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POLICY EDUCATION TO BUILD LOCAL CAPACITY TO MANAGE THE RISK OF GROUNDWATER CONTAMINATION

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ABSTRACT: Universities, like it or not, are engaged in the policy process. Extension education organizations are attempting to develop ways to make that participation more rewarding and successful through applying a better understanding of the policy process and the role of information at different stages of public decisions. An increasingly sophisticated public should understand the limits to scientific knowledge and the need for an informed political process to go beyond those limits. The Kellogg Foundation is funding a seven state test, applying educational concepts that have proven successful with other, quite different policy topics. Groundwater protection has characteristics as a policy issue that particularly requires an educational approach for solution. Managing the risk of groundwater contamination presents unique demands upon local governance capacity. The diversity of groundwater vulnerability across the landscape, the ubiquitousness of sources of hazard, the stake that local users of the resource have in its protection, the need for face-to-face management relations, and the substantial preemption of land use controls by local governments, all taken together suggest that the States and Federal Government should build local capacity in this topic. But for this to happen both local and state leaders need policy educational support. Since so many of the questions involve research results and their interpretation, universities, particularly the Land Grants with their Agricultural Experiment Stations and Water Resource Institutes, should be drawn to this window opportunity to help create new resource management institutions in response to strong public interest.
KEY TERMS: Groundwater, policy, education, local governments, capacity building.

INTRODUCTION

Institutions for the protection of groundwater are needed. But what will shape should they take? The nation is building new institutional capacity to manage its natural resources in many ways. After many decades of fashioning better arrangements to allocate water quantity, the need for quality protection has become more apparent.

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Once surface water received almost exclusive attention, now we recognize that groundwater must also be protected. Thus as we learn more about the water resource we add an other focus or set of concerns and add features to our laws and organizations to deal with those concerns. Currently the evolutionary pace for groundwater protection and the management of related potential contaminants is accelerating.

Universities have helped to stimulate and facilitate this evolution. The use of new knowledge both has led to unanticipated problems and provided the basis for understanding the significance of those unintended consequences. Thus as the policy process tries to respond to these environmental concerns, universities are turned to for more information and interpretations by virtually all participants and stakeholders. But not all questions are amenable to being answered by scientific methods. For some the phenomena are either not well enough understood or vary tremendously by local conditions. For other questions the cost of certainty goes up rapidly to levels no one is willing to pay. For most issues social valuation processes have to be applied to make management decisions. Even though public decision processes are only partly fueled by scientifically generated information, objective in the sense of stakefree sources of expert information should lead to better decisions. If universities can't stay out of the process, what can they do to do it right?

Would the groundwater policy process be more effective if there were a more proactive approach by universities to putting information into the hands of decision makers? But what information should be provided? And how should it be presented? In the issues of food and farm policy the Cooperative Extension System has found that formal concepts of policy processes and educational activities linked to those concepts have given needed and useful structure to its participation in the evolution of policy. More recently other family and community issues have been successfully addressed with the same approaches.

One key notion is that there is a well defined policy cycle, and that different stages in the cycle have very different information needs. Until these needs are met the process is hampered and less effective in going on to the next stage. That is not to say that the next stage will not happen without those answers, simply that it will not be as efficient and effective. Likewise, key participants in the policy process may be at different stages of the same issue cycle. Thus those participants are not keeping up and may disrupt or weaken the process later if there is inadequate attention to their information needs.

In particular, it has been useful to urge consideration of alternative policy options, to identify the consequences of those options, and to encourage wider participation in the policy process of all of those with stakes in the options that should be considered. If those concerned by an event such as a contamination incident do not learn the broader context and implications of that event, institutional development will be constrained. While this approach is sometimes seen as delaying action, and in the short run may do so, it gives wider ownership of the results and thus in the long run speeds the evolutionary process.

Figure 1 presents the Issue Evolution/Educational Intervention Model as adapted and elaborated by Alan Hahn (1988) from the work of other policy education specialists (Barrows, 1983). Note the different kinds of information called for by the different stages. This paper, in part, is intended to indicate some of the challenges in meeting these information needs for groundwater protection.

How can these concepts be adapted to this issue arena? Will they work? The Kellogg Foundation has funded a three year project to find out. Policy specialists in seven state Cooperative Extension Systems have joined together to develop materials and educational approaches. The project is led by Charles Abdalla of the Pennsylvania State University. Each state will provide different settings and challenges in part because they will define the issues differently and will be at different stages in the cycle. The seven states are Pennsylvania, New York, North Carolina, Florida, Wisconsin, Iowa, and California.

This project is in support of several program initiatives by Federal agencies. The U.S. Department of Agriculture, for example, through the Soil Conservation Service, and through the Land Grant Universities, among others, undertaking more work on the causes and extent of the groundwater problem. Public strategies is one of four critical issues identified under the water quality initiative. The emphasis of the USDA initiative is on preventing contamination by farm chemicals. For example Extension production specialists are tailoring their advice to reduce risk as the scientific basis to do so becomes available. But it is clear that management of farm chemicals should take place in a setting where local capacity to manage risk of contamination is developed evenhandedly across all sources of hazard (Allee, 1987).

Thus the Kellogg project seeks to supplement the normal university resources available to the Cooperative Extension System by adopting a coalition building approach. The Freshwater Foundation with its strong commitment to the issue and the Soil and Water Conservation Society with its extensive local chapter system are both part of the project steering committee. Also at the national level the U.S. Environmental Protection Agency and the U.S. Geological Survey are cooperating and can provide access to critical technical and policy information. Other agencies and organizations are providing information and feedback on materials and educational methods.

In the individual states coalition building is expected to vary greatly. Agencies and groups that represent public health, environmental and natural resource management interests can be expected to be involved as well as local government associations and state policy makers. The need for local capacity building puts a premium on obtaining the cooperation of those agencies that have local "change agents" in place. These are people like the county agent, or district conservationist, or local public health professional, who have a natural role in the issue and can use their skills to help local people help themselves.

University participation can supplement the technical information available for the policy process. Universities also can provide social science expertise important for institutional development. Technical information on cause and effect, on what the problem is and how it got

that way, is a necessary to understanding the problem and modifying behavior to prevent future problems. But behavior is modified in important ways by changes in institutional arrangements. Many alternative institutional responses are available and should be considered.

While no one can be completely unbiased, we all bring different backgrounds and experiences to any issue, striving for objectivity is appreciated by many participants in the policy process. University specialists have certain advantages as sources of information. They can be expected to be closer to the professional literature. And while often less practical in orientation than other technical participants they tend to have less program stake in the issue.

Ignorance and the apathy that ignorance engenders stands in the way of progress in the protection of the groundwater resource. That common enemy should provide incentive for the necessarily many sources of expertise to work together. Inter-agency cooperation will not happen easily and without effort even when all have a stake in the policy education process. It may be necessary for the educators in each agency to find an informal basis to work together. We suspect that the coalition building process is much like negotiation of other agreements, it works best when heels are not dug in on turf positions, when legitimate interests are frankly articulated and "win, win" options can be identified. Groundwater protection has many attributes that should provide such a basis for inter-interest cooperation. Not the least of these is that the potential polluter is most often also a user of the resource, with an interest to controlling the actions of those who do not have that same incentive for risk reduction.

WHY LOCAL CAPACITY IS NEEDED

Local management capacity is needed to reduce risk of contamination. This is indicated by a number of characteristics of the problem (Allee, 1986; Abdalla, 1987).

Not all points in the landscape are equally vulnerable to contamination of groundwater. The edges of the sand dune that is Long Island, New York, for example, drain out to the Ocean or the Sound. A spill or leaking land fill in the interior is more likely to eventually seep down to the drinking water aquifers, but how quickly and how differently in various parts of the Island depends upon the character of the materials that confine and define the groundwater. The behavior of groundwater in sand and gravel mixed with clay is different in this setting than in glaciated valleys a few miles away. Fractures in granitic bed rock and solution channels in limestone, which are also found within a few miles pose quite different management problems. The point is that the system to be managed has a high degree of uniqueness in such short distances that familiarity with these idiosyncratic characteristics is only likely to come about from managers that are on the spot. This is compounded by the need to integrate this information with other factors of a local scale such as the diversity of hazards.

Hazards also change across the landscape with major differences in short distances. But in most landscapes every land use poses some risk.

Farmers apply chemicals that vary with crop and year. Some have been recently screened and thus more rigorously evaluated for potential groundwater impacts. Some applicators and advisors are more aware of groundwater implications than others. Households use hundreds of chemicals that require very small concentrations to be at least contaminants of uncertain risk. Home use of pesticides and fertilizers can rival and exceed rates applied by farmers. Industrial solvents and other chemicals are handled today with far greater care than only a few years ago. But one only needs to follow press reports of fires in industrial facilities to realize that local governments are just beginning to know where toxics are used and under what kinds of risk management conditions.

Face to face management of risks is an essential part of the needed institutional development. The user of the hazardous chemical has to be a participant in the policy development process as well as a participant in the resulting risk management process for it to be effective. Awareness about paths for releases to the environment have to be a part of so many day to day decisions. For some users of chemicals such as most farmers the connection to the groundwater resource is very direct. Their own drinking water is at risk. For others, such as some landfill operators, it is more remote. The importance of these stakes to institutional evolution is very great.

The costs of groundwater pollution are in a major way locally borne. Health effects and the associated acute anxieties are not fully compensated, they cannot be fully known. In terms of water supply replacement and treatment, again in only a fraction of the cases can liability be pinpointed. And treatment to remove a chemical adds an other source of uncertainty and anxiety. While many of the stakes in groundwater protection are local they need to be better understood by local leaders if they are to provide impetus for institutional change.

And some of the potentially more potent public management tools are effectively in the hands of local governments. To some extent groundwater management arrangements are an out growth of surface water institutions. Classification approaches to allocate enforcement resources and vary approaches to fit the need are similar. Source controls in terms of treatment standards and best management practices can be adapted serve both ground and surface water objectives. But local land use control and public health authorities may be more effective in dealing with the need for face to face management, the physical diversity of the resource and the ubiquitous nature of the hazards. Of course very few local powers are exercised without some state and federal support. These support relationships will be more important in this area than most.

The expertise to characterize the resource and interpret its likely behavior will come from the US Geological Survey and related state agencies and private consultants. The US Soil Conservation Service and its state and county level affiliates also have a large potential role in physical interpretation. Not the least of the need is to make informed judgements when it is not likely that the money to get more data will be forthcoming.

Similarly, a complex of state and federal agencies and private consultants can be expected to be employed in the difficult questions of

evaluating particular chemicals in particular uses. This is the point at which regulatory activity becomes a bargaining process where information is the medium of exchange. Expertise cannot be efficiently developed at each local unit and thus must be organized to serve the many units of local government. However, outside experts have to be able to relate to local political decision processes in order to be effective.

The local management of risk must involve the use of experts who interpret the behavior of the resource itself and the chemicals that may or have contaminated it. Local experts have to be linked to outside experts in effective ways for this to happen most effectively. Most people trust new information that they can either verify by appeals to their own senses and experience or are verified by others who they know and whose judgement they consider relevant. Groundwater and chemical contaminants don't lend themselves to direct observation. Thus the local expert can be expected to carry an inordinate amount of weight in the capacity building process. Institutional arrangements that recognize this should be more successful; policy education programming that reflects this principle should also be more successful.

APPLYING THE ISSUE EVOLUTION CYCLE

Note that Figure 1, The Issue Evolution/Educational Intervention Model uses three arrows to emphasize that the process is circular and repetitious, These three arrows also group the stages of the cycle into somewhat more self contained parts. In other words concern about groundwater protection by a public, involvement by decision makers who can really do something about it and getting the issue on a public agenda are more likely to happen together.

Naturally some courses of action will have been part of these preliminary discussions. Understanding cause and effect are important part of issue development. Farm use of pesticides or manufacturer's disposal methods will be brought up. But really serious examination of alternatives and consequences are not likely to come about until it looks like someone may make a choice, ie. take action. That action is likely to build on existing programs and policies that relate to the events that led to the concerns about groundwater integrity in the first place. If there has been a comprehensive review of hazards then a broader response is more likely.

Once a choice has been made implementation must follow. This is a complex process with a policy process of its own. Like each of the other stages different questions suggest themselves as indicated in Figure 1. If questions remain unanswered, left over from the process of considering alternatives and consequences, they will reappear in the implementation process. Indeed such questions have sparked formal or informal evaluations of programs soon after the policy choice was made. In other cases concerns about how well a program is working may take years to start the cycle all over again. In either formal or informal evaluations the issue may be defined in quite different ways, stimulated by quite different events. But issues tend to be bundled together in predictable combinations, held together by the agencies and legislative committees that claim jurisdiction.

Building local capacity to deal with groundwater contamination poses some particular challenges if university extension educators and their allies are to answer the questions relevant to the stages in the policy cycle. A few will be reviewed here. Materials under development for the project hopefully will be quite complete.

Risk assessment and acceptance is one of the most challenging topics that is needed to inform the early stages of the policy process, if not through out the cycle. "Is it safe?" has to be one of the most difficult questions to answer, yet is so central to the needed debates. The chance of getting cancer may indeed be 1:4 and of dying of it, 1:5. But how to compare this to the fact that someone has been inadvertently drinking water with a carcinogen at any level of risk? How to explain the use of laboratory animals and elevated doses of a chemical to set standards for human exposure A how is a 1:1,000,000 standard determined and applied? The role of the local expert in interpreting these kinds of issues may be particularly important.

Involvement does not mean large increases in the number of political activists. It can't. But recruiting people to the issue and to the public policy process is important. Only a few are needed to make a difference - just a small percentage of the adult population are responsible for making the policy process work. But essential to the concern, involvement, issue part of the cycle is the opportunity to interact with others. Concerned people need to learn that theirs is not so unique an event, that they can join with others with similar, but different experiences. By developing an acceptance of other points of view they are more likely to forge proposals that will be supported and that will make a difference.

For example when survey research showed that farmers in Iowa were very concerned about the safety of their own wells the process of developing a new groundwater protection law changed. What had been expected to become a polarized and confrontational process, was instead a productive, bargained developmental process (Padgett, 1987). Educational techniques are available to help groups with different points of view conduct more productive dialogues. Encouraging a marketplace of ideas where there is competition among the advocates of different concepts should lead to more stable and considered decisions.

Debate over alternatives and consequences is an important step toward decisions. The following five issues appear to be among the most prominent (Abdalla, 1987):

Acceptable Risk. When contaminants in groundwater are found, what level, if any, of the contaminant should be permitted? In other words, what level of risk to human health is acceptable?

Rights to Groundwater. Who holds the property right to the use of groundwater? The homeowner with a private well? The farmer whose practices cause contamination? The public water supplier?

Liability. Who should pay damages that may result form contamination? The user of the offending chemical? The manufacturer of the chemical input? Any other party?

Institutional Level. What level of government should deal with what part of the groundwater protection function? What are the advantages of different initiatives at the different levels.

Preventative versus Remedial Approaches. Although most analysts recommend a preventative strategy, is this always the most economical way to manage groundwater resources? Where drinking water safety is the primary concern, how does a remedial approach via treatment compare to prevention? Should drinking water standards be the goal for both prevention and remediation programs.

Consider how each of these issues would arise in the development of a local risk management program. Land use controls might be compared to public health rules. Voluntary programs that stressed technical assistance and cost sharing may provide several alternatives. How effective would each be and why? How and why might regulatory and voluntary options be combined? How should this discussion differ at the State level where enabling legislation is considered as compared to the local level where management programs must be put in place? Recognize that at the local level the problems is sure to include multiple jurisdictions in order to match the resource system to be managed. Intergovernmental cooperation raises further advantages and disadvantages that need to be clarified.

CONCLUSIONS

In general alternatives for government action to change individual behavior take the form of providing information, using either cost sharing or coercion, and reorganization of public management to better fit the systems, natural and human, that are involved.

It is one thing to present options and an other to make a choice, not to mention going on and implementing that choice. Bargaining is easier if choices are wider, and this is greatly facilitated by encouraging the discussion of interests rather than positions. Conflict is bound to stem from the consequences of the options. Differences in understanding are amenable to information. Differences in stake have to be bargained out. Differences in values are more difficult, due process becomes most important. Often differences in values are simply left unresolved. As decision makers consider the causes of groundwater contamination and the choices before them they need to have both information about the technical facts as well as the institutional alternatives.

Universities are inevitable participants in the groundwater policy debates. The should formalize their participation and be proactive both in terms of sharing technical information as well as information to assist in the evolution of more effective institutions to manage risk to groundwater. There is a window of opportunity currently to impact this institutional evolution. Objective information is important. Advocacy of the issue, of wider participation but not of any of the particular options for action help achieve informed choices. These policy education methods have proven themselves in other public issues to be a productive basis for university participation. They should be effective for groundwater protection as well.

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1. Help audiences understand existing conditions. Show how different groups are affected. Help people look beyond symptoms. Help separate facts and myths and clarify values.

2. Identify decsion makers and others effected. Stimulate involvement. Encourage communication among decision makers, supporters, and opponents.

3. Help clarify goals or interests. Help understand goals or interests of others and points of disagreement. Help get the issue on the agenda.

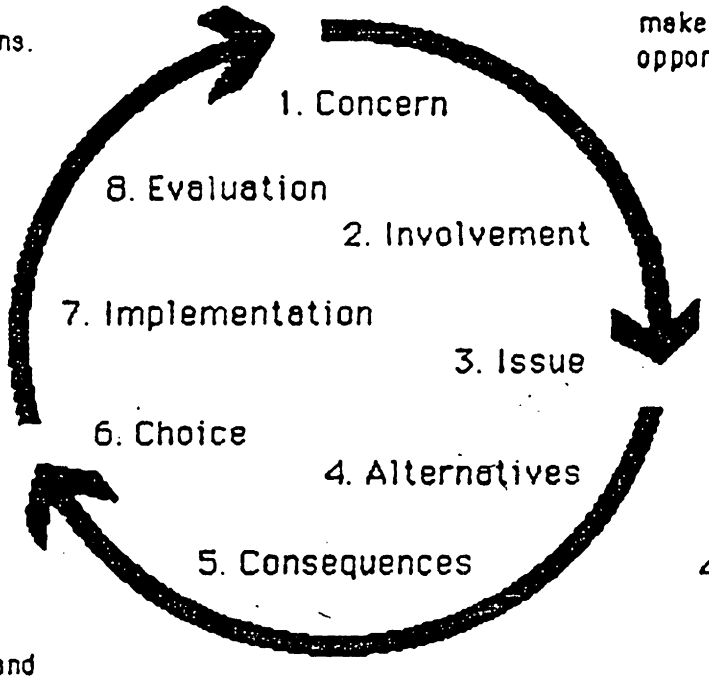
4. Identify alternatives, reflecting all sides of the issue and including "doing nothing." Help locate or invent additional alternatives.

5. Help predict and analyze consequences, including impacts on values as well as objective conditions. Show how consequences vary for different groups. Facilitate comparison of alternatives.

6. Explain where and when decisions will be made and who will make them. Explain how decisions are made and influenced. Enable audiences to design realistic strategies.

7. Inform people about new policies and how they and others are affected. Explain how and why they were enacted. Help people understand how to ensure proper implementation.

8. Help monitor and evaluate policies. Inform people about formal evaluations and their results. Help stakeholders participate in formal evaluations.



Adapted from: Verne W. House, "Issue Evolution and Educational Intervention," in Verne W. House and Ardis Armstrong Young, Working with Our Publics, Module 6: Education for Public Decisions (Raleigh, NC: Agricultural Extension Service and Dept. of Adult and Community College Education, North Carolina State University, 1988).

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