Communicating Water Quality Risk Issues to the Public

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The public expects an open public policymaking process. Yet policy-making groups have developed *few* mechanisms for involving the public, and even fewer for creating a public adequately informed to participate effectively in the process. If public participation is to be meaningful and helpful in formulating risk-related public policy, information about both risk assessment and the decision-making process must be made available to the public.

Increasingly, individuals and groups are demanding to play a part in defining issues, identifying alternatives, debating consequences, and even working out the implementation of policy choices made by elected decision makers. While the public supports this citizen involvement if representation from various interest groups is equitable, it has proven difficult to develop mechanisms for citizen involvement. It has proven even harder to create a public adequately informed to participate effectively in the decision-making process.

For example, can an open policymaking process for water quality be fair and meaningful without widely available information about risk assessment and the unique aspects of the water quality decision-making process itself? Effective communication to the public about the human health risks resulting from water contamination is essential to a more open policymaking process.

While the technology for detecting and understanding the impact of various activities on water quality has advanced considerably—many chemicals can now be detected at the one-part-per-billion level—our ability to communicate this complex information has advanced more slowly. Public understanding and acceptance of scientific conclusions is complicated by many factors, including a tendency to simplify complex situations, the nature of the risk, and the perception of fairness.

Over the last 20 years, water quality issues have moved quietly to the forefront of the public agenda, along with such concerns as AIDS, pesticides in foods, and asbestos. In a recent study of 10 health-risk issues, water quality issues were of greater concern to the public than such health-risk issues as AIDS and radon.

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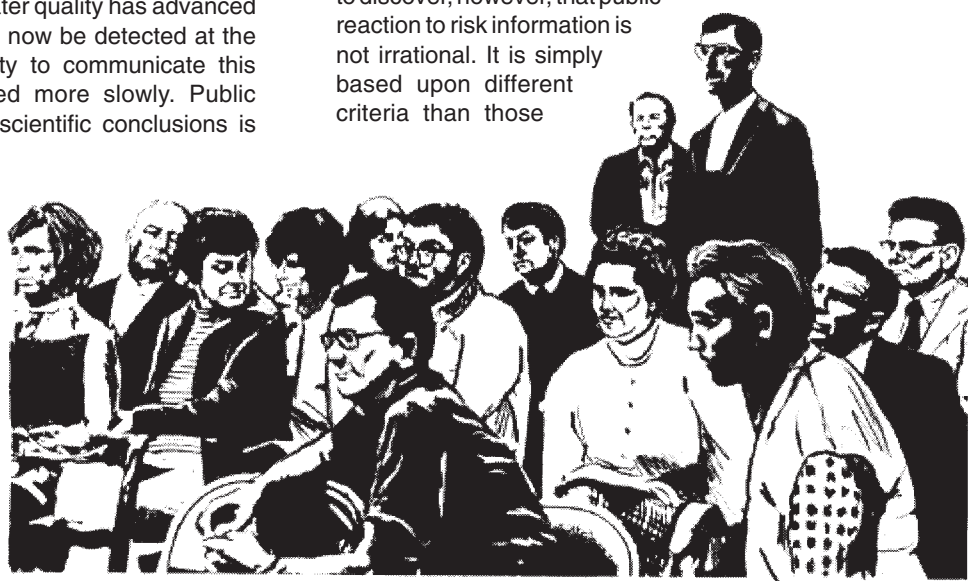
This high public awareness and concern is both a blessing and a curse for policymakers. While the public supports policies designed to protect valuable water resources, citizens also frequently challenge conclusions and recommendations of scientists and risk assessment experts.

Public Involvement: Yes or No?

The scientific community appears divided in its reaction to public involvement. There are those who argue that, in a system of participatory democracy, citizens have a right to provide input into policy decisions, especially those decisions that affect them directly. William Ruckelshaus, twice past administrator of the U.S. Environmental Protection Agency, noted that effective public policy can only be formulated if the public is involved in the decision-making process.

There are those, however, who argue that the issues are far too complex to allow participation by the average citizen. They suggest that public reaction to complex risk issues is often emotional and irrational, focusing attention on less important aspects of the issue.

Social scientists have begun to discover, however, that public reaction to risk information is not irrational. It is simply based upon different criteria than those



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used by the experts—criteria that are at least equally legitimate and necessary for sound policy choices.

Citizen Influence on Policymaking

When citizens question decisions and judgments by the scientific community, they influence policymaking, either directly or indirectly. Social problems require a combination of social and technical solutions, and finding the blend of social and technical considerations that provides for stable, long-run institutional changes requires effective two-way communication.

Thus, while in the past a technical solution—such as a landfill or a primary treatment plant or a non-leaching pesticide—was the solution, today we must consider a wide range of both technical and social factors in evaluating technical alternatives. Public support for the social factors and how they interact with the technical factors is particularly important where broad changes in public behavior are needed.

For example, the risk posed to ground water by a landfill may be much more tolerable if extra monitoring is provided and neighboring well owners have access to test reports and their interpretation. Furthermore, a recycling program linked to an overall waste management program may make the siting of a new landfill more acceptable to nearby residents. While these accommodations to social concerns may smooth the process of change, ground water experts could see extra monitoring or recycling as challenges to their judgment, unnecessary, or irrelevant to the risk issue at hand.

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Risk Perception: Hazard vs. Outrage

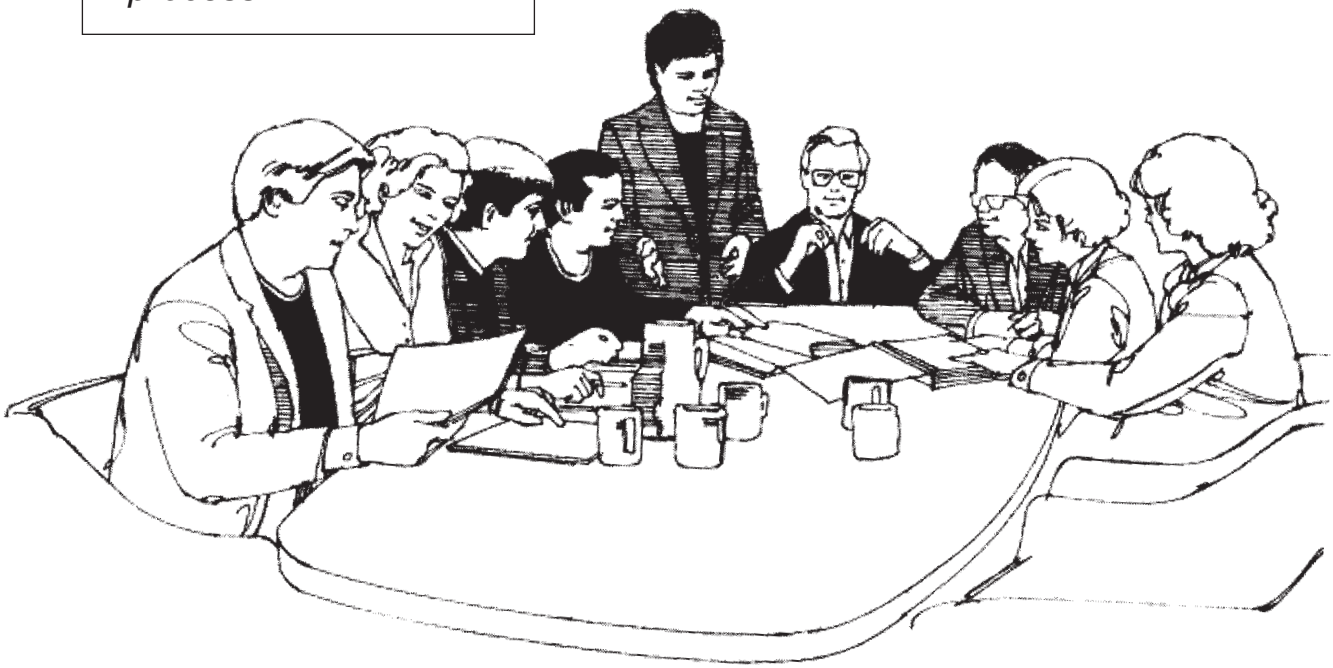
"Hazard": The Experts' Focus

Informing the public about risk has proven to be complex. Risk experts focus on the hazard and the probability that someone will be exposed to that hazard. An ocean crossing in a small boat is very hazardous, but the probability of very many people trying it is so low that it is not much of a source of risk to human health. Thus, risk is a blend of how bad something is if it happens and how likely it is to happen.

We may refer to this as theoretical risk, as opposed to perceived risk. Theoretical risk is the product of statistics, experimental studies, and risk analysis. Perceived risk refers instead to nonexpert perceptions of hazards and probabilities, embellished by such factors as past experience and media attention—factors essential to understanding the communication process.

"Outrage": The Public's Focus

While experts often argue that the public focuses on subjective judgments of risk, research suggests instead that the public thinks of and determines risk through a completely different set of criteria. The public is likely to focus not so much on how bad a particular hazard is and how likely it is to happen, but instead on the dimension of outrage it represents.



Outrage is a combination of more than 20 factors, such as fairness of the risk, degree of personal control, the process by which risk decisions are made, and voluntariness.

Public Reaction to Differing Levels of Hazard and Outrage

Figure 1 shows four cases, two with high technical risk and two with low technical risk. One case with high technical risk has a low potential for outrage; the other has high potential for outrage consistent with the level of technical risk.

Case 1 is an unsupervised handler from outside the community who dumped toxic chemicals from industrial processes with no measures to protect nearby, heavily used ground water. This case would likely elicit high public outrage. There is a villain to blame, the public has no control of the problem, and exposure is not voluntary. Citizens may complain that "it isn't fair for outsiders to dispose of their wastes in our community." Technical risk may also be high; thus, the risk assessment experts and the public agree.

Case 2 is a proposed landfill with a very low chance of contaminating ground water. This case suggests that technical risk often has little to do with public outrage. The nearest aquifer is protected by tight soils and a recharge pattern that reduces risk. A double liner, oversized leachate drains, and storage and treatment facilities between and above the liners reduce risk to the minimum known. Test wells for monitoring and suitable for capture and treatment of any escaping material add another line of defense, as does a process for screening out toxic wastes from materials entering the landfill. Nevertheless, high levels of outrage may still exist, which could be related to several factors, including:

- ***Process:*** Lack of participation in the decisions made about a proposed landfill leads to high levels of outrage. Outrage tends to be lower and thus perceptions of risk are lower when citizens have been involved in the decision-making process.
- ***Fairness:*** This becomes an issue when a small group of residents is forced to take increased risks for the convenience of the majority, especially where there is no recognition of their special stake in the decision. For example, will they have access to the test well results? Who will decide when and how recovery and treatment is needed? If property values fall, will there be compensation? How can there be assurances that agreements will be honored?

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Case 3 is an example of high technical risk, but low public outrage. One difficulty with nonpoint source pollution is that generally there is no dumpsite or discharge pipe. The cause is diffuse—the public tends to be more familiar with the risks, such as runoff from streets, and the risks are more fair in that everyone is exposed, not just a select group.

Case 4 is naturally occurring geologic radon, a significant contributor to lung disease. With well water being one of the routes that radon may take to find its way into the atmosphere of a home, removal of this route can reduce exposure and thus the probability side of the technical risk assessment. Even where airborne radon levels have been exceptionally high, studies show public outrage has been low, regardless of the technical risks, as long as the radon has been naturally occurring. When the radon source is identifiable, such as a factory, outrage may be high, even if risk is low.

These four examples show agreement in priority-setting between risk assessment experts and the public in cases 1 and 4, the toxic dump and the radon in ground water. Design and choice of alternatives may still generate conflict if the differences in the reasons for those assessments are not recognized.

The greater challenge to risk communication is in cases 2 and 3, the state-of-the-art landfill and the nonpoint source pollution. Where the hazard is low, communication needs to encourage participation to help alleviate the outrage factors. Where risk is high but outrage low, the problem may be developing public awareness and motivating corrective action.

Figure 1. Public reactions to differing levels of hazard.

	Technical Expert Assessment	
Public Perception	*High Risk*	*Low Risk*
High Outrage	**Case 1.** Purposeful dumping of toxic chemicals by source outside the community.	**Case 2.** Proposed landfill with a 1: 1,000,000 chance of contaminating ground water.
Low Outrage	**Case 3.** Nonpoint source pollution of ground water.	**Case 4.** Naturally occurring radon in ground water.

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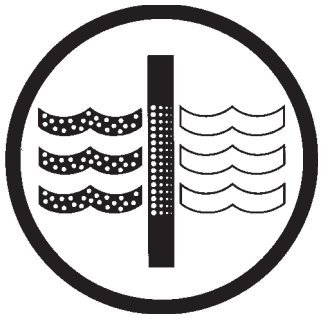
Outrage Factors Related to Water Quality Issues

Outrage embraces many factors, often in clusters, and no case evokes purely one factor. Consider an industrial solvent, such as TCE. Suppose the TCE was found after you had been assured that, if the new landfill next door caused a problem, the owners would replace your water supply and compensate you for any loss in property value. Suppose the TCE in your well water was called to your attention in buying the property, but after the study you decided to buy it anyway. Does it make a difference if it is a chemical you use at work?

In contrast, consider a naturally occurring hazard such as radon. Responses would be very different. Research has suggested that these and other factors affect perceptions of risk through the dimension of outrage.

Some of the more important outrage factors related to water quality issues include the following:

Process: When involved in all aspects of the decision-making process, the public often is willing to accept higher risk than when not involved. Process appears to be extremely important in ground water policymaking. A closed decision-making process can trigger a number of other factors, such as fairness, morality, and control.



Control: There is a general feeling of safety associated with personal control. We trust our own instincts about personal safety more than we trust others. People who have private wells, for example, feel greater control and have more confidence in their water than do residents on central water systems. Perhaps this is part of the reason that geologic radon generates little outrage when found in private wells.

Voluntariness: Risks that we choose to take generally are perceived as safer than risks forced upon us.

Fairness: One of the important issues in community water quality is often one of fairness. A landfill has a significant theoretical risk. It also provides most of its services to people who never have to face that risk. Many argue that it is not fair that the few should have to suffer that risk for the convenience of the many. Even though the technical risk may be quite low compared to many other sources of risk, those residents tend to experience more outrage, and therefore, greater risk.

Familiarity: More exotic risks tend to be regarded as more risky than familiar risks. For example, peanut butter or alcoholic beverages offer as high a level of objective risk as some industrial chemicals found in well water. Yet they generate little outrage, in part, because they are so familiar.

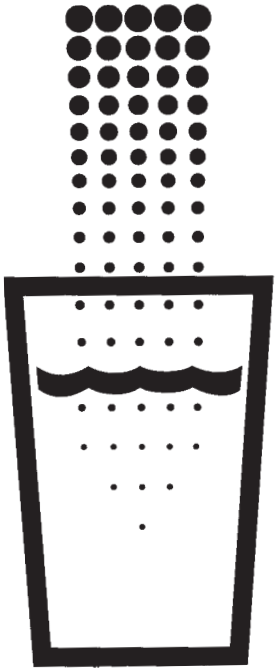
Community risk history: Has the community had a history of risk-related problems? Were those situations resolved satisfactorily? If risk experts were to argue that there was a one-in-a-million chance of a waste management facility causing water pollution, and then it happened, the public would be unlikely to believe future estimates.

Social dynamics: The nature of change in the community clearly influences how residents will respond to the potential of threats to ground water. Communities in a process of change, with an infusion of new residents, and with slightly higher education levels (including more people with professional and managerial skills) are apt to be more responsive to recommendations for ground water protection. In those towns, residents raise more questions, are more involved, and are more insistent that protective policies be established. In towns with less protective policies, there is likely to be more concern for the impact on development and a stronger emphasis on the status quo.

Communicating Risk

Given that experts and the public focus on different aspects of risk, the question remains: How do we create an informed public, experts, and policymakers better able to balance the social and scientific aspects of water quality risk issues? All must understand and appreciate the different perspectives present in risk policymaking.

Risk assessment experts often have difficulty appreciating the public perspective on risk and the concept of outrage factors. This happens despite the fact that risk assessment emerged as an administrative tool to gain public acceptance for policies related to risk situations.



For example, congressionally determined standards for cancer-causing residues in food—the Delaney Clause—stimulated the development of risk assessment procedures to help make the choices needed to apply the new rule. The procedures had to be defensible before congressional committees, the courts, and thus in the press—all places where the public is involved.

Recognizing Public Concerns as Legitimate

If the public is to have a role in policymaking, risk assessment experts and policymakers must recognize as legitimate those factors that the public views as important in assessing and determining the level of acceptable risk for a community.

Understanding why zero risk is an unreasonable and unattainable goal is one of the challenges facing risk communication. Risk assessment experts, policymakers, and risk communicators must help the public identify choices and understand their costs, who bears those costs, and how best to achieve risk reductions. This may require broadening the debate from a focus on individual threats to consideration of the balance between hazards that face the community and its water supplies.

Effective ground water policy requires that two determinations be made:

1. what to do to solve specific technical problems; and
2. how to bring about community decision-making that will empower policies and enlist citizen support in implementing and maintaining them. If the public feels involved and empowered in the process, it is likely to support final policy decisions. This means making available at each stage of the policy cycle the information needed to answer the questions that are unique to that stage of the process.

The Decide-Announce-Defend Approach

The typical model used to involve the public in policy decisions is a strategy often described as the decide-announce-defend approach. A decision-making body typically commissions a study, uses the results to determine what they consider the best alternative, and then announces a decision. This is followed commonly by a public hearing or meeting in which the decision-makers defend their decision and seek reactions.

This strategy is effective in cases when there is little or no conflict about the balance between social and scientific factors that should be taken into account in those decisions; when the technology is stable and widely accepted; and when the processes to deal with fairness, voluntariness, and other outrage factors are worked out and understood.

On the other hand, when scientific understanding is changing rapidly, when uncertainty is high, and when the surrounding social problems have not been worked out, the decide-announce-defend strategy often results in high public outrage. Part of the challenge is to judge when a different approach is needed.

The Free-Flow-of-Information Approach

Much more effective in finding the balance between scientific and social factors—but more difficult to implement—is a strategy that calls for free flow of information within the community about problem, policies, and potential solutions. The goal of this approach is to equalize information in the community, providing all affected individuals with the opportunity to become informed and to understand various aspects and difficulties associated with the problem. The public may then be forced to take more responsibility for the result.

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Unrealistically simple solutions are much less likely to be proposed when citizens know enough to realize the complexity of the problem. Trust can develop around those who must deal with that complexity as they demonstrate their competence and willingness to take into account the concerns of the public. While this approach may seem cumbersome and slow, it has often proven faster in the long run.

Perhaps most important is that this free flow of information opens the process up for citizen inspection. Implemented properly, this strategy sends the message that "there are no secrets" and that everyone has free access to any information—and builds trust and confidence in decision makers. Just as important, this proactive strategy not only invites the public to participate, but also facilitates and encourages public participation—not just in public meetings when final choices are in progress, but in all phases of the decision-making process. The use of citizen study committees, community opinion surveys, and the free flow of information in the mass media create an environment of cooperation and an implicit assumption that the goal is to make the best decision for the community.

Disgruntled groups that remain have a harder time disrupting the process when it is clear that they had their chance to bargain out a decision to their liking. Open systems of communication at the very best imply to citizens that the decisions are not being made to favor some undeserving special interest group.

In designing a free-flow-of-information approach, it is important to recognize that different questions must be answered at different stages of the policy process, and that various groups will be at different stages of the cycle at any one time. Some will want to understand what the concern is about, who is affected, how to look beyond symptoms, and how to separate facts from values before they are ready to consider involvement. Once these concepts are in hand, defining the issue becomes more efficient.

The search for alternatives that make as many winners and as few losers as possible is a particular challenge and calls for development of information on the consequences of each alternative to facilitate comparisons. Then, once choices are made, how is the new policy to be implemented, by whom, and under what terms? Once a program is in place, questions shift to evaluation and the cycle can begin again.

Effective Risk Communication Strategies

Communication about complex risk issues will be more successful if the following guidelines are considered:

- Recognize public values and outrage factors, not just scientific and technical Information.
- Prepare for all stages in the policy process and the issue evolution cycle, particularly in defining the problem, identifying alternatives, and debating the consequences.
- Recognize that communication is not a simple one-way process. Significant changes in levels of awareness, knowledge, and participation require substantial input and back-and-forth exchanges.
- Understand that individuals do not deal with complex information in isolation (particularly that which has social value implications), but rather through interaction with other individuals. To be successful, communication should include interpersonal discussions.
- Avoid expecting community-based mass media to carry the entire content of complex communication. One major role of the media, however, is to facilitate and add legitimacy to community-based information and help focus issues and debate.
- Allow audience needs, including level of awareness, existing knowledge, and perception of the problem, to be major guiding factors in the design of all information going into the community.
- Target specific groups in the community, not just "the lay public" as a whole. Who is the public for this issue? Community leaders, technical experts, elected and appointed officials, teachers, business leaders, media representatives, industrial workers, plant managers, and farmers all need information about the technical situation as well as about other groups' perceptions, how they feel about the problem, and what they consider the most appropriate alternatives.

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Risk communication is a difficult challenge. There are no easy answers and no "cookbook solutions." The best evidence we have, however, does suggest the direction for long-term success—an open, informed, democratic process of decision making, while more cumbersome than closed, expert decision making, will be most likely to succeed in designing effective policies that citizens will support to meet the emerging problems of ground water protection.

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A complete set of leaflets can be obtained from the
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