear set of goals and began to implement an educational program designed to bring to the region a greater awareness of water resources and a broader understanding of groundwater issues [4].

The program consisted of the following phases: 1) yearlong seminar series for local government officials and community leaders, 2) technical workshops for county and municipal staff, 3) preparation and distribution of two groundwater handbooks, 4) groundwater management training for local government and multitown groups.

Thus far the beneficial results have been that agencies and professionals were not sidetracked, threatened, or damaged; the best available technical information and expertise were brought into discussions of the issues; a climate of trust and a willingness to cooperate on the parts of the involved parties were established; involved parties were motivated to look for positive solutions; and networks of local groups and resource agencies were organized.

Policy

The federal government has authority over groundwater through a variety of statutes including the Safe Drinking Water Act; the Federal Insecticide, Fungicide and Rodenticide Act; the Resource Conservation and Recovery Act; the Toxic Substances Control Act; the Comprehensive Environmental Response and Liability Act; and the Strip Mining Conservation and Recovery Act. The real policy issues with respect to aquifer protection and water supplies are decided on the state and local level. State and local authorities are responsible for enforcing many of the federal laws and they set regulations that affect water resources.

Regulations on the state and local level that affect aquifer protection include pesticide use, wastewater discharge, landfills, industrial siting, storage of road salt, residential development, and zoning. Regu-

lations that affect water supplies include drinking water standards, well closings, alternate water sources, notification of contamination, and treatment options.

The decisions that must be made require public health, technological, and economic input. Often there is significant controversy. But with carefully designed educational programs such success can be achieved. In each of the case studies presented, a program was put into place that helped to resolve issues in a reasonable manner. Some of the common aspects of these programs will be presented in the following section.

Educational Programming

The purposes of public policy initiatives in water quality can be summarized as follows: to act as a catalyst to resolve issues through compromise, to provide understanding of complex water quality issues, to help clarify responsibilities of parties involved, and to conduct the process early, before mediation, negotiation, or litigation.

Some of the groups that can be involved include local government (key leaders), regulatory agencies, the agricultural sector, the industrial sector, environmental groups, homeowners, and outside experts.

A strategy must be developed, and a program tailored for a given situation must be defined. The purpose of this workshop is to use the experience of the public policy experts and the information provided by the two speakers to devise some common outline for public policy education on water quality issues related to groundwater.

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