Role of the Scientist Technician in Water Policy Decisions at the Community Level: A Study in Purposive Communication

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A dominant trend in advanced societies has been the use of scientific knowledge to solve human problems. This, of course, entails widespread employment of scientists and communication between the public, decision-makers, and scientists. Scientific facts, statements by technical experts, publications, testimony and scientific opinion of all kinds is increasingly important as policy-making criteria. There are, however, some problems in the application of science to critical problems. There is no doubt a gap in development and application of water resources technology (Wilkenson, 1972). We know more than we are capable of applying. Since knowledge about water resources need to be applied in local communities, social structure and public attitudes in the community become critical variables. They form an important part of the gap between knowledge and application.

The objective of this research is to further understand how scientific knowledge may be most effectively applied to community problem-solving. An essential step is studying how community members and their leaders view the use of scientific knowledge and the role of the scientist and technician as an advisor. Specifically, our report will focus on: how certain community characteristics affect public perspectives of science and the role of the scientist in solving water resource problems; and, the degree of consensus between public perspectives and local leaders about science and the role of the scientist in defining and solving water problems.

Application of scientific knowledge depends both on its technical validity and what people think of the knowledge, how its use affects them. For this reason, the use of knowledge has both a technical and social dimension. The development and use of knowledge is greatly determined by social definitions of how much knowledge is desired, what questions are to be submitted to research, and which findings are to be accepted, suppressed, or disregarded. All knowledge is interpreted within a social context. Etzioni (1968:136-7) has discussed knowledge as having two functions. One, reality testing, and the other, evaluative interpretation. Knowledge provides a relation to reality by providing information about the environment, the community, the person, or the family. This is what we mean by scientific facts about something. On the other hand, knowledge can also provide meaning. Fact can always be interpreted in light of other facts, values or personal and community circumstances. Experience and research suggest that social factors are as basic to the employment of scientific knowledge as is technical validity. The worth of scientific knowledge, information control, and the role of the scientist as a communicator as seen by the public and its leaders are basic to the process.
serves his role in a particular situation. Community leaders are sometimes disappointed when they approach scientists that represent public universities, for example, because there is considerable pressure on the scientist to engage in basic research that may not have immediate policy considerations. Because of the reward structure of his professional community, the university scientist is probably oriented to the kind of research that will allow him or her to contribute to a growing body of knowledge about water management but with little training in the art of communicating to the public and public leaders. The research is likely to be significant in the long but not the short run. The policy-maker, given the nature of his local economic and political situation, can define the scientist role in other ways. He, for example, often expects the scientist to serve only as one profusing information that he, the policy-maker, decides is important. The implications of this problem and orientations can result in attempts to control the direction of the scientist's research. The scientist, on the other hand, will likely consider the policy-makers definition of the problem as insignificant in comparison with his long-run interests. Research and experience also shows that public groups sometimes settle on a course of action and then call in a technical specialist to help them legitimize their position.

Environmental Questions

Decisions about environmental problems require extensive communication between the public, leaders, and scientists. Public and leader perceptions about the legitimacy of science as a problem-solving means is a basic element. Environmental questions have unique attributes making decision-making and the use of science very complex.

Resolution of water problems can have immediate and drastic consequences for a community. There is, in some cases, a question of community survival. Water pollution and sewage disposal are community-based problems where value conflicts and partisanship is evident and has direct impact upon local life. Donohue, Olien, and Mischenor (1974) correctly point out that "State and Federal anti-pollution regulations, symbolic of social change, often force communities to weigh preservation of the physical environment in the long run against preservation of the social environment in the short run." Job loss, higher costs, inconvenience, restricted use of public waters, are examples.

Scientific advising is critical to defining and answering environmental questions. The scientist has to be able to communicate on a personal basis with local people and their leaders. This constitutes one of the difficulties in the application of science to community issues. Scientific work on these problems must be conducted in the public arena. Rather than isolated in research centers dealing with arcane matters like rocket thrust, experts must apply their knowledge to sewage disposal in Alexandria in the short run, or in the pollution in Fairmont, Minnesota where people have definite views about the issue and are very concerned as to how certain kinds of "solutions" will affect them. Conflict over community issues like these is likely, people become very concerned, and carefully examine the scientist's testimony in terms of its potential impact over and above the environmental problem.

Research evidence, scientific statement, and testimony, is a basic ingredient in environmental decision-making. Substantial scientific evidence is presented in any environmental controversy and communicated to the public by the mass media. Science directly becomes part of the decision-making process, political in nature, and public attitudes about science and the role of scientists are fundamental to our understanding of how knowledge can be applied to environmental problems. Since local communities are still vitally responsible for the administration of environmental programs even though standards are usually imposed by State and Federal agencies, the relationship between the public, local leaders, and scientists is worthy of analysis. Environmental decisions require communication between the public, local leaders and scientists considerably more than issues of national importance but having local impact only in isolated cases. Legitimization of scientific activity by the public and local leaders becomes a critical variable. We need to know how conflict and other community characteristics affect public perception of science and scientists.

Community Characteristics

Four factors are considered in this study as explanatory variables. These include (1) levels of community conflict, (2) community size and heterogeneity, (3) degree of local concern, and (4) level of public participation in the issue. Two types of participation are used. One is general participation by people in the communities we studied. The second is attendance at local environmental or pollution control hearings. The communities will be compared according to these factors.

Conflict

This is an endemic condition of social and community life. Conflict occurs in a social system in line with whatever social and economic divisions exist. The more power is dispersed in a social system, the more open controversy and participation is likely to be. Some degree of conflict in a community means local citizens are capable of mobilizing, participating, and presenting views of subjects they think are critical to them. Scholars have pointed to some of the positive consequences of community conflict (Coser, 1956). It can, within limits, arouse and maintain citizen participation. It can focus attention on basic community concerns. Issues that would not otherwise be seen by public view are once conflict about them reaches a certain level. Because of the public nature of community partisanship, knowledge about an issue is more evenly distributed in a community as the level of conflict increases. In a study of sixteen Minnesota communities, Donohue, Mischenor, and Olien (1974) discovered that as conflict about community issues intensify, knowledge about that issue begins to distribute across educational and status levels. Conflict, therefore, can function to bring knowledge into a system, expose the public to existing knowledge through the mass media or their participation, and open the whole decision-making process to public referendum.
Citizen participation can be expected to increase as the level of concern does or the degree of knowledge about the issue. These three factors are again indicators of system oneness. Where there is knowledge, concern, participation by citizens, scientific knowledge about environmental issues is sought and used. Regard for scientific knowledge can vary, however, according to the seriousness of the environmental issue for community well-being.

Again, we assume these conditions affect the community regard for knowledge and the scientist. The second question in the convergence of public and leader perspectives in various community contexts. Are members of the public and leaders more likely to agree about science and its use when there are high levels of public concern and participation? Does public concern lead to more regard, more science, restriction of the scientist, or the reverse.

Summary

Application of scientific knowledge is a distinctly social process. Use of such knowledge involves perspectives as to the worth of scientific knowledge, information control by partisans engaged in conflict, and the proper role of the scientist-technician. We have proposed that public and leadership perspectives of science, at the community level, are related to certain community characteristics. As discussed, these are the level of conflict about the issue, the size and heterogeneity of the area, concern, and participation by citizens with the issue.

Selection of the Communities and Research Strategy

Six communities were selected for analysis in this study. Data was gathered in each of the communities over a two year period. Five of the communities were faced with environmental problems involving the attention of the general public and in one case community survival. The issues varied in seriousness and intensity. In one community, Silver Bay, community survival was and still is a central question. A number of people in Ely defined the mining and taconite issue as having direct implications for community stability if not survival. Duluth, Fairmont, and Alexandria, Minnesota, experienced rather high levels of conflict about the operation of a steel mill, preservation of a local slough for wildlife, lake pollution from soil run-off, and sewage disposal but community survival was not at stake. Grand Rapids, Minnesota is used in this study as a comparison point. At the time our work was undertaken, Grand Rapids was not directly involved with any environmental issue. Although located in Minnesota's Iron Range, it is geographically separated from Ely, Silver Bay, and Duluth. Closing the steel mill and the taconite plant or restriction of mining in the BWCA are not issues that seriously threaten Grand Rapids. Each of the communities and the issues were selected if they had explicit implications for water resource management and conservation.

The communities we selected for analysis differ systematically but are also alike. They differ in terms of their size, complexity, and location. One community is in south central Minnesota in the heart of a highly productive farming area, Alexandria is located north and west of Minneapolis-St. Paul. Ely, Silver Bay, Duluth and Grand Rapids are in northeastern Minnesota. The environmental issues vary in their content but each has direct relevance for water resources planning and land use management. Another basic similarity of considerable importance to this study is that scientific testimony, fact, and judgment has been a primary element in the controversies surrounding these issues. Scientific deliberation and often disagreement among scientists has been widely publicized by the local media and national media in the case of Silver Bay. Dumping of taconite tailings into Lake Superior by the Reserve Mining Company has become a national issue exemplifying the conflict between private economic interests and environmental preservation. The criteria we used for selecting communities was that (1) there was an environmental issue affecting water resources and (2) that scientists and other technical experts had been involved in problem definition and resolution. Additionally, we were interested in communities where the local media had widely publicized the issue particularly the involvement and judgment of professionals.

2/ Grand Rapids does profit from the tourist trade in the "iron range" area but does not stand to lose or gain much by decisions related to the dumping of taconite tailings in Lake Superior by Reserve Mining or prohibition of mining in the Ely, Minnesota area.
Research Strategy

The data presented in this study is part of a long term research program related to community development, mass communication and social change, and to problems of using scientific knowledge for community problem solving. Most of the findings are from personal interviews conducted in six different communities over a two year period. In each community, members of the general public were randomly sampled. Adults 21 and over were selected by probability sampling methods and were interviewed in their homes by local persons trained for the project. In all of the communities, save two, a sample of local leaders was drawn and interviewed. Scientists, engineers, and other professionals involved in these and other issues were also interviewed. Samples of the interview schedule used in the study can be found in the methodological appendix.

Local leaders were selected by a two step process. Names of those involved were taken from newspaper accounts of the issue and nominations by local professionals. We then contacted those people and asked for additional names. If a person was cited by at least three people as having an important role, they too would be interviewed. We followed this procedure until the list was exhausted.

Analysis

The next section presents data on the relationship of certain community properties and public attitudes about scientific information and the scientist's role. The community rather than the individuals in the community is the unit of analysis in each case. In the last data section, members of the public and local leaders will be compared according to their views on the use of knowledge and the scientist's role. In this case, we are interested in the degree of agreement between local leaders and the rest of the community. We should quickly add that the data is presented as statistical summaries. In no case, is the identity of any individual revealed, or data presented in such a manner that personal identities could be inferred.

PUBLIC ATTITUDES TOWARD SCIENTIFIC INFORMATION IN SIX COMMUNITIES

Scientific literature in the past few years has shown considerable concern about public support for science. Government cutbacks in research, public disenchantment with our major institutions have led some to wonder if scientific research and science will continue to enjoy the support it had in the last decade. According to national opinion polls, public trust of leaders in our various institutions, including science, has declined. This does not mean that public regard for scientific knowledge has also suffered. Although people may distrust, to a degree, the leaders of a given institution this does not mean they no longer value scientific information.

Our basic finding is that scientific information is seen by the public in six communities as a very important factor in decision-making about water management and other environmental issues. In this section, we will look at public attitudes regarding the worth of scientific information and how it should be used.

We will compare communities with respect to public attitudes about 1) worth of scientific information, 2) control or restriction of scientific information about environmental problems and, 3) the role of the scientist in environmental decision-making.

The analysis will include description and explanation. Communities may be compared as to the percentage of individuals agreeing with items about information or the relative degree of information control agreed to by individuals in each community. On the other hand, we are attempting to explain variance among communities in their response to scientific information. The latter effort requires the use of community characteristics such as level of education, degree of community conflict, public participation as independent variables. As explained in the first section, it is our general hypothesis that community characteristics affect public evaluation of science and scientists.

Table I shows that most of the people in the six communities highly regard scientific knowledge. In every case except one, more than 50% of the community members feel that scientific knowledge is an important means for resolving water resource and other environmental problems. We asked people to respond to the following items: 1) people would trust government more if public decisions depended more on scientific information, 2) there is no need to put a question up for a vote if scientists already have the answer, 3) in solving an air or water pollution problem, there is no substitute for knowing the scientific facts. Respondents were asked to agree or disagree with these statements. Answer categories were weighed in the following manner: 0 = don't know, 1 = agree, 2 = qualified, 3 = disagree. The scoring on these items was reversed so that a high score means a person highly regards scientific information. The responses were then summed and used as a scale. If a person agreed with all three items he would have a score of 9 which indicates a very high regard for scientific information. If they disagreed with all of them or with two and agreed
with one, their score would be either 3 or 5 indicating a relatively low regard for scientific information. For our analysis, we have dichotomized the responses so that low includes scale scores from 1 through 5 and high encompasses scores from 6 through 9. Communities are compared by reference to the percentage in each that are low and high on the "worth of science" scale.

The second dependent variable is public attitudes toward information control. There are two aspects of this variable. First of all, we asked people if they wanted increased newspaper coverage of local environmental issues. Two items were presented: 1) Newspapers would do a great service by reporting, in detail, the scientific and technical arguments about the taconite problem, 2) Newspapers should cut down on things like comics and use more space to explain pollution and other environmental problems. The first question was revised to fit the community in question. A "yes" response to these items was interpreted as one in favor of expanding newspaper coverage and information dispersal about the issue. Respondents were asked to agree or disagree with each of these statements. Answer categories were weighted in the following manner: Agree = 3, disagree = 1, qualified response = 2. If a person agreed with all the items, this response was defined as one in favor of holding back information about local environmental problems if conflict and disagreement could result. Scores ranged from a low of 3 to a high of 9. A person with a score of 9 disagreed with all three items and is considered to be in favor of reporting scientific work about a local problem if conflict might result. In Table 1, we can see that 53.5% of those interviewed in Fairmont were in favor of holding back some scientific information if local conflict could result. In Alexandria, 26.9% were in favor of this. It must be emphasized here that we are dealing with a relative scale.

The final dependent variable refers to public attitudes about the scientist's role in decision-making. Definition of the technical specialist's role is an important factor in what kinds of information enter decision-making. Scientists can play a variety of roles from casual consultants to decision-makers. Generally, the greater the autonomy given the scientist in reporting information, the more likely will scientific information and data become a part of the decision-making scheme. We asked people to respond to four possible role alternatives for scientists that measured the degree of autonomy given by the public to scientists and other professionals in environmental policy-making. They were asked to select the alternative that came closest to their views: 1) information and ideas from scientists ought to be ignored by people who make environmental decisions, 2) people who make environmental decisions should use technical information from scientists, but should not depend much on what scientists say should be done, 3) people who make environmental decisions should not only use technical information from scientists, but should also depend to a great extent on what scientists recommend, 4) scientists themselves should be making most of the major environmental decisions.

As can be seen in Table 1, most citizens prefer alternative 3. The majority in each community want scientific information used and want decision-makers to pay attention to recommendations from scientists. Although the public strongly supports the use of scientific information by decision-makers, it is quite clear that they do not want scientists themselves making most of the major decisions. Alternative 4 was selected by about 12% in Ely and Grand Rapids, 17% in Duluth, 7.5% in Silver Bay, 4.8% in Fairmont, and 8.5% in Alexandria.
Community Conflict

Considerable news has been generated by pollution issues over the past few years. Pollution abatement and the management of water resources can have direct and far reaching consequences for local communities. One of the communities we studied, Silver Bay, is faced with the question of survival and the Reserve Mining issue has emerged as a landmark case in the conflicts between economic growth and environmental preservation. Mineral exploration in the Boundary Waters Canoe Area and the forested area adjacent to Ely is also a critical case involving the courts, local, state, and federal agencies as well as private industry and numerous conservation groups. Scientific evidence and testimony has been a critical source of information for decision-making and discussion about these issues and those in the other communities included in our analysis. Since both sides in these issues have extensively used scientists and their knowledge in the development of their arguments with extensive media coverage of scientific testimony and statements, a reasonable question is how do community members respond to scientists and their knowledge in a conflict situation?

In Table I, communities are ranked according to the degree of conflict they experienced as a result of selected environmental issues. Level of conflict is defined operationally as the extent to which respondents perceive the issue as containing tension. The measure is based on a single question, for example: "Would you say the question of the taconite plant is a touchy subject around here, or not?" The proportion saying "yes" is taken as an indicator of level of perceived conflict in the community. In Fairmont 37.9% of our sample answered "yes" while 72.5% answered "yes" in Alexandria. In Fairmont, the question refers to filling in the Luceatte Slough and sewage disposal is the issue in Alexandria. Citizens of Duluth, Ely, and Silver Bay also report rather high levels of conflict as more than 60% say that environmental issues are touchy subjects in their communities.

Low and high conflict communities evaluate scientific information similarly. Citizens in Fairmont, Minnesota where the degree of conflict is comparatively low rate scientific information about the same as those in Alexandria. The same is true with respect to expansion of newspaper coverage, information control and the role of the scientist. Conflict does not strongly correlate with any of these variables.

There are two kinds of conflict. In three communities, Fairmont, Alexandria, and Ely, there has been disagreement among groups in the community about environmental issues. In Silver Bay, the situation is clear, most people in the community reject the idea that Reserve Mining's operation is harmful to Lake Superior. This is an example of in-group, out-group conflict. Silver Bay against groups from the outside including federal and state regulatory agencies along with pressure from private conservationist groups. Table II shows a comparison of these communities.

The kind of conflict effects how people feel about the worth of scientific information. Scientific information is more highly evaluated in Silver Bay than in the other three communities. This is true also with the role of the scientist. Silver Bay citizens are more likely to agree with the following statement than people in Fairmont, Ely, and Alexandria: "people who make environmental decisions should not only use technical information from scientists but should also defer to a great extent on what scientists recommend." At the same time, people in communities experiencing internal conflict are somewhat more in favor of controlling information than people in Silver Bay. People in Fairmont are particularly sensitive to conflict resulting from disclosure of scientific information about environmental issues. Forty-five percent of our sample in Ely were in favor of holding back some information about environmental matters if local disagreement and conflict could result.

The nature of the conflict in a community does seem to influence public evaluation of scientific information. When there is a high level of consensus in a community and scientific data and work is the principal factor in the development of an argument, there is a great deal of respect for such information and a strong feeling that leaders should pay attention to scientists and use their information. As far as newspaper coverage is concerned, the responses of people in all the communities probably reflects a degree of weariness with environmental issues. To suggest that newspapers should cut back comics and include more information about the respective issues in these communities does not meet with much enthusiasm. Holding back scientific information is another matter, however. The data show that in communities where the level of conflict
is the highest, people are less likely to want information held back than in communities where the level of conflict has been low. One striking example is Fairmont. In a community where conflict was quite low (see Table I) relative to the other communities (Table II) 53.5% of those we sampled were in favor of holding back information if local conflict and disagreement could result. Forty-five percent felt this way in Ely. In Alexandria, where the level of conflict was highest and probably the most divisive, about 29% were sympathetic to holding back information. In Silver Bay which has the most to lose only 30% of our sample could be considered as highly supportive of controlling information if it could reduce local disagreement and conflict. Communities experiencing the highest levels of conflict could also be considered as those most open to the use of scientific information about the issues.

**Community Size**

Size is used here as the principal indicator of structural heterogeneity in a community. Social scientists generally link structural heterogeneity with system openness. That is, in social systems (communities, for example) having a high level of differentiation and specialization of roles and functions, one would expect a great deal of information to enter the system. Communities with large numbers of professionals working in specialized areas can be expected to have more access to professional information and scientific knowledge than smaller, more homogeneous areas. As a result, one would expect more regard for scientific information in heterogeneous than homogeneous communities. There is, however, another argument that can be made. Donohue, 1969a has found that "knowledge gaps" between socio-economic status groups were greater in larger, heterogeneous communities than in smaller, more homogeneous ones. In a community where everyone is "talking about an issue" there is likely to be more sharing of information even in highly technical areas than where professionals highly specialized and more isolated from the public are dealing with the issue. One could find, therefore, that the public in large communities have less regard for scientific information than those in small communities or that no difference exists between regard for scientific information in large and small communities.

In Table III, communities are ranked on the basis of their size. Silver Bay is the smallest, 3,420 people in 1970. Ely had 8,049, Alexandria 6,973, Grand Rapids, 7,747. Fairmont had 18,751 and Duluth is the largest by far with 100,510. Size and regard for scientific information are not related in any straightforward manner. The public in Duluth doesn't regard scientific information as highly as Silver Bay. Although Silver Bay is small, it is a highly technical community with a relatively high proportion of college educated people.

**Education**

Community regard for scientific information in problem solving is related to educational level, (Table IV). The level of community education in each community is measured by the median number of years of education per person and the percentage in the community earning a college degree. The first measure gives us an approximation of overall community education while the latter measure allows an estimate of the degree of professionalism in a community. The communities are not sharply

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**Table III. Public attitudes about scientific information and scientist’s role in decision-making by community size.**

<table>
<thead>
<tr>
<th>Community</th>
<th>Silver Bay</th>
<th>Ely</th>
<th>Alexandria</th>
<th>Grand Rapids</th>
<th>Fairmont</th>
<th>Duluth</th>
</tr>
</thead>
<tbody>
<tr>
<td>% ranking scientific information highly (3 item scale)</td>
<td>67.0</td>
<td>49.0</td>
<td>52.7</td>
<td>62.4</td>
<td>51.0</td>
<td>61.8</td>
</tr>
<tr>
<td>% in favor of expanding newspaper coverage of pollution issues (2 item scale)</td>
<td>36.0</td>
<td>13.6</td>
<td>39.9</td>
<td>33.3</td>
<td>39.3</td>
<td>35.0</td>
</tr>
<tr>
<td>% in favor of holding back information if local conflict could result (3 item scale)</td>
<td>39.2</td>
<td>45.1</td>
<td>28.9</td>
<td>30.9</td>
<td>33.5</td>
<td>34.4</td>
</tr>
<tr>
<td>% agreeing that people who make environmental decisions should not only use technical information from scientists, but should also depend to a great extent on what scientists recommend</td>
<td>80.6</td>
<td>64.6</td>
<td>73.4</td>
<td>76.6</td>
<td>71.8</td>
<td>69.3</td>
</tr>
</tbody>
</table>

**Table IV. Public attitudes about scientific information and the role of the scientist by median years of education in each community.**

<table>
<thead>
<tr>
<th>Community</th>
<th>Alexandria</th>
<th>Ely</th>
<th>Fairmont</th>
<th>Grand Rapids</th>
<th>Silver Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>% ranking worth of scientific information highly (3 item scale)</td>
<td>56.0</td>
<td>49.0</td>
<td>54.0</td>
<td>62.4</td>
<td>61.8</td>
</tr>
<tr>
<td>% in favor of expanding newspaper coverage of pollution issues (2 item scale)</td>
<td>29.9</td>
<td>29.9</td>
<td>29.9</td>
<td>33.3</td>
<td>35.1</td>
</tr>
<tr>
<td>% in favor of holding back information if local conflict could result (3 item scale)</td>
<td>28.9</td>
<td>35.1</td>
<td>53.5</td>
<td>29.9</td>
<td>34.4</td>
</tr>
<tr>
<td>% agreeing that people who make environmental decisions should not only use technical information from scientists, but should also depend to a great extent on what scientists recommend</td>
<td>73.4</td>
<td>64.6</td>
<td>71.8</td>
<td>76.6</td>
<td>69.3</td>
</tr>
</tbody>
</table>
different in median education. In Alexandria, the median level of education per person is 12 grades or high school. In Ely, it is 12.1, Fairmont 12.2, Grand Rapids 12.3, Duluth 12.3, and Silver Bay 12.6. Silver Bay is the highest in both counts because of the large number of technical specialists and managerial personnel involved with the Reserve Mining Company. There seems to be an association between the median years of education per person in a community and attitudes toward the worth of scientific information. The percentage distribution shows that as the level of community education increases, regard for scientific information increases also.

Most citizens in the six communities are not in favor of expanding newspaper coverage about pollution issues. There doesn't seem to be any direct correlation between educational level and attitudes toward newspaper coverage. (See Table IV.) Silver Bay is most supportive of decision-makers using scientific information. About 81% agreed that scientific information should be extensively used in decisions about water quality and management of natural resources and that leaders who make environmental decisions should depend to a great extent on what scientists say.

In Table V, scientific information is ranked the highest in communities having the highest percentage of persons with college degrees. Ely is the exception. In Silver Bay, 20% have college degrees as well as education beyond this level. Sixteen percent in Duluth and 15% in Grand Rapids have at least college degrees. Ely has 9% of its population with college degrees while Fairmont and Alexandria both have about 6%. The percentage of college degrees in a community is not directly related to other dependent variables.

Community Concern

An important question in any community endeavor is "how concerned are local citizens?" Concern about pollution in the local community is measured by public response to two items: 1) decisions about whether to enforce pollution standards around here will have a no direct affect on me, 2) regardless of direct effect on me, I feel very concerned about whether pollution standards are enforced. The items were modified slightly to reflect the issue relevant to each community. Persons that were most concerned would be those disagreeing with the first question while agreeing with the latter. Scores ranged from a high of 6 to a low of 1. A score of 6 was defined as high concern. The responses of each person were aggregated to show the mean or average level of personal concern in each community. The greatest degree of personal concern is in Alexandria. The least is in Ely. Eighty-three percent were highly concerned about the sewage disposal issue in Alexandria. Forty-three percent expressed high levels of personal concern in Ely about mining in the Boundary Waters Canoe Area. In general, the level of personal concern was quite high. In Grand Rapids, fifty-six percent were highly concerned, 44% in Duluth, 67% in Silver Bay, and 75% in Fairmont.

Data in Table VI shows that public concern has a curvilinear relationship with public ranking of scientific information.

<table>
<thead>
<tr>
<th>Communities ranked by percent having at least a college degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandria</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>% ranking scientific information highly (3 item scale)</td>
</tr>
<tr>
<td>% in favor of expanding newspaper coverage of environmental issues (2 item scale)</td>
</tr>
<tr>
<td>% in favor of holding back information if local conflict could result (3 item scale)</td>
</tr>
<tr>
<td>% agreeing that people who make environmental decisions should not only use technical information from scientists, but should also depend to a great extent on what scientists recommend</td>
</tr>
</tbody>
</table>

Table VI. Public attitudes about scientific information and the role of the scientist in environmental decision-making in each community by degree of personal concern in each community.
The community showing the lowest degree of personal concern about pollution feels almost the same about scientific information as the community evidencing the highest degree of personal concern. Apparently some degree of personal concern results in a positive evaluation of scientific information but beyond a certain point, scientific evidence loses a degree of public regard.

The level of concern does not strongly relate to the other dependent variables. As can be seen in Table VII, most citizens reject expansion of newspaper coverage for environmental issues. Most, however, want information about their issue publicized even if local conflict could result. Finally, there is little association between community concern and attitudes toward the use of scientific knowledge by decision-makers about environmental issues.

### Participation

We measured citizen participation in each community by calculating the average group membership of individuals and their attendance of local hearings and meetings devoted to discussion of environmental issues. Each person was asked to list the organizations or groups he or she belonged to. Secondly, each person was asked the following question: "Have you ever attended a public hearing on a conservation or pollution issue?" The first measure of participation refers to "general participation". See Table VII. The second measure is participation linked exclusively with environmental issues.

There is not much difference between communities as to the level of participation. In Fairmont, the lowest, average group membership among individuals is 1.5. Ely is the highest with average group membership equalling 2.1. There simply is not much difference between communities on this factor.

About 33% of those we questioned in Alexandria had attended a hearing devoted to an environmental issue. In contrast, 13% had attended such a meeting in Fairmont. Twenty-six percent in Silver Bay, 25.7% in Ely, 20.3% in Grand Rapids, and 17.6% in Duluth said they had attended some kind of environmental hearing.

### Public Attitudes About Scientific Information and the Role of the Scientist in Environmental Decision-Making

<table>
<thead>
<tr>
<th>Community</th>
<th>Fairmont</th>
<th>Alexandria</th>
<th>Silver Bay</th>
<th>Grand Rapids</th>
<th>Duluth</th>
<th>Ely</th>
</tr>
</thead>
<tbody>
<tr>
<td>% ranking scientific information highly (3 item scale)</td>
<td>54.0</td>
<td>52.7</td>
<td>67.0</td>
<td>62.4</td>
<td>61.8</td>
<td>49.0</td>
</tr>
<tr>
<td>% in favor of expanding newspaper coverage of environmental issues (2 item scale)</td>
<td>29.3</td>
<td>29.9</td>
<td>26.0</td>
<td>33.4</td>
<td>35.0</td>
<td>18.6</td>
</tr>
<tr>
<td>% in favor of holding back information if local conflict could result (3 item scale)</td>
<td>46.5</td>
<td>71.1</td>
<td>69.8</td>
<td>70.1</td>
<td>65.6</td>
<td>54.9</td>
</tr>
<tr>
<td>% agreeing that people who make environmental decisions should not only use technical information from scientists, but should also depend to a great extent on what scientists recommend.</td>
<td>71.8</td>
<td>73.4</td>
<td>80.6</td>
<td>76.6</td>
<td>69.3</td>
<td>64.6</td>
</tr>
</tbody>
</table>

### Public Attitudes About Scientific Information and the Role of the Scientist in Environmental Decision-Making by Degree of Citizen Participation in Environmental Issues

<table>
<thead>
<tr>
<th>Community</th>
<th>Fairmont</th>
<th>Duluth</th>
<th>Grand Rapids</th>
<th>Ely</th>
<th>Silver Bay</th>
<th>Alexandria</th>
</tr>
</thead>
<tbody>
<tr>
<td>% ranking scientific information highly (3 item scale)</td>
<td>54.0</td>
<td>61.8</td>
<td>62.4</td>
<td>49.0</td>
<td>67.0</td>
<td>52.7</td>
</tr>
<tr>
<td>% in favor of expanding newspaper coverage of environmental issues (2 item scale)</td>
<td>29.3</td>
<td>35.1</td>
<td>33.3</td>
<td>18.6</td>
<td>26.0</td>
<td>29.9</td>
</tr>
<tr>
<td>% in favor of holding back information if local conflict could result (3 item scale)</td>
<td>53.5</td>
<td>34.4</td>
<td>29.0</td>
<td>45.1</td>
<td>30.2</td>
<td>28.6</td>
</tr>
<tr>
<td>% agreeing that people who make environmental decisions should not only use technical information from scientists, but should also depend to a great extent on what scientists recommend.</td>
<td>71.8</td>
<td>69.3</td>
<td>76.6</td>
<td>64.6</td>
<td>80.6</td>
<td>73.4</td>
</tr>
</tbody>
</table>
A COMPARISON OF LEADERS AND PUBLIC ATTITUDES ABOUT SCIENTIFIC INFORMATION AND ROLE OF THE SCIENTIST

In the last section, we presented data related to public attitudes about scientific information and its use in decision-making. This is only part of the analysis, however. Although public attitudes are important, the opinions of leaders are even more critical to the decision-making process. Local leaders, by definition, are those that directly relate to scientists and other technical experts in the formulation of policy. Arguments between local factions or between the community and outside agencies are carried on by local leaders. Either the formulation of policy or the development of strategy in relation to outside agencies is a basic part of the role of local leaders. The action of leaders, however, is associated with local attitudes and leader behavior. In the long run, it is subject to legitimation of significant segments of the local public. Ultimately, leaders must answer to the public in the kind of policies or strategies created. Leader authority rests upon the acceptance or consent of the public. At least, a large enough segment so that leaders can identify support for their decisions in the community.

Analysis in this section will proceed in the following ways. First of all, we will present the overall degree of agreement between leaders and the general public on items related to worth of scientific information, information control, and the use of scientific knowledge (and the role of the scientist) in decision-making. Secondly, we will analyze the degree of agreement between the public and leaders in relationships to the level of community conflict, size, personal concern, participation, and education in a community. Thirdly, we want to know how responsive leader's attitudes about scientific information are to community characteristics such as those mentioned above.

In this section, we will be using data from four communities. Although our original sample included six, in four of the communities both members of the general public and leaders were interviewed about their attitudes toward scientific information and its use. The community continues to be our unit of analysis.

Table IX compares leaders and the public on their attitudes about scientific information. The public and leaders are in substantial agreement about the worth of scientific information. The majority in both categories agree that government would be trusted more if public decisions depended more on scientific information. The leaders seem to have a higher regard for scientific information than the general public although when it comes to actually decision-making, leaders are more reluctant to allow scientists to actually make the decisions. More so than the general public, leaders tend to agree that there is no substitute for knowing the scientific facts in solving a water or air pollution problem.

Table IX. A comparison of public and leader's attitudes about scientific information and its use in environmental decision-making.

<table>
<thead>
<tr>
<th></th>
<th>Public % Agree</th>
<th>Leaders % Agree</th>
<th>Difference %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>60.1</td>
<td>67.0</td>
<td>6.9</td>
</tr>
<tr>
<td>B</td>
<td>16.6</td>
<td>7.3</td>
<td>9.3</td>
</tr>
<tr>
<td>C</td>
<td>73.3</td>
<td>90.0</td>
<td>16.7</td>
</tr>
<tr>
<td>D</td>
<td>31.8</td>
<td>45.5</td>
<td>13.7</td>
</tr>
<tr>
<td>E</td>
<td>14.6</td>
<td>5.7</td>
<td>8.9</td>
</tr>
<tr>
<td>F</td>
<td>14.1</td>
<td>1.9</td>
<td>12.2</td>
</tr>
<tr>
<td>G</td>
<td>3.8</td>
<td>4.9</td>
<td>1.1</td>
</tr>
<tr>
<td>H</td>
<td>15.6</td>
<td>18.4</td>
<td>2.8</td>
</tr>
<tr>
<td>I</td>
<td>70.9</td>
<td>73.8</td>
<td>2.8</td>
</tr>
<tr>
<td>J</td>
<td>9.6</td>
<td>2.9</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Public and Leader Attitudes About Scientific Information

Items D, E, and F are directly related to the distribution of information about environmental problems. (Table IX). In each of the items,
it is clear that leaders are more likely to support disclosure of scientific facts about a local issue than is the public. Leaders seem to be more tolerant of disagreement about an issue in the community than the general public is. This is a matter of degree, however, as most members of the general public want scientific facts publicized regardless of local consequences.

It is clear from Table IX that both leaders and the general public want scientific information used to a great extent but do not want scientists making decisions. Leaders and the public substantially agree on this issue. This is clear from an analysis of items G through J.

Members of the public and leaders when interviewed were asked to select from four items (G through J) what they thought was the most appropriate involvement for scientists in environmental decision making. As can be seen in Table IX, items G through J, public and leaders are most likely to choose the item saying that "people who make environmental decisions should not only use technical information from scientists but should also depend to a great extent on what scientists recommend." Item H, however, does show that some distinguish use of technical information and depending on what scientists may say should be done. About 16% of the general public and 15% of the leaders chose this alternative rather than the others. Notably, few chose the first item in the scale (item G) or the last (item J). Few suggest that information and ideas from scientists should be ignored but not very many feel that decision-making should be turned over to scientists (item J).

Community Conflict

Now we turn to the second part of our analysis. We are interested here in whether the degree of conflict in a community affects the degree of agreement between the public and leaders about use of scientific knowledge. Table X shows more agreement among public and leaders in low conflict communities. There is also more disagreement among leaders as we move from low to high conflict than there is on the part of the general public.

The opposite finding is true in the second item. There is less agreement in low conflict communities than those with high conflict. At the same time there is more disagreement among the public as we move from low to high conflict than there is among leaders. This finding reflects two factors. One, public participation is tied to levels of conflict in a community. As the level of disagreement increases, rates of participation usually go up as well. A low conflict community can be one where the public is generally aesthetic about an issue leaving decision-making to local leaders or local professionals. Conflict tends to decrease the gap between the public and decision-makers because of increased participation by the public, increased information flow, and conflict makes decision-making more visible. Conflict can, therefore, be seen as part of the process reducing the gap between leaders and the general public in their attitudes toward decision-making and the role of scientific information, and the scientist.

Table X. A comparison of public and leaders' attitudes about scientific information and its use in environmental decision-making by degree of community conflict.

<table>
<thead>
<tr>
<th>Attitude Items</th>
<th>Public</th>
<th>% agree</th>
<th>Low</th>
<th>High</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. People would trust government more if public decisions depended more on scientific information</td>
<td>Public</td>
<td>60.5</td>
<td>60.6</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>60.7</td>
<td>69.6</td>
<td>8.9</td>
<td></td>
</tr>
<tr>
<td>B. There is no need to put a question up for a vote if scientists already have the answer</td>
<td>Public</td>
<td>19.8</td>
<td>15.0</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>7.1</td>
<td>7.5</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>C. In solving a water or air pollution problem, there is no substitute for knowing the scientific facts</td>
<td>Public</td>
<td>75.4</td>
<td>73.6</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>92.6</td>
<td>88.6</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>D. Newspapers should cut down on things like comics and use more space to explain pollution and other environmental problems</td>
<td>Public</td>
<td>31.6</td>
<td>31.9</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>38.4</td>
<td>18.0</td>
<td>9.6</td>
<td></td>
</tr>
<tr>
<td>E. If scientific evidence of pollution leads to more public disagreements like the one at Silver Bay, it might be better not to report that evidence</td>
<td>Public</td>
<td>13.3</td>
<td>14.4</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>3.6</td>
<td>6.4</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>F. Scientific information should be held back if it looks like it might lead to public disagreement in this community</td>
<td>Public</td>
<td>15.1</td>
<td>18.1</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>0.0</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>G. People who make environmental decisions should use technical information but should not depend much on what scientists say should be done</td>
<td>Public</td>
<td>18.0</td>
<td>18.5</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>10.7</td>
<td>20.0</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>H. People who make environmental decisions should not only use technical information from scientists but should also depend to a great extent on what scientists recommend</td>
<td>Public</td>
<td>71.8</td>
<td>71.4</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>61.2</td>
<td>77.3</td>
<td>13.1</td>
<td></td>
</tr>
</tbody>
</table>

24 25
Secondly, item B refers directly to decision-making. People are asked to forego their right to influence decision-making and turn it over to scientists. We would expect that as conflict increases in a community about an environmental issue, people would be less likely to turn over decision-making to another party whether a scientist or local leader. It is significant to note that leaders feel about the same no matter the level of conflict in their communities. Such a finding is sensible as we would not expect local leaders to give their decision-making prerogatives to professionals no matter the respect they have for them or the degree of community conflict.

The distribution on item C in Table X shows that leaders and the public both feel that there is no substitute for knowing scientific facts when making decisions. However, leaders in high conflict communities are somewhat less reluctant to agree with item C in high conflict communities as opposed to those in low conflict communities.

In all the subsidiary tables in Table X, save one (item B), the data show that there is more variation in leader's responses to the attitude items than among the general public. The only exception is item B. Very few leaders in low or high conflict communities are willing to turn decision-making itself over to scientists.

In high conflict communities, leaders seem to be split between how much they feel they should rely on "what scientists say should be done" about an environmental problem. This is evident in the responses to items G and H. Most of leaders in high conflict communities agree that decision-makers should use technical information and depend to a great extent on what scientists recommend (77.3%, item H, Table X). However, more so than in low conflict communities, some also agree that decision-makers should use scientific information but should not depend much on what scientists say should be done. Twenty percent respond in this manner. Leaders are, therefore, distinguishing the use of scientific information from the role of the scientists. To some extent, they are saying that we should listen to scientific information but be skeptical about what scientists themselves say. This finding has important implications for use of scientific information in communities. Almost any scientific analysis of a pollution problem requires interpretation and adjustment to local situations. In any scientific finding, there is always a level of uncertainty as to its applicability to local conditions. As a result, the advice and testimony of scientists is important over and above the publication of written reports.

Communication between leaders and scientists is sometimes difficult because leaders discover that scientists can disagree in their interpretation of data. The more experience that leaders have with scientists, the more experience they should have with this fact as well as with science as an institution. That is, challenging existing interpretations is an important part of the creation of new knowledge by scientists. When there is a high level of conflict in a community over pollution problems, scientific information has in many cases been a very important aspect of the decision-making process. Also, scientists as technical experts become personally involved through their statements at hearings, identification with certain groups, formal and informal consultation with leaders and the public, and the publication of their statements in the local newspapers, radio and television stations. The importance of scientific information for decision-making in environmental disputes helps us to explain why leaders in high conflict communities regard scientific information more highly than those in low conflict situations. However, when there is high conflict in a community, there is also a possibility that actual contact and communication between leaders and scientists creates some problems. This may be especially the case when leaders have worked with scientists, developed a perspective, presented it to the public only to find that scientists with other groups interpret the data differently.

There is a degree of difference between leaders and the public but it does not seem to be consistently nor substantially affected by community conflict. Changes in leadership attitudes appears to be the most important factor rather than the attitudinal differences between leaders and the public about scientific information and its use.

**Community Size**

Table XI illustrates two important findings. The first is that the degree of agreement between leaders and the general public increases as community size increases. The second is that as community size increases, leaders have somewhat less confidence in the effectiveness of science for problem solving in environmental issues. Indeed, the basic reason for the changing magnitude of differences between leaders and the public in rural and urban communities is the changing attitude of leaders. Leaders in the larger urbanized communities are more skeptical about the use of scientific information in decision-making than leaders in small, rural communities. This finding is clear in items A, C, E, and H. Even in items B and F the results are consistent with other items even though the differences are not as sharp.

Leaders in large communities have considerably more experience working with scientific consultants, local professionals, and experts in general than leaders in small communities. As a result, they are likely to have more knowledge about the uncertainties of science and that there are many questions that scientists and their research cannot fully answer. The findings don't necessarily reveal less respect for science but, perhaps, the degree of knowledge about scientific information and problems inherent to application of science to decision-making.

If we compare items G and H, (Table XI), it is apparent that leaders in the larger communities respect scientific information but 32.1% say that decision-makers should not depend much on what scientists say should be done. As in the analyses of conflict and attitudes toward science, we find that leaders clearly distinguish between use of scientific information and the role of the scientist. Leaders distinguish these two factors more sharply as the level of conflict in a community increases.

1. [Table X](#)
2. [Table XI](#)
Table XI. A comparison of Public and Leader’s attitudes about scientific information and its use in environmental decision-making by size of community.

<table>
<thead>
<tr>
<th>Attitude Items</th>
<th>Size of Community</th>
<th>% Agree</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. People would trust government more if public decisions depended more on scientific information</td>
<td>Public</td>
<td>58.1</td>
<td>60.5</td>
<td>65.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>73.7</td>
<td>60.7</td>
<td>58.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>15.6</td>
<td>0.2</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>B. There is no need to put a question up for a vote if scientists already have the answer</td>
<td>Public</td>
<td>12.8</td>
<td>20.1</td>
<td>16.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>8.4</td>
<td>7.8</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>4.4</td>
<td>12.3</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>C. In solving a water or air pollution problem, there is no substitute for knowing the scientific facts</td>
<td>Public</td>
<td>71.0</td>
<td>75.4</td>
<td>78.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>89.5</td>
<td>92.8</td>
<td>80.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>17.6</td>
<td>17.4</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>D. Newspapers should cut down on things like comics and use more space to explain pollution and other environmental problems</td>
<td>Public</td>
<td>20.4</td>
<td>30.5</td>
<td>39.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>50.6</td>
<td>38.5</td>
<td>44.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>20.6</td>
<td>8.0</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>E. If scientific evidence of pollution leads to more public disagreements like the one at Silver Bay, it might be better not to report that evidence</td>
<td>Public</td>
<td>15.3</td>
<td>13.3</td>
<td>11.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>4.3</td>
<td>3.6</td>
<td>9.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>11.0</td>
<td>9.7</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>F. Scientific information should be held back if it looks like it might lead to public disagreement in this community</td>
<td>Public</td>
<td>20.4</td>
<td>15.2</td>
<td>13.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>2.1</td>
<td>0.0</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>18.3</td>
<td>15.2</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>G. People who make environmental decisions should use technical information from scientists but should not depend much on what scientists say should be done</td>
<td>Public</td>
<td>14.5</td>
<td>18.0</td>
<td>11.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>10.6</td>
<td>10.7</td>
<td>12.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>3.9</td>
<td>7.3</td>
<td>20.3</td>
<td></td>
</tr>
<tr>
<td>H. People who make environmental decisions should not only use technical information from scientists but should also depend to a great extent on what scientists recommend</td>
<td>Public</td>
<td>72.2</td>
<td>71.8</td>
<td>64.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaders</td>
<td>85.1</td>
<td>64.2</td>
<td>64.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Diff.</td>
<td>12.9</td>
<td>7.6</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

As discussed earlier, participation refers to whether a person has attended a hearing or meeting where an environmental issue was discussed. Communities are arranged on this dimension from low to high. (See Table XII). Again we see that public attitudes remain about the same as the degree of participation changes in a community. However, the attitudes of leaders are likely to change. As the degree of public participation increases in a community, leaders seem more likely to support increased use of scientific information in decision-making. Such a conclusion is clearly consistent with the responses by leaders to items A, D, and H. Items B, C, and E show tendencies in this direction (See Table XII). The finding is especially marked in the last item. About 87% of the leaders in communities having high participation levels agree to the statement that “people who make environmental decisions should not only use technical information from scientists but should also depend to a great extent on what scientists recommend.” About 6% of the leaders in low participation communities agree with this statement.

The degree of participation in a community has more of an effect on leader’s attitudes than on the general public. The leaders are the ones that have to stand the heat of increased public participation. Given the value placed on scientific information by the public, we would expect that leaders would value scientific information more highly when there are relatively high levels of public participation. What we are seeing is that levels of public participation in a community influences the values of its leadership and the nature of decisions. Public participation is, therefore, an important factor in leader's attitudes toward the use of scientific information in decision-making.

Public Participation in Environmental Issues

The degree of concern about an issue can be an important factor in public attitudes about scientific knowledge. The responses by the general public and leaders to items A, B, and C in Table XII show some relationship between the degree of public concern in a community about environmental issue and evaluation of scientific information. Analysis of items A, B, and C shows that a moderate degree of concern in a community increases public regard for scientific information. This is not true of leaders.

Responses by leaders to item A, Table XII shows that a moderate degree of concern in a community decreases leader regard for scientific information. Leaders in communities where there is either low or high concern are likely to feel that public trust in government requires increased use of scientific information. Interestingly, a moderate degree of concern in a community increases public regard for scientific information over those in other communities. Leaders, on the contrary, have somewhat less regard for scientific information when there is a moderate degree of concern than when concern is low or high.
Table XII. A comparison of public and leader's attitudes about scientific information and its use in environmental decision-making by degree of public participation in environmental issues.

<table>
<thead>
<tr>
<th>Attitude Items:</th>
<th>Degree of participation in a community</th>
<th>% Agree</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. People would trust government more if public decisions depended more on scientific information</td>
<td>Public 62.5 57.9 58.2</td>
<td>Leaders 59.4 77.8 69.6</td>
<td>% Dif. 3.1 19.9 11.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. There is no need to put a question up for a vote if scientists already have the answer</td>
<td>Public 18.2 9.0 16.6</td>
<td>Leaders 7.4 8.0 8.6</td>
<td>% Dif. 10.8 1.0 8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. In solving a water or air pollution problem, there is no substitute for knowing the scientific facts</td>
<td>Public 76.8 74.2 60.6</td>
<td>Leaders 81.7 96.3 82.6</td>
<td>% Dif. 4.8 22.1 1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Newspapers should cut down on things like comics and use more space to explain pollution and other environmental problems</td>
<td>Public 34.6 20.2 32.8</td>
<td>Leaders 41.8 61.5 35.0</td>
<td>% Dif. 7.2 41.3 2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. If scientific evidence of pollution leads to more public disagreements like the one at Silver Bay, it might be better not to report that evidence</td>
<td>Public 13.7 18.6 14.1</td>
<td>Leaders 6.8 3.8 4.8</td>
<td>% Dif. 6.9 14.8 9.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Scientific information should be held back if it looks like it might lead to public disagreement in this community</td>
<td>Public 13.2 16.8 14.0</td>
<td>Leaders 1.7 0.0 4.8</td>
<td>% Dif. 11.5 16.8 9.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. People who make environmental decisions should use technical information from scientists but should not depend much on what scientists say should be done</td>
<td>Public 12.3 18.2 15.1</td>
<td>Leaders 21.8 16.6 13.9</td>
<td>% Dif. 9.1 1.6 2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. People who make environmental decisions should not only use technical information from scientists but should also depend to a great extent on what scientists recommend</td>
<td>Public 70.8 68.8 73.4</td>
<td>Leaders 64.3 83.3 86.9</td>
<td>% Dif. 6.5 14.5 13.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table XIII. A comparison of public and leader's attitudes about scientific information and its use in environmental decision-making by degree of personal concern about environmental issues in a community.

<table>
<thead>
<tr>
<th>Attitude Items:</th>
<th>Degree of participation in a community</th>
<th>% Agree</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. People would trust government more if public decisions depended more on scientific information</td>
<td>Public 57.9 62.5 58.2</td>
<td>Leaders 77.8 59.4 69.6</td>
<td>% Dif. 19.9 3.1 11.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. There is no need to put a question up for a vote if scientists already have the answer</td>
<td>Public 9.0 18.2 16.6</td>
<td>Leaders 8.0 7.4 8.6</td>
<td>% Dif. 1.0 10.8 8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. In solving a water or air pollution problem, there is no substitute for knowing the scientific facts</td>
<td>Public 74.3 76.8 69.6</td>
<td>Leaders 96.3 81.7 82.6</td>
<td>% Dif. 22.1 4.9 13.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Newspapers should cut down on things like comics and use more space to explain pollution and other environmental problems</td>
<td>Public 20.2 34.6 32.8</td>
<td>Leaders 61.5 41.8 35.0</td>
<td>% Dif. 41.3 7.2 2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. If scientific evidence of pollution leads to more public disagreements like the one at Silver Bay, it might be better not to report that evidence</td>
<td>Public 18.6 13.7 14.1</td>
<td>Leaders 3.8 6.8 4.8</td>
<td>% Dif. 14.8 6.9 9.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Scientific information should be held back if it looks like it might lead to public disagreement in this community</td>
<td>Public 16.8 13.2 14.0</td>
<td>Leaders 0.0 1.7 4.8</td>
<td>% Dif. 16.8 11.5 9.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. People who make environmental decisions should use technical information from scientists but should not pay much attention to what they say</td>
<td>Public 18.2 12.3 16.1</td>
<td>Leaders 16.6 21.4 13.0</td>
<td>% Dif. 1.6 9.1 2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. People who make environmental decisions should not only use technical information from scientists but should also depend to a great extent on what they say</td>
<td>Public 68.8 70.8 73.4</td>
<td>Leaders 83.3 68.3 66.9</td>
<td>% Dif. 14.5 6.5 13.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Items A and C also show a greater degree of difference between the public and leaders in the condition of low or high concern than a moderate degree of concern. However, when respondents are presented item B there is more disagreement in the moderately concerned communities than in the other two.

When we move to the next three items, high concern in a community seems to produce a degree of agreement between leaders and the public. Items D, E and F show this although this is not the case with H and G. In the latter two items, there is more agreement between the public and leaders in moderately concerned communities than in the others.

Public and leader response to the last two items are most interesting. The public in low concern communities is more likely to want to restrict the role of the scientist than in communities where the concern is moderate or high. See item G, Table XIII. “The leaders in moderately concerned communities are those that are most likely to state that decision-makers should use scientific information but should not depend much on what scientists’ recommend.” In highly concerned communities, only 13% respond in such a fashion. Analysis of item H shows that most of the leaders and most of the general public support the use of scientific information and dependence on what scientists’ recommend. (See Table XIII). For the leaders, this is true for low and highly concerned communities but in communities where people in the community are concerned to a moderate degree. The degree of concern in a community does affect both public and leader responses to scientific information and the role of the scientist. Again, leader’s responses are more related to community concern than are those of the general public.

Level of Education

Table XIV shows that leaders in high education communities have somewhat less confidence in scientific information than where the educational level is relatively low. A community is defined as low in education if 5-8% of its members had a college degree from a four year institution. If it had 9-14% with college degrees, it was defined as high. Having 15-20% with college degrees is an in-between category. When we consider the first three items, the most difference is to be found in the responses to items A and C. About 58% of the leaders in high education communities agree that “people would trust government more if public decisions depended more on scientific information.” There is also a difference when we look at the responses to item C. Leaders in communities with higher educational levels are less optimistic about the potency of scientific facts in solving a water pollution problem than are leaders in the other communities.

The above findings are consistent with responses to the last items. Leaders in communities with relatively high educational levels are less likely to agree that “decision-makers should not only use scientific information but should also depend to a great extent on what scientists recommend.” (Item H, Table XIV). Combining this finding with the responses to the first three shows that the level of education in a community does affect how leaders respond to scientists and scientific information.
tion. Leaders in high education communities are also more likely to value scientific information than dependence of what scientists say should be done. About twice as many leaders in high education communities agreed with the statement that "People who make environmental decisions should use technical information from scientists but should not pay much attention to what they say." (Item G, Table XIV).

Again the findings indicate respect for scientific knowledge but the existence of problems in the relationship of scientists and leaders. Respect for scientific information holds constant with leaders and the public. At the same time, leaders in high education communities are somewhat more likely to agree to limiting the communication of scientific information to the public if local disagreement is likely to result. This can be seen in Items R and P. The greatest degree difference is in the responses to Item R. About 10% of the leaders in the high education communities agree that "if scientific evidence of pollution leads to more public disagreements like the one at Silver Bay, it might be better not to report that evidence." None of the leaders in the low education communities agreed with that statement while 3.5% of the leaders in the middle category agreed. Indeed, the differences observed could, in most tables, be explained by variation in leader's attitudes. Public attitudes were rather consistent no matter the degree of conflict or size of the community.

Among the most interesting set of findings were those showing that leaders in communities, urban communities, and low education communities were somewhat less optimistic about the effectiveness of scientific information in solving pollution problems than their counterparts. We explained this on the basis of leader's experience in relating to scientists. In our study, we found that conflict in a community signaled the active involvement of scientists and professionals of all kinds. Environmental quality has been handled in most instances as a technical question. For example, would techniques of sewage disposal in lakes kill fish and spread disease? Would mining result in pollution of lakes as the result of the run-off of toxic acids from mining operations?

Definition of environmental problems has led to intensive interaction of scientists and leaders. In the process, leaders learn about the tentative nature of science and the limitations of using scientific information in problem solving. Leaders in urban communities and high education areas relate to scientists and other professionals as a common course of action. Again, they are in the position of learning about science and its limitations. "This is especially important when we are considering changes in water quality. Increasing emphasis on environmental scientists and leaders does not seem to decrease respect for scientific information but it does seem to lead to some negative feelings about the actions of scientists.

Leaders in communities where contact with scientists is likely to be the greatest are those most likely to say "decisions should not depend much on what scientists say should be done." Decision-makers should, however, use scientific information. This is an important distinction and points to one of the problems of employing scientific information in problem solving of all kinds. In order for scientific information to be used, leaders must relate to scientists for interpretation of data, application to present circumstances, and development of policy. It is in the relationship of leaders to scientists where the problem lies. Perhaps, the central issue is the relative degree of tolerance that leaders have for scientists to interpret the inevitable uncertainties in science and disagreement among scientists in the interpretation of data. This is especially pronounced when we speak of water quality.

Water quality is a notable ambiguous concept and there are a number of reasons that it is. For one, there are often inadequate scientific methodologies for deciding whether this or that chemical is present in a body of water or, whether the presence of a given chemical, if found in water, is injurious to human health. And, finally, whether the chemical is considered to be a problem by either the public, those formally charged with developing water quality policy, or heavy water users such as industries and municipalities. An excellent example is the difficulty experienced by scientists and decision-makers in deciding the existence, source, and affects of the mineral, cumminizite, that is similar in substance to asbestos. According to reports by scientists, the methodology to determine its existence is rather unsophisticated and, as reported, little is directly known about the long-range consequences for public health. Scientific estimates about the effects of pesticides on water quality and human health could be included as well as the safety parameters for introducing radioactive wastes into public waters. Scientists and engineers, as experts, are often called upon to study and define the status and trends of water quality but the public usually finds extensive disagreement among professionals about the nature of the problem and what can be done about it. One important source of ambiguity with respect to water quality is, therefore, the tentative nature of scientific knowledge.

All knowledge, from the scientific point of view, is tentative. Scientific standards are arrived at, if ever, as the result of numerous tests and re-tests of concepts and theories and the accompanying development of methodologies so that theories can be tested. Knowledge, developed in this manner, is never accepted as certainty as it is expected that all knowledge will and should be challenged. As a basic tenant of science, knowledge is in a constant state of creation, revision, and further improvement. It the acceptance by scientists of knowledge as tentative is functional for ultimate understanding, difficulties arise in the application of science to every-day problems such as defining water quality. Science as a sub-system has norms that are quite different from those of policy-makers. For example, scientists are rewarded if they can find holes in existing logic and bodies of knowledge through their writing and research whether or not alternative conclusions to a problem, knowledge and establish standards which are applied to present circumstances. Where the scientist accepts uncertainty and exploits it for more understanding, the policy-maker suffers some degree of frustration. The policy-maker is searching for certainty so that existing problems can be resolved to an acceptable. Since science and the scientific method
has been accepted as a major tool for problem solving in this century, tentative scientific findings can be expected to lead to a degree of frustration among leaders that are dependent upon scientific information for problem definition and resolution yet learn of the limitations of scientific information when policy decisions have to be made.

REFERENCES


METHODOLOGICAL APPENDIX

Community and Environment Study
Silver Bay, Spring 1974

Case No. ________________ Interviewer ________________

Hello, I'm ________________ and I'm helping with a University of Minnesota study of news and environmental events, and what people think about them. The study is being conducted by the Department of Sociology at the University. Names of individual persons will not be connected with their responses in any reports.

The first question for example, is:

1. Between television, radio, and the newspapers, which one do you prefer most as a source of news these days?
   1. television
   2. newspapers
   3. radio
   0. don't know

2. We're interested in the specific ways people get their news. Do you read newspapers at all?
   1. yes
   2. no
   0. don't know

   If yes, continue to 2a, if no skip to item 3.

2a. Which papers do you read? and how often?

   Duluth News-Tribune
   Duluth Herald
   Grand Rapids Herald-Review
   Minneapolis Star
   Minneapolis Tribune
   Hibbing Daily Tribune
   Internatl Falls Daily Journal

   seldom 1 wk. 2 wk. daily

   Probe: "Any other, such as weeklies?"

3. About how many hours do you spend watching television each day?
   0 1 2 3 4 5 6 7 8 hours
   0. don't know

3a. What is your favorite television channel?

4. About how many hours do you spend listening to radio each day?
   0 1 2 3 4 5 6 7 8 hours
   0. don't know

4a. What is your favorite radio station?

5. What magazines do you read regularly?

5a. Have you read any books lately about public problems?
   1. yes
   2. no
   0. don't know

   If yes: Can you give me the title(s)?

NEXT, WE WOULD LIKE TO ASK ABOUT SOME THINGS THAT HAVE BEEN IN THE NEWS LATELY.

6. Of all the major issues which have been in the news recently, which one do you think is the most important?

   0. don't know

   (Score 1 for most important, 5 for least important.)

7. HOLD UP CARD 1 Which one of these issues do you feel is most important and which one do you feel is least important?

   (Score 1 for most important, 5 for least important.)

   Oil and gasoline supply
   National Health Insurance
   Environmental Pollution
   Watergate Controversy
   Unemployment and Cost of Living
NEXT, WE WOULD LIKE TO ASK ABOUT SOME THINGS THAT HAVE BEEN HAPPENING IN NORTHEASTERN MINNESOTA.

8. Have you read or heard anything lately about the Boundary Waters Canoe Area in Northeastern Minnesota?
   1. yes
   2. no
   If yes, ask 8a, if no or don't know, skip to item 10

8a. Can you recall the most important thing you have heard about it recently?
   0. don't know

   Anything else?

9. As far as you can tell, do most newspaper articles about this issue favor or oppose the idea of mining in the canoe country?
   1. most favor it
   2. most oppose it
   3. neither
   4. other

9a. How about other people around here -- do you think most people favor or oppose mining in the canoe country?
   1. most favor it
   2. most oppose it
   3. neither, mixed
   4. other

10. Have you read or heard anything lately about a taconite processing plant at Silver Bay?
    1. yes
    2. no
    If yes, ask: If no, skip to item 10b

10a. Can you recall the most important thing you have heard about it recently?

   Anything else?
11. As far as you can tell, do most newspaper articles about this issue favor, or oppose the discharge of taconite tailings into Lake Superior?

1. most favor it
2. most oppose it
3. neither, mixed
4. other

12. Do you think most other people around here favor or oppose the discharge of taconite tailings into Lake Superior?

1. most favor it
2. most oppose it
3. neither, mixed
4. other

If 2, 3, 4: Could you explain that?

13. Reserve Mining maintains that dumping taconite tailings into Lake Superior neither harms the Lake nor the quality of the drinking water. As far as you can tell, do most newspaper articles about this issue seem to favor or oppose Reserve's point of view?

1. most favor Reserve's point of view
2. most oppose Reserve's point of view
3. neither, mixed
4. other

14. Do you think most other people around here favor or oppose Reserve's point of view?

1. most favor Reserve's point of view
2. most oppose Reserve's point of view
3. neither, mixed
4. other

If 2, 3, 4: Could you explain that?

15. Have you talked with other people recently about mining in the BWCA or the taconite plant at Silver Bay?

1. yes
2. no

If Yes, Ask:

15a. Which issues have you talked about? And who have you talked to? (Check all that apply.)

- Mining issue
- Silver Bay
- Taconite Plant

Theses questions have no right or wrong answers. People have different views and we would like to know your feelings. For each statement, circle the "A" if you tend to agree, and the "D" if you tend to disagree.

A D I would be willing to pay even higher taxes than now, if it would help eliminate air and water pollution.
A D Companies that pollute the air and water should be fined.
A D The state Pollution Control Agency (PCA) should have no right to close factories.
A D Federal pollution control agencies should have no right to close factories.
A D The pollution issue has received more publicity than it's worth.
A D Technology got us into the pollution crisis, and technology can get us out.
A D Rationing electrical power is almost a must if you are going to eliminate pollution.
A D Pollution control itself can be a big help to the economy.
A D New inventions were a major cause of pollution, and new inventions will get us out of the pollution crisis.

Mining, steel, and taconite

A D The Boundary Waters Canoe Area (BWCA) is one area of natural beauty that should never be opened for mining, even in a national emergency.
A D The important thing is to let industry drill and remove minerals wherever it can add to employment and the economy, even in canoe country.
The taconite plant at Silver Bay should not be allowed to discharge tailings into Lake Superior, no matter what happens to employment. Some economic hardship may result, but it is better to prevent the taconite plant from discharging tailings into Lake Superior.

The taconite plant should be allowed to keep operating and discharging tailings at the present rate, even though some lake pollution may result.

The taconite plant should be allowed to operate in the way it finds necessary to maintain full employment, regardless of the lake issue.

NEXT, A FEW QUESTIONS ABOUT ENVIRONMENTAL DECISIONS IN THIS COMMUNITY.

16. Suppose a major public decision had to be made, affecting water quality in rivers, lakes, and city water here.

16a. Judging from the past, would you expect a small number of persons, or a large number of persons to take part in this decision?

1__yes, same persons
2____large number of persons to take part in this decision
0___don't know

16b. Would these be the same persons who take part in most other public decisions around here, or not?

1__yes, same persons
2____no, not the same
0___don't know

16c. Would you expect this decision to involve just one or two organizations and govt agencies, or many?

1__just one or two organizations and govt agencies
2____many
0___don't know

16d. Would this include the same organizations and agencies that get involved in most other public decisions, or not?

1__yes, same organizations
2__no, not the same
0__don't know

16e. How much general public discussion would you expect before a final decision was made?

1__none
2____some
3____a great deal
0___don't know

16f. Would you expect much attention to be given to public opinion before the final decision, or not?

1__yes
2____no, not much attention
0___don't know

16g. From past experience, is there usually a great deal of community agreement about public decisions like this, or not?

1__yes, a great deal of agreement
2____no, not a great deal of agreement
0___don't know

17. How about public decisions in general around here: Do you feel they are usually made in the right way, or not?

1__Usually made in right way
2____Not usually in the right way
0___don't know

If not in right way: Could you explain that?

NEXT WE'RE INTERESTED IN YOUR VIEWS ABOUT SCIENTISTS AND OTHERS INVOLVED IN ENVIRONMENTAL DECISIONS.

18. Take the taconite issue, for example: Who do you think actually has the most influence on how this will be decided:

1__scientists
2____local government
3____state and federal government, or
4____company leaders?

If other than DK: Could you tell me why you feel that way?

19. On decisions like these, do you feel scientists should have:

1__more influence
2__less influence, or
3____about as much influence as they have now?

0___don't know

If not in right way: Could you explain that?

20. Finally, who should have the most influence on these decisions?

1__scientists
2__local government
3____state and federal government
4____company leaders, or who?
5____other

If other than DK: Could you explain why you say that?
21. How about environmental groups, such as MECCA and the Sierra Club? Should these groups have:

1 more influence 0 don't know
2 less influence
3 about as much influence as they have now on these decisions?

Now, some questions on scientific information

22. Suppose public leaders used more scientific information in solving environmental problems than they do now; would that lead to:

1 better decisions 0 don't know
2 worse decisions
3 wouldn't it matter?

23. If leaders used more scientific information, do you believe there would be:

1 more agreement 0 don't know
2 less agreement, or
3 no difference in agreement on environmental problems?

24. Compared with 10 or 15 years ago, do you believe public leaders now depend:

1 more on scientific information
2 less, or
3 about the same amount 0 don't know

Hand card 2 to respondent

25. Which one of these four statements comes closest to your views about scientists and public decisions? (Check one)

1 Information and ideas from scientists ought to be ignored by people who make environmental decisions, such as whether to let taconite tailings go into Lake Superior.
2 People who make environmental decisions should use technical information from scientists, but should not depend much on what scientists say should be done.
3 People who make environmental decisions should not only use technical information from scientists, but should also depend to a great extent on what scientists recommend.
4 Scientists themselves should be making most of the major environmental decisions, such as whether to let taconite tailings go into Lake Superior.

Next, some questions about news in the papers and on radio and television.

26. First, a question about the Pentagon documents. Publication of secret documents showed the U.S. was making plans to step up the war in Viet Nam without telling the public it was doing so. Do you think publication of the secret documents was or was not in the best interests of the United States?

1 was in best interests 0 don't know
2 wasn't in best interests

27. Do you think the national government ever has the right to withhold information from its citizens?

1 yes 0 don't know
2 no

28. Do you think local governments ever have the right to withhold information?

1 yes 0 don't know
2 no

29. Do newspapers and broadcast stations around here usually report major issues before they're decided, after they're decided, or both?

1 usually before 0 don't know
2 usually after
3 both

Here are some statements that have been made about science, the environment and problems in general. Please circle the "A" if you tend to agree, and the "D" if you tend to disagree, as before.

A D Whenever a newspaper obtains a copy of "top secret" government documents, it should go to the government to get permission to print it.
A D There are times when it's necessary for our government to issue statements to the American public that are not completely true.
A D Newspapers would do a great service by reporting, in detail, the scientific and technical arguments about the taconite problem.
A D Newspapers should cut down on things like comics and use more space to explain pollution and other environmental problems.
A D A wide open public debate about environmental problems is healthy for this community.
A D Scientific information should be held back if it looks like it might lead to public disagreement in this community.
The way things have gone at the taconite plant, it might have been better if we had never heard those scientific reports about air pollution.

If scientific evidence of pollution leads to more public disagreements like the one at Silver Bay, it might be better not to report that evidence. When scientists disagree about something like pollution of Lake Superior, the public should hear all sides of the argument.

Scientists disagree among themselves as much as politicians do. It's okay for newspapers and TV to report public disagreements in larger cities, such as Duluth.

It's okay for newspapers and TV to report public disagreements in smaller communities, such as Grand Rapids. Public controversy is a good thing, because it brings out ideas and facts you didn't know before.

Scientists often confuse things by telling us more than we need to know to solve a problem. Technical experts are not half as important as government leaders who use good judgment.

People would trust government more if public decisions depended more on scientific information. There's no need to put a question up for a vote if scientists already have the answer.

In solving an air or water pollution problem, there's no substitute for knowing the scientific facts. We have plenty of technical information about water pollution.

What we really need to solve environmental problems is more knowledge about how to deal with people. Scientists should tell us how to solve environmental problems, without bothering us with so many facts and details.

There's too much information given out by scientists on problems. The drug problem is an example of people learning more scientific information than is good for them.

Since a little knowledge is dangerous, scientists shouldn't try to explain the taconite problem to the public at large.

We depend too much on scientific information these days, and not enough on doing what is right.

Changes in everyday life

I am now convinced that government people will deceive you just to gain their own ends. Public officials have shown more interest in my problems recently than ever before.

One nice thing about shopping now is that stores are less likely to take advantage of you than they did a few years ago. Public agencies that enforce pollution standards show that government is more interested in helping people these days.

We are losing the feeling of family closeness that we once had. The encouraging thing about families now is that parents and children trust each other more than ever.

Even in families, people take advantage of others more than ever. Government workers, like those in the courthouse and the post office, are more helpful than ever before.

Public concerns

The decisions about whether to enforce pollution standards at the taconite plant will have no direct effect on me. Regardless of direct effects on me, I feel very concerned about whether strict pollution standards are enforced at the taconite plants.

NEXT, WE WOULD LIKE SOME INFORMATION ABOUT GROUPS YOU BELONG TO.

HAND CARD 3 TO RESPONDENT

30. Do you belong to any organization of these kinds now? Are you an officer?

NAME OF ORGANIZATION     YES     NO

Take Card Back From Respondent

NOW, SOME QUESTIONS ABOUT LEISURE TIME.
31. Did you do any hunting or fishing in the past year?
   1. yes
   2. no
   IF YES: about how often did you go?

32. Did you do any camping, canoeing, or skiing, or things like that in the past year?
   1. camping
   2. canoeing
   3. skiing
   4. other (Specify)

33. Have you ever attended a public hearing on a conservation or pollution issue?
   1. yes
   2. no
   3. don't know

34. Do you own any of the following?
   1. snowmobile
   2. camper truck
   3. camping trailer
   4. outboard motor
   5. lakeshore property
   6. canoe
   7. sailboat
   8. other boat

35. Have you ever written to a public official, like a congressman, on the issue of:
   1. Boundary Waters Canoe
   2. Pollution of Lake Superior
   3. another conservation issue
   4. a different issue entirely

36. What is the highest grade in school which you have completed?
   1. 8th grade or less
   2. 9-11 years
   3. finished high school
   4. attended college
   If not stated: Do you have a degree? 5. yes
   6. no
   In what field?

37. What is the occupation of the main wage earner in this household?

37a. For whom does the main wage earner work?

38. Where did you spend most of the first 16 years of your life?
   1. farm
   2. small town
   3. large city
   4. non-farm, open country

39. Have you been interviewed before on a study like this?
   1. yes
   2. no
   0. don't know

THANK YOU FOR YOUR COOPERATION

FILL IN IMMEDIATELY AFTER LEAVING

Sex: 1. male
2. female
Estimated Age: under 30; 31-40; 41-50; 51-60; 61-70; 70+
Amount of time spent interviewing (minutes): 15; 20; 25; 30; 40;

Interviewing date: ________________
Time of day: ____________________

Interviewing area: 1. Grand Rapids
2. Duluth
3. Silver Bay
4. Ely
5. Hibbing

Street and house number: ____________________________