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**The Water Pollution Hazard  
in the Iowa River Basin, Iowa:  
A Descriptive Study of  
Attitudes and Opinions**

by

**James Gardner  
Nancy Hultquist  
Phillip Frankland**

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THE WATER POLLUTION HAZARD  
IN THE IOWA RIVER BASIN, IOWA:  
A DESCRIPTIVE STUDY OF  
ATTITUDES AND OPINIONS

by

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INTRODUCTION

The Iowa River is situated in eastern Iowa. Despite an urbanization trend, this region retains a strong agricultural and rural emphasis in economy and life style. Within the drainage basin, water resource issues have been of concern for at least seventy years. These are of two types: floods and water quality. Building of various flood control structures has diminished the concern over flooding. Increasing environmental awareness and increasing water-related recreation have accentuated the concern about water quality. The purpose of this paper then is to examine

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public opinions and attitudes about water quality or the water pollution hazard.

The study of public attitudes and opinions about societal problems and issues is a relatively recent research approach. Presumably the aim of this approach is to take this type of information into consideration in the resolution of issues and management of resources. Water resources and water resource problems have been studied in this framework.<sup>1</sup> Most have addressed the flood hazard while a few more recent studies have examined water quality.<sup>2</sup> The latter have either been generalized or specific to urban or industrial water quality, such that public opinion of and attitudes to water pollution in the agricultural context is a relatively unexplored area.<sup>3</sup>

In the Iowa River basin human activities and land use both influence and are influenced by water quality. The extent to which we may speak of water pollution as a hazard in this context is unclear. Impacts in terms of economic costs are difficult to define and measure. The violence, energy loading or property damage of a tornado, flood or even a drought are not readily evident. Thus one objective of the paper is to assess and discuss what individuals see as the impact.

Hazard research has shown that the extent to which an environmental hazard impinges on the life support and economic base of a population, influences perception of and adjustment to the hazard.<sup>4</sup> Water quality and the economic base of the study area are closely related. Agricultural land

run-off appears to be a major source of water pollution. Control of the hazard is tantamount to control of man and his activities. Therefore, we hypothesize that variations in opinions of and attitudes to the water pollution hazard will be closely related to the extent of one's commitment to agriculture.

The paper is composed of three parts. First, the physical and socio-economic characteristics of the Iowa River basin are described. In so doing, we attempt to define the magnitude, extent and history of water quality problems. Secondly, from data collected by questionnaire, public opinions and attitudes to the pollution hazard are outlined. Differences are explained on the basis of socio-economic, background and locational variables. Three sub-populations: citizens, professionals and activists, and their differences are of particular interest. Finally the results are discussed from the viewpoint of solutions or adjustments.

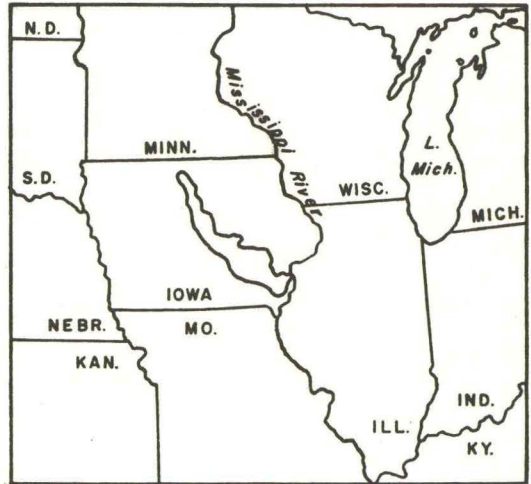
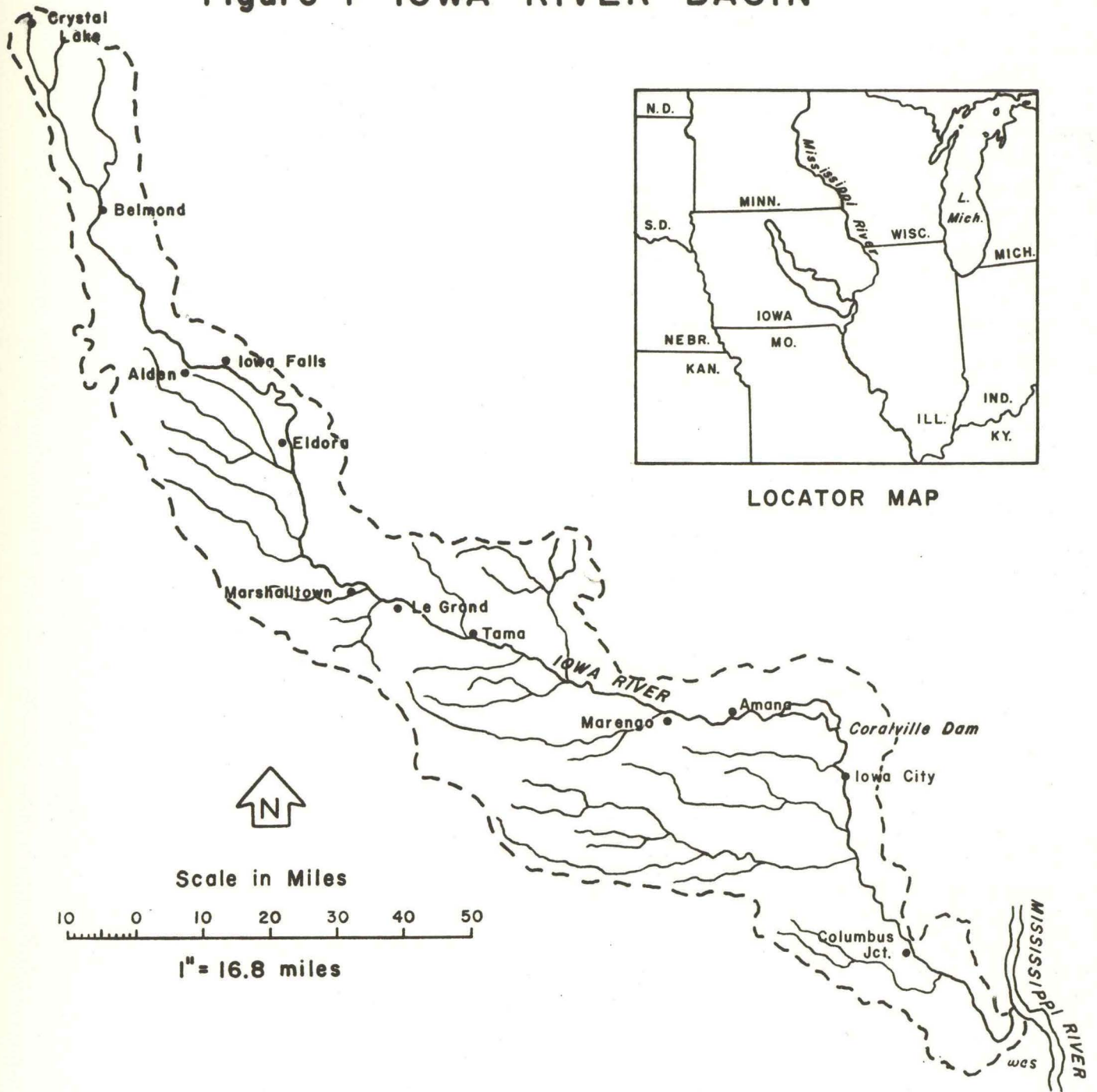
#### The Site: Iowa River Basin

##### A. Physical Characteristics

The west branch of the Iowa River emerges from Crystal Lake as a small drainage ditch. The east branch, in a similarly altered channel, joins the other at Belmond and together they flow over 300 miles to Columbus Junction, the confluence with the Cedar River (Figure 1). About 4,375 square miles are within the drainage area which is no wider than 40 miles at a maximum.

Altered channels are necessary in the upper reaches of the river to enhance the drainage of recently deposited Wisconsin glacial drifts.

Figure 1: IOWA RIVER BASIN



LOCATOR MAP

Here the average slope of the channel is 1.5 feet per mile. When properly drained, the soils derived from the Wisconsin drift are amongst the most productive in Iowa.

Near Alden the channel changes to one cut deeply into limestones and sandstones. Forty miles of this gives way to terrain with well-integrated drainage developed on Kansan age erosion surfaces. From here to Columbus Junction the terraced flood plain averages 2,000 feet in width. The rock gorge now filled by the Coralville Reservoir is an exception. Most soils on the Kansan surface are loess-based and productive. However, the relatively low infiltration capacity of the fine-grained loess and the hilly to rolling topography give rise to erosion problems and related high sediment concentrations in the river. Terrace and bottomland soils occupy 20% of the basin. They too are productive when properly drained. Intervening factors such as floods discourage permanent cultivation in some parts of the bottomlands.

Climatic conditions are conducive to agriculture as well. A warm frost-free season of 150 to 180 days and ample precipitation during the growing season are conducive to such crops as corn and soybeans. However, some climatic extremes are experienced. Exceptionally wet years (> 40" precipitation) and periods of intense rainfall (e.g., 8"/24 hours) have given rise to serious flooding and erosion. Dry years are known to have had adverse agricultural effects. These extremes have great significance

for the water quality in the region. Low discharge in the river has resulted in deficient dissolved oxygen levels<sup>5</sup> whereas high run-off from heavy rain and snowmelt has resulted in high coliform levels and increased B.O.D. (biochemical oxygen demand).<sup>6</sup> (See Table I for stream discharge.)

#### B. Land Use and Economy

The human use of the study area is an integral part of the hazard ecology. Though land use and the economy in the Iowa River basin are predominantly agricultural, ongoing changes in population distribution reflect: (a) the changing character of agriculture and agri-business, and (b) the growth of higher education. Iowa City, the largest urban area in the study area with a 1970 population of 46,850 and the site of the University of Iowa, is the major exception to the agricultural emphasis.

Rural to urban population trends in the study area are reflected by the fact that only two of eleven counties experienced a net population increase between 1960 and 1970.<sup>7</sup> These contain the two largest urban areas: Iowa City and Marshalltown. In 1900, 75% of Iowa's population was classed as rural. By 1970 that figure was 43% (See Table II).

Various estimates place about 80% of the Iowa River basin in agricultural land use. Although the total area devoted to agriculture has fluctuated, today it is about the same as in 1939.<sup>8</sup> Since 1939, the area in corn has increased 18%, that in soybeans 200%, and that in pasture has declined by 53% (Table III).



Table I

Maximum and Minimum Discharge (cfs)  
of Iowa River at Iowa City, Iowa

Year	Max.	Min.	Year	Max.	Min.
1904	8410	150	1937	16800	56
1905	8710	250	1938	4600	126
1906	11900	360	1939	8860	74
1907	6100	366	1940	2800	32
1908	5850	85	1941	6320	126
1909	12400	58	1942	7590	384
1910	9520	48	1943	8730	335
1911	9680	43	1944	30100	234
1912	20000	64	1945	9270	200
1913	7030	70	1946	14500	295
1914	8000	181	1947	32600	176
1915	20000	300	1948	16500	106
1916	10500	10	1949	13700	82
1917	17500	80	1950	13300	88
1918	32300	38	1951	15000	88
1919	12800	79	1952	10300	85
1920	8130	264	1953	7910	54
1921	14300	190	1954	7690*	47
1922	5780	158	1955	3910	58
1923	8420	153	1956	2100	32
1924	19100	61	1957	4600	70
1925	3160	48	1958	4700	139
1926	17400	111	1959	9250	81
1927	9310	258	1960	9820	204
1928	8820	290	1961	9700	129
1929	21900	320	1962	10200	250
1930	11300	92	1963	7560	114
1931	7750	48	1964	3000	134
1932	5400	83	1965	9900	235
1933	8700	88	1966	6000	96
1934	1840	30	1967	4310	138
1935	8550	179	1968	2920	128
1936	12900	59	1969	14500	270

\*This maximum discharge figure seems to be inordinately low for a year that was supposed to be a serious flood year.

- Sources:
1. Inventory of Water Resources and Water Problems Iowa Cedar River Basin, Iowa Natural Resources Council.
  2. Water Supply Bulletin, U.S.G.S., Washington.
  3. Water Resources Data for Iowa, U.S.G.S., Washington, D.C.

Table II

Urban Population Trends in the Iowa River Basin

<u>Town</u>	<u>1960</u>	<u>1970</u>
Garner	1990	2217
Belmond	2506	2358
Iowa Falls	5565	6454
Eldora	3225	3223
Marshalltown	22521	26219
Tama	2925	3000
Belle Plaine	2823	2810
Marengo	2264	2235
Iowa City	33443	46850
Columbus Jct.	1123	1205

Source: U.S. Census of Population

Table III

Changes in Agricultural Land Use  
(with 1939 considered 100%)

<u>Year</u>	<u>Total Cropland Harvested</u>	<u>Corn</u>	<u>Soybean</u>	<u>Pasture</u>
1939	100%	100%	100%	100%
1944	107%	117%	177%	53%
1949	113%	124%	117%	57%
1954	113%	114%	150%	57%
1959	116%	140%	160%	51%
1964	102%	118%	302%	47%

Source: Census of Agriculture

Changing agricultural technology is probably of greater significance to a discussion of water quality. The use of commercial fertilizers in the river basin has increased from 19,000 tons in 1946 to 303,000 tons in 1971.<sup>9</sup> Similarly, there has been a growing emphasis on feedlot production of livestock such that Iowa is now the leading cattle-feeding state in the U.S. While the number of lots has not increased since 1946, the number of animals has. In the study area, we estimate that the number of grain-fed cattle has increased from 125,000 in 1946 to 355,000 in 1970.<sup>10</sup> The implications of the changing technology have been noted in pesticide residues in aquatic life, increased nutrient levels in the Iowa River and a research concern for the impact of feedlot run-off.<sup>11</sup>

In contrast to the adjacent Cedar River, few large industries are located in the Iowa River basin. A survey of industries along the river in the 1960's, noted five major ones. These contributed effluent comparable to a population of 15,000 (5-day 20° B.O.D.).<sup>12</sup> This was slightly less than that being derived from untreated municipal sewage.

An increase in water-related recreation is evident in the region. The impoundment above the Coralville Dam is heavily used for boating, swimming, fishing and hunting waterfowl. Recreational demands are beginning to conflict with its primary role as a flood control mechanism. Increasing recreational demand seems to have brought certain segments of the population into closer contact with the water. This, along with a greater "environmental awareness", seems to have brought a long standing water quality problem into the public eye.

### C. The Hazardousness of the Region

Natural hazards in the Iowa River basin are similar to those at most mid-latitude continental locations. The area has a history of damaging floods, droughts, blights, hail storms, tornadoes, blizzards, glaze storms, cold temperatures, epidemics, etc.<sup>13</sup> In addition, man-induced hazards such as water pollution, soil erosion and well contamination have been of concern in the area for a number of years.

Floods have been one of the most damaging, intensively studied and adjusted to hazards in the area. Reports of severe flooding date to 1851.<sup>14</sup> Most flooding occurs with storm run-off in May and June and is most disruptive to agriculture. The flood of June 1954 provides a graphic example. Agricultural damage on the Iowa River amounted to \$3,694,400.00 (1954) while urban damage was \$46,870.00 (1954).<sup>15</sup> Since 1958, the Coralville Dam has acted to reduce flood damage in the lower third of the drainage basin and levees have been constructed in some upstream areas. Despite a general success, not everyone is ready to accept the flood control program as an unqualified success. Although the flooding is of lesser magnitude (See Table I), the high-water period is more prolonged and thus more disruptive for individuals attempting to utilize the bottomlands for agricultural purposes.<sup>16</sup>

A pollution hazard has been evident in the Iowa River for a number of years. Between 1930 and 1934 a systematic analysis of water quality concluded the river water was unfit for a domestic water supply as well as

for bathing and other recreational purposes.<sup>17</sup> This was attributed to high coliform counts resulting from municipal and industrial sewage. Low dissolved oxygen levels were measured during periods of low flow. Physical manifestations such as: odor, turbidity, presence of solids, taste, scum, algae and fish kills were noted as signs of pollution.

By 1963, another study concluded that, in general, dissolved oxygen levels were sufficient to maintain fish and aquatic life most of the time.<sup>18</sup> Most municipal sewage treatment was adequate by this time. The low dissolved oxygen levels were measured during the warm summer months with low flow. Nevertheless, the river was physically unattractive and many of the signs people associate with pollution persisted.

The effects of agricultural land run-off came to be of primary interest in the late 1960's. The Coralville Reservoir and the Iowa River near Iowa City have been carefully monitored.<sup>19</sup> Since 1964, an increase in plankton population and threshold odor values indicate a trend to greater biological productivity. This has been linked to the introduction of nitrates, phosphates and the accumulation of organic sediments from life processes in the water. Moreover, pesticide residues are being found in bottom sediment, plankton and fish. Again the most obvious physical manifestations of poor water quality are taste, odor and turbidity. These are closely related to increases in B.O.D., ammonia, tannins and lignins during spring run-off and to concentrations of plankton in the summer.

A recent survey by the Iowa State Hygienic Laboratory indicates that waste disposal is a lingering problem in some reaches of the river.<sup>20</sup>

However, most emphasis now seems to be placed on the contributions from agricultural land run-off. To the layman, the Iowa River continues to present an array of physical evidence usually associated with poor water quality. Measurement of the quality parameters do not always support the notion that a pollution hazard exists, despite what the water looks, smells and tastes like.

#### Data Collection and Analysis

Public opinion and attitude data were collected by means of a questionnaire (See Appendix). Time and resources did not permit the utilization of the basic interview schedule suggested for comparative hazards studies.<sup>21</sup> Nevertheless, an interview and questionnaire previously used in a study of air pollution awareness in Great Britain\* were used as a basis for constructing a water quality questionnaire. The questionnaire was pretested in a class of 100 students, revised and distributed to 639 individuals or households in the Iowa River basin, of these, 537 were a stratified (by county) random sample from households in the study area. The rest were distributed amongst two groups in the Iowa City area: a group of "professionals" identified from the University of Iowa Faculty Inventory in the Ecological-Environmental Field (n=48); and an environmental group henceforth referred to as "activists" (n=54). All questionnaires were of the mail-out mail-back variety. The total return rate was 29%,

\*Study carried out by Natural Hazard Research group, 1972.

giving a final sample size of 183.

Several types of data were solicited, though not necessarily in the following order. First, basic socio-economic data were asked for. Secondly, questions were posed to test the respondents' knowledge, awareness and opinion of the pollution hazard. Thirdly, an attempt was made to evaluate how people saw water pollution affecting them. Fourth, what might be termed "behavioral" information was solicited. This was done through questions related to what people would do or are doing to solve or adjust to the pollution hazard.

Data analysis consisted of three stages. All stages were accomplished via the SPSS (Statistical Package for the Social Sciences) programs. The first stage amounted to developing profiles of the respondents and frequency distributions for the responses or variables. Relationships between variables were analyzed through contingency tables and Chi-square tests. The third stage was directed towards defining general environmental and specific water quality concerns amongst various groups of respondents. This was done, in part, by principal components analysis.

## THE RESULTS

### A. The Respondents: Socio-economic Variables

In their socio-economic characteristics, individuals in the sampled populations are surprisingly variable. Probably the greatest part of the variation results from the "cosmopolitan" orientation in Iowa City, a



university town, and the "rural" orientation of the rest of the study area. The influence of a major university is reflected in Table IV, where 31% of the respondents have lived in the study area less than five years. However, the fact that Table IV shows that 18% have resided within the area more than forty years reflects a strong tie to the area amongst the rural population. Consistent with trends to urbanization, most of the respondents live inside municipal limits.

As revealed in Table V, most respondents (72%) live near the Iowa River. Table VI shows that locations adjacent to the river are occupied by 65%, while an additional 19% live within five miles of the river or a tributary of it. About 8% live upstream from Belmond which is the region where the river is little else than two drainage ditches. An additional 53% live between Belmond and Iowa City, 30% live in Iowa City and 9% live downstream from Iowa City.

Table VII depicts some of the background information on the respondents. Male (62%) and married (87%) respondents are the most frequent. The most frequent household size is two persons (33%). The age distribution (among adults) is relatively uniform with the most frequent group (30%) being 30 to 37 years and the least frequent group (20%) being over 58 years. The professions including teaching are the largest occupational group in the sample (26%). Housewives occupy 19%, while 10% are farmers. Laborers (3%) and craftsmen (1%)

Table IV

Residency

Item	% of Respondents
Length of area residence	
0 to 5 years	31.1
6 to 18	28.1
19 to 39	22.8
40 and over	18.0
Location	
Within city limits	69.4
Outside city limits	30.6

Table V

Stream Nearest Respondent's Residence

River or stream name	% of Respondents
Iowa River	72.1
Honey Creek	7.1
English River	4.9
Bear Creek	4.9
Cedar River	2.7
Clear Creek	1.1
Salt Creek	0.5
Nameless or other	6.0

Table VI

Respondents' Locations in Iowa River Basin

Item	% of Respondents
Distance from river	
On river	64.7
Up to 5 miles	18.8
5 to 10 miles	8.2
10 and over	8.2
Distance from Belmond confluence	
Above Belmond	7.7
From Belmond through Alden	10.4
From Alden through Marshalltown	14.2
From Marshalltown to Iowa City	28.4
Iowa City	30.1
Below Iowa City	9.3

Table VII

Background of Respondents

Item	% of Respondents
Sex	
Male	62.1
Female	37.9
Marital Status	
Single	7.7
Married	86.9
Other	5.5
Occupation	
Farmer	10.4
Laborers	3.3
Service	5.5
Operatives	4.9
Craftsmen	1.6
Clerical	5.5
Mgrs., Officials	6.0
Professionals, technical	13.1
Teachers, ph.d.	13.1
Students	8.2
Housewife	19.1
Retired	4.9
Number in household	
One person	8.2
Two	32.8
Three	17.5
Four	19.1
Five	11.5
Six or more	10.9
Amount of education	
Elementary	4.4
Some High School	14.2
High School graduate	17.5
Some college or technical school	19.7
College graduate	21.3
Post graduate work	23.0

Table VII Continued.

Item	% of Respondents
Income	
Under \$2,500	4.4
2,500 - 4,999	18.8
5,000 - 7,999	13.8
8,000 - 9,999	13.8
10,000 - 12,999	14.9
13,000 - 15,999	16.0
16,000 - 24,999	7.2
25,000 or more	11.0
Age	
29 and younger	23.8
30 to 37	30.4
38 to 57	25.4
58 and older	20.4
Spend days in outdoor recreation	
Yes	56.9
No	43.1
Present water system	
Cistern	0.6
Well	34.8
Public water supply	64.6

are the least frequently noted occupations .

Levels of education reflect the emphasis on professions . The majority of respondents have some high school , 21% have four years of college and 23% have some post-graduate training . In view of this , it was surprising to learn that the most common income group is \$2,500 to \$4,999 (19%) but this is balanced by the second most frequent income group of \$13,000 to \$15,999 (16%) .

The majority (65%) of the respondents depend on a public water system . With a few exceptions who rely on cisterns , the rest depend on private wells , most of them shallow . Slightly more than half (57%) partake of outdoor recreational activities at least several days each year .

#### B. Opinions and Attitudes

Opinions and attitudes people have about a phenomenon or problem should be put in context of societal problems generally . If the issue of interest , whether it be water quality or flood , holds a relatively low priority in individuals' minds , their opinions , concerns and hence actions or adjustments are likely to be ill-defined.<sup>22</sup>

Table VIII shows that most respondents (96%) agree that the quality of the natural environment has been declining for many years but awareness of the problem has increased in recent years .

The context of the water quality issue was examined at the state , county and community levels . The results are portrayed in Tables IX through

Table VIII

Opinions of Environmental Statements

Statement	% of Respondents		
	Strongly agree & Agree	Don't Know	Strongly disagree & Disagree
The quality of our natural environment has been decreasing for many years, but in recent years there has been more awareness of it than in the past.	95.6	2.8	1.7
The cultural benefits of a big city are more important than are the benefits from life in a rural area.	15.0	10.0	75.0
The Iowa River is polluted enough that I would never allow my children to swim in it.	56.9	19.0	24.0
The benefits from pesticides and fertilizers far outweigh the water pollution they create.	25.5	29.5	44.9
Water pollution is a major threat to me.	52.8	16.7	30.6
Good fish can adapt to polluted waters if given time.	4.4	19.4	76.1
Water pollution makes my taxes higher.	55.7	30.1	12.2
If my drinking water is properly treated, water pollution would never affect me.	11.2	15.6	73.1
Every child should live in a big city at some time in his life.	19.9	12.7	67.4
Fish from the Iowa River are safe to eat.	42.6	35.8	21.6
High nitrate levels in drinking water can be harmful to young children.	61.9	35.9	2.3
The advantages of city life outweigh the disadvantages.	12.3	19.4	68.3
If I knew that someone or some industry was polluting a nearby stream, I would take some action.	69.7	25.8	4.5



Table VIII Continued.

Statement	% of Respondents		
	Strongly agree & Agree	Don't Know	Strongly disagree & Disagree
If water pollution isn't slowed down immediately, many people will be hurt by it.	84.4	12.8	2.8
I don't care what the condition of the stream is below me, because it doesn't directly affect me.	5.6	2.8	91.6
The stress of urban life has led to increased mental illness.	47.5	35.8	16.7
I feel that all leaded gasoline should be banned immediately.	32.9	29.1	38.0
Soil runoff from construction adjacent to streams will pollute the water.	60.0	22.8	16.7
Urban areas contribute to water pollution just by being there.	43.0	19.2	37.9
There is no bad water pollution around here.	21.6	12.8	65.6
More of my tax dollar should be used for water pollution research.	70.7	14.9	14.4
Construction on floodplains should never be allowed, even with a dam upstream.	30.9	38.7	30.4
All forms of water pollution can be handled by present technology if cities or industries will spend the money for necessary equipment.	48.9	30.2	20.8
In my area, the Iowa River's wildlife and fish population is being affected by pollution.	67.2	20.6	12.2
I would be willing to share the costs needed to police water polluters.	70.0	12.2	17.8
I would sit on a water pollution control board to protect the water quality in my community.	65.4	24.0	10.6
The pollution in the Iowa River comes more from city sewage than from agricultural runoff.	29.3	34.3	36.5
Rivers are beautiful additions to the landscape and should not be used as sewers.	97.2	1.6	1.0
Agricultural pollution (feedlot or field runoff) should be prevented.	86.1	10.0	3.9

XI, respectively. At the community level, water pollution is consistently ranked second behind high property taxes. Drugs and maintenance of streets and roads are ranked high as well. Environment-related issues like air pollution, parks, recreation and population control are given relatively low priority. High taxes are consistent in their first priority ranking at county and state levels. Again, water pollution, road maintenance and drugs are ranked high.

In the context of water resource issues, Table XII shows that water pollution is the most frequently identified (78%) problem. Other frequently identified problems are floods (55%) and water treatment (38%) which is implicitly related to the pollution issue. Water shortage and water costs are the least frequently identified problems.

Even though water pollution may be identified as a problem in an area, it may not be significant when placed in the context of relative advantages and disadvantages of the area. The negative impact of environmental hazards may not outweigh individuals' willing reliance on the positive aspects of their environment. According to Table XIII the most frequently identified advantage of the study area is that it is quiet. Good schools, friendly people, clean air, the small town atmosphere, unhectic pace of living and few people follow as important advantages. The essence of the image is very "pastoral". The disadvantages are the corollaries or the reasons for the "pastoral" atmosphere. Table XIV portrays

Table IX

Problems of Concern in Iowa

Rank	Problem	% of Respondents
1	High taxes	57.9
2	Water pollution	49.7
3	Use of drugs	46.4
4	Lack of progress in state gov't.	41.5
5	Insufficient education funds	30.1
6	Poor urban-rural cooperation	23.0

Table X

Problems of Concern in Respondent's County

Rank	Problem	% of Respondents
1	High taxes	58.5
2	Road conditions	42.6
3	Water pollution	42.1
4	Use of drugs	32.8
5	Dishonesty in government	25.1

Table XI

Awareness of Problems relating to Respondent's  
Immediate Area

Rank	Issue	% of Respondents regarding issue as problem	
		Very important problem	Very important and important problem
1	High property taxes	50.8	75.7
2	Water pollution	43.9	72.2
3	Drug taking	41.1	69.4
4	Maintenance of streets, roads	20.9	66.0
5	Litter	22.7	53.1
6	Lack of law and order	26.1	49.4
7	Unemployment	18.8	48.6
8	Population control	25.4	47.5
9	Air pollution	23.9	45.6
10	Welfare	15.9	40.6
11	Inadequate housing	15.5	39.3
12	Lack of technical training opportunities	13.3	38.7
13	Lack of public parks and recreation	9.9	37.5
14	Excessive noise	11.7	34.0
15.5	Inadequate water supply (amt.)	16.7	32.3
15.5	Racial discrimination	15.6	32.3
17	Traffic tie-ups	10.1	28.6

Table XII

Water Resource Issues in Iowa River Basin

Rank	Problem	% of Respondents
1	Pollution	77.6
2	Floods	55.2
3	Water purification	38.3
4.5	Water shortage	15.3
4.5	Water cost	15.3
6	There are no problems	6.0
7	Other	3.3

Table XIII

Advantages of the Respondent's Area

Rank	Advantage	Frequency of Response (tally)
1	Quiet	37
2	Good schools (includes university)	30
3	Friendly people	28
4.5	Small town (city) atmosphere	19
4.5	Clean air	19
6	Rural area	18
7	Less hectic pace of life	17
8	Less people (not crowded)	16
9.5	Good roads	15
9.5	Peaceful environment	15

Table XIV

Disadvantages of the Respondents Area

Rank	Disadvantage	% of Respondents
1	Inaccessible	18.0
2	Lack of services	9.3
3.5	Lack of recreation	7.6
3.5	Road maintenance	7.6
5	Poor schools	5.4
6	High taxes	4.8
7	Water pollution	3.8
8	Unemployment	3.7



the area's disadvantages. Relative inaccessibility is related to many of them, such as: lack of services, lack of recreation and poor roads. The fact that only 4% of the respondents note poor water quality as a disadvantage suggests an acceptance of the environmental hazards in the context of other qualities of the area of residence.

People are ready to note appealing qualities about the streams in their area. Riverine corridors are amongst the most scenic settings in Iowa and Table XV shows that 45% of the respondents note scenery as the most appealing aspect of the streams supports this observation. Fishing and general recreation are seen as other appealing aspects. The feeling that their stream wasn't polluted appeals to 4% but 9% can find nothing appealing about their stream.

According to Table XVI, pollution is noted most frequently (32%) as the most unappealing characteristic of the streams. Junk (29%) and color (14%) are also frequently noted aspects. Floods are noted in few instances which probably reflects the fact that few people live on the Iowa River flood plain and, if they do, their presence is related to a flood control mechanism.

Table XVII portrays the respondents' awareness of pollution in the Iowa River. Most respondents (72%) feel the Iowa River is polluted in their vicinity and that the problem will increase (65%). There is uncertainty as to when the river became polluted or wasn't polluted. Many

Table XV

Stream Appealing Attributes \*

Rank	Attribute	% of Respondents
1	Scenery	45.3
2	Fishing	21.8
3	Recreation	10.9
4	Nothing	9.3
5	Not polluted	4.3
	Other	12.6
	Don't know	2.2

Table XVI

Stream Unappealing Attributes

Rank	Attribute	% of Respondents
1	Pollution	31.7
2	Junk, objects	29.0
3	Color	14.2
4	Ugly	8.7
5	Smell	4.9
6	Nothing	3.0
7	Pests	1.0
	Other	32.2

Table XVII

Awareness of Pollution in Iowa River

Item	% of Respondents
Is Iowa River polluted in your area ?	
Yes	78.6
No	19.8
Future of pollution in river	
Lessen	16.4
Increase	65.1
Remain the same	18.5
When was river not polluted ?	
Don't know	21.1
As long as I can remember	18.0
Before mass settlement	15.7
Post 1930	11.7
Pre 1900	11.0
Pre-big farming	9.4
Pre-industry	4.7
Post 1960	3.9
Pre-cities	1.6

respondents were able to answer this through association with events such as: "pre-industry", "pre-cities", and "pre-big farming", all implied sources of pollution. This implies something about what people see as the source or cause of water pollution while the uncertainty may be related to a general uncertainty as to what pollution is.

A relative definition of pollution was given by many respondents, as shown in Table XVIII. For example, a relative definition of pollution is found in many responses. For example, "matter damaging to life" is the most frequent definition (30%). This was closely followed by "contaminating man-made substances" (29%). However, when asked to identify the most common physical signs of water pollution (See Table XIX), the respondents note trash and junk, (72%) and muddy water (65%). Other evidence such as: bad smell, scum, algae, foam, and bad taste are less frequently noted.

Some inconsistencies arise in the identification of sources of water pollution in the Iowa River basin. As shown in Table XX, 68% of the respondents identify run-off from cultivated fields as a source. However, the results in Table VIII show people are uncertain when forced to make a choice between agricultural run-off and city sewage. Many respondents agree that construction adjacent to the stream is an important pollutant source. Interestingly, industry is the least frequently identified source which is consistent with the relative role of industry in the study area.

The effects of water pollution are seen to be extremely varied. Water pollution is viewed as "a major threat" by 53% of the individuals (See

Table XVIII

Definition of Water Pollution

Rank	Definition	% of Respondents
1	Matter damaging to life	30.0
2	Contaminating man-made substances	28.9
3	Sewage wastes	10.4
4	Agricultural wastes	9.8
5.5	Can't be used for drinking	8.2
5.5	Industrial wastes	8.2
7	Color	6.0
8	Smell	2.1

Table XIX

Signs of Water Pollution in Respondent's Area

Rank	Sign	% of Respondents
1	Trash and junk in water	72.2
2	Muddy water	64.5
3	Bad smell	43.7
4.5	Green scum or algae	42.1
4.5	Foam and suds	42.1
6	Bad taste of water	21.3
7	Abundance of rough fish	19.1
8	There are no signs of pollution	6.6
	Other	6.0

Table XX

Sources of Water Pollution in Respondent's Area

Rank	Source	% of Respondents
1	Runoff from cultivated fields	68.3
2	People	54.6
3	City and town sewage	52.5
4	Feedlot runoff	45.4
5	Industry	40.4
6	It is not polluted	6.6
	Other	6.6



Table VIII). Even with proper treatment of drinking water, 73% feel water pollution would affect them. In Table XXI, the most frequently noted effect on a household is a shortage of drinking water (19%). Illness (13%) and a decrease in water-related recreation (12%) are other frequently noted effects. Most respondents (56%) agree that water pollution makes their taxes higher (See Table VIII). A sense of urgency is apparent in that 84% speculate that if water pollution problems are not solved many people will be harmed. In one word, altruism is evident in Table XI as 72% of the respondents agree that water pollution is an important problem in their community, even though the above observations imply the effects of water pollution on the respondents are not direct.

Concern for water pollution is high and there are suggestions that this concern could be translated into positive action. Several sentence completion statements were included to test individuals' feelings. The results are portrayed in Table XXII. The most frequently noted desire when faced with a bad water pollution situation is "to solve the problem" (19%). The same feeling is attributed by the respondents to those around them in the community (26%). On the other hand, 14% feel that their neighbors would be apathetic. Others note feelings of anger, disgust, depression, and frustration. When water pollution is especially serious most concern is felt for : everyone (19%), those dependent on water (19%) and children (17%).

Table XXI

Effect of Water Pollution on Respondents

Item	% of Respondents
Effect on household	
Shortage of drinking water	19.1
Illness, effect on health	12.5
Decrease in water recreational activities	11.5
Not affected	5.5
Chlorine tasting water	4.4
Drink less water	3.8
Water prices, taxes	3.8
Stench, bad smell	3.3
Other	22.4
Financial effect	
Yes	46.4
No	53.6

Table XXII

Sentence Completions

Completions	% of Respondents
1. When water pollution is especially bad, I feel:	
A desire to change	19.1
Angry, mad, upset	14.2
Depressed	10.4
Disgust	9.8
Helpless, frustrated	8.2
Sick	6.5
Mad at polluters	2.7
Other	19.7
2. When water pollution is really serious, the people I am concerned about are:	
Everyone, all of us	19.1
Those depending upon the water	18.6
Children, the young	16.9
My family	7.6
Those unaware of the situation	4.9
Mankind, future generations	3.8
Other	15.8
3. When water pollution is very bad in a community, the feelings among the people would be:	
To solve the problem	25.7
Apathetic	13.7
Disgusted, frustrated	10.9
Angry, mad, upset	9.3
Mad at polluters	5.4
Sick	2.7
Other	13.1

there is variance in the population.

One of the initial hypotheses of the study was that there would be identifiable differences in opinions of and attitudes to the water pollution hazard amongst factions of the population. This was partly based on the dichotomy existing between Iowa City and most other areas of the river basin. Initially, three groups: citizens, professionals, and activists, were identified in the sampling procedure. As expected, Table XXIV shows that the activists consistently give environmental problems a higher priority amongst societal problems than the other two groups. According to Table XXV, all groups considered pollution the most important water resource problem in the study area. The citizen group rate floods very highly relative to professionals and activists. The latter two groups live within the "perceived" security of the Coralville Dam whereas a large part of the citizen sample lives in areas outside the influence of flood control structures (See Table XXVI).

In assessing the region's appeal, Table XXVII reveals that those living in Iowa City (activists and professionals) put great emphasis on the good schools and cultural attractions. The citizens are attracted by the rural, small town quality. Table XXVIII shows that the environmental activists see water pollution as a major unappealing quality of the area. The other groups do not. Also according to Table XXIX, only 39% of the citizen sample feel that water pollution affects them financially whereas the other groups feel it does to a much greater degree.

Table XXIV

Comparison of Groups' Awareness of  
Problems in their Immediate Areas

Issue	% of Respondents regarding issue as very important or important problem		
	Citizens	Professionals	Activists
Maintenance of streets, roads	70.3	65.3	33.3
Lack of public parks and recreation facilities	31.9	68.0	38.9
High property taxes	78.3	64.0	72.2
Lack of technical training opportunities	40.9	34.6	27.8
Lack of law and order	57.7	23.1	58.8
Inadequate water supply (amt.)	37.5	15.3	16.7
Unemployment	53.6	24.0	44.4
Air pollution	46.3	23.0	72.2
Inadequate housing	36.5	38.5	61.1
Welfare	39.9	38.4	50.0
Water pollution	70.1	73.1	88.2
Traffic tie-ups	26.7	26.9	38.9
Drug taking	69.9	73.1	61.1
Racial discrimination	27.9	42.3	50.0
Excessive noise	27.4	46.2	66.7
Litter	51.1	50.0	72.2
Population control	42.3	53.9	77.8

Table XXV

Comparison of Groups' Association of Water  
Problems in Iowa River Basin

Problem	% of Respondents		
	Citizens	Professionals	Activists
Pollution	73.4	88.5	94.4
Floods	61.9	34.6	33.3
Water purification	28.1	65.4	77.8
Water shortage	17.3	11.5	5.6
Water cost	12.2	30.8	16.7
There are no problems	4.3	0.0	0.0
Other	2.9	5.7	11.1

Table XXVI

Comparison of Groups' Residential  
Locations in Iowa River Basin

Item	% of Respondents		
	Citizens	Professionals	Activists
Distance from Iowa River			
On river	54.0	100.0	88.9
Up to 5 miles	23.0	0.0	11.2
5 to 10 miles	10.8	0.0	0.0
10 miles and over	12.2	0.0	0.0
Distance from Belmond Confluence			
Above Belmond	9.4	0.0	0.0
From Belmond through Alden	13.7	0.0	0.0
From Alden through Marshalltown	18.7	0.0	0.0
From Marshalltown to Iowa City	36.0	0.0	11.2
Iowa City	10.1	100.0	88.9
Below Iowa City	12.2	0.0	0.0

Table XXVII

Comparison of the Groups' Indications  
of the Advantages of the Area

Advantages	Frequency of Responses		
	Citizen	Professional	Activist
Quiet	30	5	2
Good school (university)	19	6	5
Friendly people	19	4	5
Less hectic pace of life	16	0	1
Rural area	15	1	2
Clean air	15	1	3
Less people (not crowded)	13	1	2
Small town (city) atmosphere	11	6	2
Peaceful	11	2	2
Privacy	5	0	2
Lower taxes (cost of living)	10	0	2
Cultural interest (activities)	5	6	5
Good roads	10	2	3
Work opportunities	4	1	2
Open spaces	8	1	2
Accessible	6	3	0
Little crime	5	2	0
Progressive community	4	2	1
Recreational facilities	10	4	0
Beautiful scenery	6	2	1



Table XXVIII

Comparison of Group's Indications of the  
Disadvantages of the Area

Disadvantages	% of Respondents		
	Citizen	Professional	Activist
Inaccessible	19.5	7.6	22.3
Road Maintenance	8.7	0.0	11.2
Lack of services	8.6	15.3	5.6
Lack of recreation	7.8	11.5	0.0
Poor schools	6.4	0.0	5.6
Unemployment	4.3	3.8	0.0
High taxes	4.3	3.8	11.1
Water pollution	2.1	3.8	16.7
Other	18.7	53.8	42.3

Table XXIX

Comparison of Group's Indications of a  
Financial Effect of Water Pollution

Item	% of Respondents		
	Citizen	Professional	Activist
Financial effect			
Yes	39.2	76.0	61.1
No	60.8	24.0	38.9

As illustrated in Table XXX, both professionals and activists (68% and 61%) are ready to pay \$20 or more in taxes each year to help solve water quality problems. The citizens vary between 17% saying they'd pay no more, to 21% saying they'd pay \$20 or more. All groups agree that government regulations and charges to the polluter should be the pollution control mechanisms.

The viewpoints of the various groups were summarized by performing a principal components analysis with varimax rotation on the responses to environmental statements (p. 8-10 in questionnaire). Six dimensions, accounting for 50% of the variance in the responses, are interpreted as: Pollution Threat, Concern for Prevention, Urban Life, Environment Involvement, Anti-Establishment and Awareness. Resultant factor scores were separated into the three groups and the group means and standard deviations computed for each dimension.

The activists regard water pollution as a serious threat as seen in the factor score statistics in Table XXXI. A more conservative and perhaps knowledgeable stance is taken by the professionals who are less threatened. The citizen group on the whole does not feel threatened, though there is a great variation in this group. Urgent concern for preventive measures is expressed by the activists and shown in Table XXXII. The citizen sample tends toward prevention despite their general lack of concern. Again, the professionals are conservative and less emphatic or less sure about preventive measures.

Table XXX

Comparison of Group's Indications of Water  
Pollution Control and Willingness to Pay

Item	% of Respondents		
	Citizen	Professional	Activist
Amount in taxes willing to pay to stop water pollution?			
None	17.3	4.0	5.6
\$3	7.9	0.0	0.0
\$5	7.1	0.0	5.6
\$10	20.5	8.0	5.6
\$15	11.0	4.0	16.7
\$20	15.7	16.0	5.6
More	20.5	68.0	61.1
Best method for controlling water pollution			
Government regulation	51.1	57.7	66.7
Government warnings	15.1	0.0	0.0
Government subsidies	23.0	11.5	27.8
Charges to the polluter	45.3	46.2	55.6
Other	6.5	11.5	5.6
Who should pay for controlling costs?			
Government (through higher taxes)	8.6	30.8	22.2
Government (through re-ordering priorities)	54.0	42.3	61.1
Industry (through less profits)	47.5	46.2	72.2
Citizen (through higher prices and/or costs)	14.4	50.0	33.3
Other	10.8	23.1	27.8

Table XXXI

Pollution Threat Factor .

<u>Factor Loading</u>	<u>Variable Description</u>
+ .70	Water pollution is a threat to me.
+ .69	The wildlife in my area has been affected.
+ .55	If water pollution is not stopped, many people will be hurt.
+ .55	The Iowa River is too polluted for my child to swim in it.
- .64	Fish from the river are safe to eat.
- .59	Benefits of fertilizers outweigh the pollution they create.
- .53	There is no bad water pollution around here.
- .53	If my drinking water is properly treated, water pollution will not affect me.

Factor Score Statistics

<u>Group</u>	<u>Mean</u>	<u>St. Dev.</u>
Activist	+ .83119	.82153
Citizen	- .13050	.99041
Professional	+ .12225	.91630

The rural-urban dichotomy became very apparent in the urban life dimension. The citizen group emphasizes the advantages of rural or small town life whereas the activists and professionals emphasize the advantages of urban life (See Table XXXIII).

Both professionals and activists indicate a strong tendency to environmental involvement (See Table XXXIV). Surprisingly, the activists appear as less action-oriented than the professionals. The latter probably feel they are deeply involved through their jobs. The citizen group is very heterogeneous but in general show a tendency away from involvement.

Table XXXV shows the loadings on the fifth dimension, which seems to emphasize the immutable "bads" of modern society. Of course, the activists by definition are ready to recognize society's ills whereas the professionals, being part of the "establishment", are less ready. The citizen group is most positive to the character of the society.

As shown in Table XXXVI, differences in awareness and knowledge of pollution sources became apparent in the final dimension. The negative loading of the professionals suggests they have good knowledge of water pollution status and sources. The citizens, on the other hand, do not seem to be as aware of the pollution hazard and ascribe poor water quality to the ineffective treatment of municipal wastes.

Considerable variation exists within each of the three groups, especially the citizens groups. A preliminary assessment of this variation was attempted by contingency analysis and Chi-square tests. The differences in opinion were related to several statements relating to the

Table XXXIII

Urban Life Dimension

<u>Factor Loading</u>	<u>Variable Description</u>
.74	The advantages of city life far outweigh the disadvantages.
.73	Cultural benefits of a city are more important than life in a rural area.

Factor Score Statistics

<u>Group</u>	<u>Mean</u>	<u>St. Dev.</u>
Activists	+ .17657	.92578
Citizens	- .07795	.96544
Professionals	+ .29448	1.20284

Table XXXIV

Involvement Factor

<u>Factor Loading</u>	<u>Variable Description</u>
.72	I am willing to share the cost to police polluters.
.65	I would sit on a water pollution control board.
.47	Quality of the environment has been declining for many years, but now there is more awareness.
.46	If I knew someone was polluting, I would take action.
.43	More of my tax dollar should be spent on pollution research.

Factor Score Statistics

<u>Group</u>	<u>Mean</u>	<u>St. Dev.</u>
Activist	+.21099	.65680
Citizen	-.12935	1.01773
Professional	+.54546	.93578

Table XXXV

Anti-Establishment Factor \*

<u>Factor Loading</u>	<u>Variable Description</u>
.66	Urban areas pollute just by being there.
.65	The stress of urban life causes increased mental illness.
.57	Soil runoff from construction pollutes the adjacent streams.

Factor Score Statistics

<u>Group</u>	<u>Mean</u>	<u>St. Dev.</u>
Activists	-.66079	1.06498
Citizens	+.12396	.96340
Professionals	-.20525	.99140



Table XXXVI

Dimension on Awareness and Knowledge of Pollution

<u>Factor Loadings</u>	<u>Variable Description</u>
.68	Pollution in the Iowa River is more from city sewage than from agricultural runoff.
.64	Present technology can handle water pollution problems if cities will spend the money.
.43	There is no bad water pollution around here.

Factor Score Statistics

<u>Group</u>	<u>Mean</u>	<u>St. Dev.</u>
Activists	-.33895	.97976
Citizen	+.24271	.89772
Professional	-1.02830	.82683

following groups of variables: background, location, financial involvement, experience with water pollution, and basic socio-economic variables (See Table XXXVII). Different viewpoints are evident in questions related to: recognition of water pollution, sources and signs of water pollution, control and agreement or disagreement with statements about water pollution. Only the most pertinent findings are reviewed here, but all differences statistically significant at the .01 level of significance for both citizen and total samples are found in Tables XXXVIII through XLII.

1. Recognition of Water Pollution

We find that people who see high taxes as a major problem are less willing to pay additional taxes to solve water pollution problems. The young and those with the shortest residence time in the study area are more prone to recognize water pollution and water purification as problems in the area. It is very significant that farmers as a group do not recognize water pollution as a major problem and hence are not willing to spend money on a problem they don't recognize.

2. Sources and Signs of Water Pollution

Very few meaningful distinctions were apparent in the data. Again, those with the least residence time in the study area noted bad taste as a significant sign of water pollution. Those who see the river as polluted mostly attribute it to agricultural land run-off. In addition, those with greater formal education recognize agricultural land run-off as a major source. This is illustrative of the Iowa City versus the rest-of-the-basin dichotomy.

Table XXXVII

Groups of Variables Examined for Difference of Opinion

Background

length of time lived in area  
place of last residence  
type of community lived in early years  
water system presently used  
stream closest to respondent

Socio-Economic

sex  
age  
occupation  
educational attainment  
income  
time spent out-of-doors

Location

closeness to a stream  
distance downstream from source of Iowa River  
exact distance from the Iowa River

Financial Involvement

recognition of financial affect of water pollution  
amount willing to pay to stop water pollution  
indication of effect of water pollution on tax expense

Experience with Pollution

an evaluation of Iowa River pollution  
evaluation of Iowa River for swimming  
evaluation of Iowa River for fishing  
evaluation of Iowa River pollution source  
consideration of water pollution as a major threat  
consideration of nitrates as pollutants  
consideration of technological advances and knowhow

Table XXXVIII

Significant Differences Based on Background

Variables	Length of Time in Area	Place Lived Before (Location)	Type of Place Lived in Early Life	Type of Water System Used	Closest Stream to Residence
RECOGNITION					
Water pollution as a basin problem	T				
Water purification as a basin problem	T, C				
Water cost as a basin problem	C				
SOURCES AND SIGNS					
City sewage as a source of pollution	C				
Bad taste as a sign of pollution		T			
Foam and suds as a sign of pollution	C				
Smell as a sign of pollution	C				
CONTROL					
Willing to pay to stop water pollution	T, C			T	
Financial effect of water pollution	C				
Gov't regulations to control pollution		T	T		
Higher taxes to pay for pollution control			C		
GENERAL STATEMENTS					
Eating fish from the Iowa River					C

Note: T represents the total sample  
 C represents the citizen sample

Table XXXVIX

Significant Differences Based on Socio-Economic Variables

Variables	Sex	Occupation	Yrs. of Educ.	Age	Income	Time Spent Outdoor
RECOGNITION						
Water pollution as a problem				T		
Water pollution as a state problem						T, C
Water pollution as a county problem						T, C
Water pollution as a basin problem				T		
Water purification as a basin problem			T	T		
Iowa River pollution		T		T		
SOURCES AND SIGNS						
Agricultural runoff as a source of pollution	C		T	T		
Feedlot runoff as a source of pollution			T			
People as a source of pollution		C		T, C		T, C
Industry as a source of pollution				T		
Trash & junk as a sign of pollution				T		
Scum as a sign of pollution						C
Smell as a sign of pollution		T		T		T
Muddiness as a sign of pollution			C	T, C		
CONTROL						
Willing to pay to stop water pollution	T		T	T		
Financial effect of water pollution			T	T		
Gov't regulations to control pollution		T			T, C	T
Gov't warnings to control pollution			T			
GENERAL STATEMENTS						
Views on pesticides & fertilizers		T		T		T, C
Water pollution as a threat		T		T		T, C
Treatment of drinking water			T	T, C		
Effect of high nitrate levels		T				
Existence of bad water pollution in vicinity		T		T		C
Redistribution of tax dollar toward water pollution				T		
Affected wildlife in Iowa River				T		C
Share costs assoc. with pollution				T, C		C
Poll. in Iowa River from city sewage or agric. runoff		T	T	T, C		
Agric. pollution should be prevented			T			

Table XL

Significant Differences Based on Location

Variables	Location with Respect to Iowa River	Distance Away From River	Distance From Source
RECOGNITION			
Water pollution as a State problem		T,C	
Water purification as a basin problem			T
SOURCES AND SIGNS			
Foam & suds as a sign of water pollution			C
CONTROL			
Willing to pay to stop water pollution	T	T	
Financial effect of water pollution	T		
GENERAL STATEMENTS			
Contribution of urban areas to pollution	T		
Existence of bad water pollution in vicinity		T,C	
Pollution in Iowa River from city sewage or agric. runoff	T	T	T

Table XLI

Significant Differences Based on Financial Involvement

Variables	Financial Effect of Water Pollution	Willing to Pay to Stop Water Pollution	Effect of Water Poll. on Taxes
RECOGNITION			
Water pollution is a problem		C	T
Water purification is a basin problem			T
Iowa River pollution		T	
SOURCES AND SIGNS			
Agric. runoff as a source of pollution		T,C	
Feedlot runoff as a source of pollution		T	
People as a source of pollution		T,C	
Trash & junk as a sign of water pollution		C	
Scum as a sign of water pollution		C	
Foam & suds as a sign of water pollution	T,C	C	
Smell as a sign of water pollution	T		
Muddiness as a sign of water pollution		T,C	
CONTROL			
Financial effect of water pollution		T	
Gov't regulations to control water pollution		T,C	
Industry should pay for water pollution control through less profits			T
GENERAL STATEMENTS			
Views on pesticides & fertilizers		T	T,C
Water pollution as a threat		T,C	T
Fish adaptation to polluted water		T,C	
Treatment of drinking water		T,C	
Action against pollution		T	
Cease pollution, or many will be hurt		T,C	
Existence of bad water pollution in vicinity		T,C	
Technology can handle all water pollution		T	
Affected wildlife in Iowa River		T,C	
Share costs assoc. with pollution		T,C	
Sit on water pollution control board		T	
Pollution in Iowa River from city sewage or agric. runoff	T	T	

Table XLII

## Significant Differences Based on Experience with Pollution

Variables	Iowa Pollution	Not Swim in Iowa River	Major Threat of Water Pollution	Eat Fish From Iowa River	High Nitrates in Water	Techno. of Water Poll. Treatment	City or Farm Pollution	Future of Poll. in Iowa River
RECOGNITION								
Water pollution is a problem	T	C	T					
Water pollution is a state problem	T		T	T,C				C
Water pollution is a county problem			T,C	T,C				C
Future of pollution in Iowa River	T							
Water pollution is a basin problem	T,C							
Water purification is a basin problem				T		T		
SOURCES AND SIGNS								
Agric. runoff as a source of pollution	T,C							
City sewage as a source of pollution	T,C	T,C	T	C				
Feedlot runoff as a source of pollution	T		T			T	T	
People as a source of pollution	T,C						T	
Industry as a source of pollution			C	T,C				
Trash & junk as a sign of pollution	T,C							
Scum as a sign of pollution	T	T					T	C
Foam & suds as a sign of pollution	T		T	T,C				
Smell as a sign of pollution	T		T	T		T		
Muddiness as a sign of pollution	T,C							
CONTROL								
Willing to pay to stop water pollution	T,C		T,C			T	T	
Financial effect of water pollution	T		T,C			T	T	
Gov't regulations to control pollution	C		T					
Charges to the polluter based on pollution			T					
Industry pay for w. poll. control throu. less profits		T		T				
GENERAL STATEMENTS								
Views on pesticides & fertilizers	C		C	C			T,C	
Water pollution as a threat				T,C				
Eating fish from Iowa River		C	T					
Effect of high nitrate levels				C				
Contribution of urban areas to pollution				T				
Existence of bad water pollution in vicinity		C						
Technology can handle all water pollution							T	
Affected wildlife in Iowa River				C				
Poll. in Ia. River from city sewage or agric. runoff						T,C		
Agric. pollution should be prevented		C						



Those with more formal education are located in Iowa City and least directly tied to agriculture.

### 3. Controlling Water Pollution

The key questions here have to do with the financial effects of water pollution and paying for water pollution control. Those respondents who are willing to pay more in taxes to control water pollution also are the people who have lived in the basin for the shortest period of time, depend on public water supplies, have more formal education, live near the river, feel threatened and ascribe the pollution to agricultural run-off. People who have grown up on the farms and those who now farm are not disposed to government regulations and control. Those who do not feel threatened by water pollution think that charges to the polluter would be the best means of control.

### 4. General Statements about Water Pollution

Respondents were asked to agree or disagree on a 5-point scale to a number of statements about pollution (p. 8-10 in questionnaire). Socio-economic variables are the best discriminators of opinion differences. Farmers agree that the benefits of fertilizers and pesticides outweigh the problems created by their use, disagree that water pollution is a threat and attribute the pollution more to city sewage than agricultural run-off. However, farmers are very cognizant of the dangers of high nitrate levels in drinking water, more so than any other group. This is to be expected because most nitrate problems appear to be associated with shallow wells on which most farms are dependent.

## CONCLUSION

Man's use of the land in the Iowa River basin and the water pollution hazard are closely related in a causal sense. A major source of pollutants is agricultural land runoff. The impact of the water pollution hazard is not readily evident and, for most individuals studied, does not outweigh the advantages of living in the area. It may discourage a few from eating fish taken from the river or may stop some people from swimming in the river. The hazard is not seen to directly affect their livelihood or survival in most cases. In fact, some individuals like farmers may see water pollution control or adjustment as more of a threat through various land use regulations and changing land use practices. These controls are equated with increased costs. Issues such as these make interpretation of the man-environment interface in this context difficult.

Some regularities have appeared in our preliminary analyses. People most cognizant of water pollution as a problem are those least directly associated with agriculture, the major source of pollutants. This finding supports the results of previous work on attitudes toward water pollution in Iowa.<sup>23</sup> Water resource professionals, environmental activists and some "citizens" involved in the university setting in Iowa City recognize the problem, recognize various forms of impact and are oriented to solving the problem, in word if not in deed, to a much greater extent than respondents elsewhere in the study area. There may be two important reasons for this: (a) they do not see control or adjustment directly affecting their livelihood; (b) they may perceive themselves to be influential in decision-making

with respect to solving the problem. The latter point is indeed the case for a number of individuals in the professional group. They sit on control commissions, see their research being used as evidence and their utterances taken seriously as the truth. Rural people and farmers are alienated to some degree from performing in a similar role. Moreover, their response to government regulation and control in many issues is negative even if the issue is not related to their livelihood.

Prior experience seems to have an influence on how people perceive water pollution, as it does with other hazards. However, the influence may be in the opposite direction to that which has been found in previous hazards research. That is, contact with poor water quality may desensitize awareness of it. Previous research on this relationship in the agriculture-water pollution context was unable to ascertain a significant relationship between awareness of water pollution and personal experience.<sup>24</sup> The study has found that respondents' evaluation of the pollution hazard is partly based on their length of residency in the area. There is an indication that people in the study area become accustomed to the water conditions and hence become more accepting of a bad situation. Those new to the area, many of whom live in Iowa City, are more sensitive to the physical signs of poor water quality.

The research suggests that water pollution should be studied with other environmental hazards that are partly man-induced. Adjustments to hazard in this context might involve either acceptance of the situation,

which has been the case in the study area in the past, or the imposition of restrictive measures on, or alterations in, the activities of one segment of the population. The latter alternative is especially difficult to implement in an area like the Iowa River basin where the activities provide the economic base for a large portion of the population.

ACKNOWLEDGEMENTS

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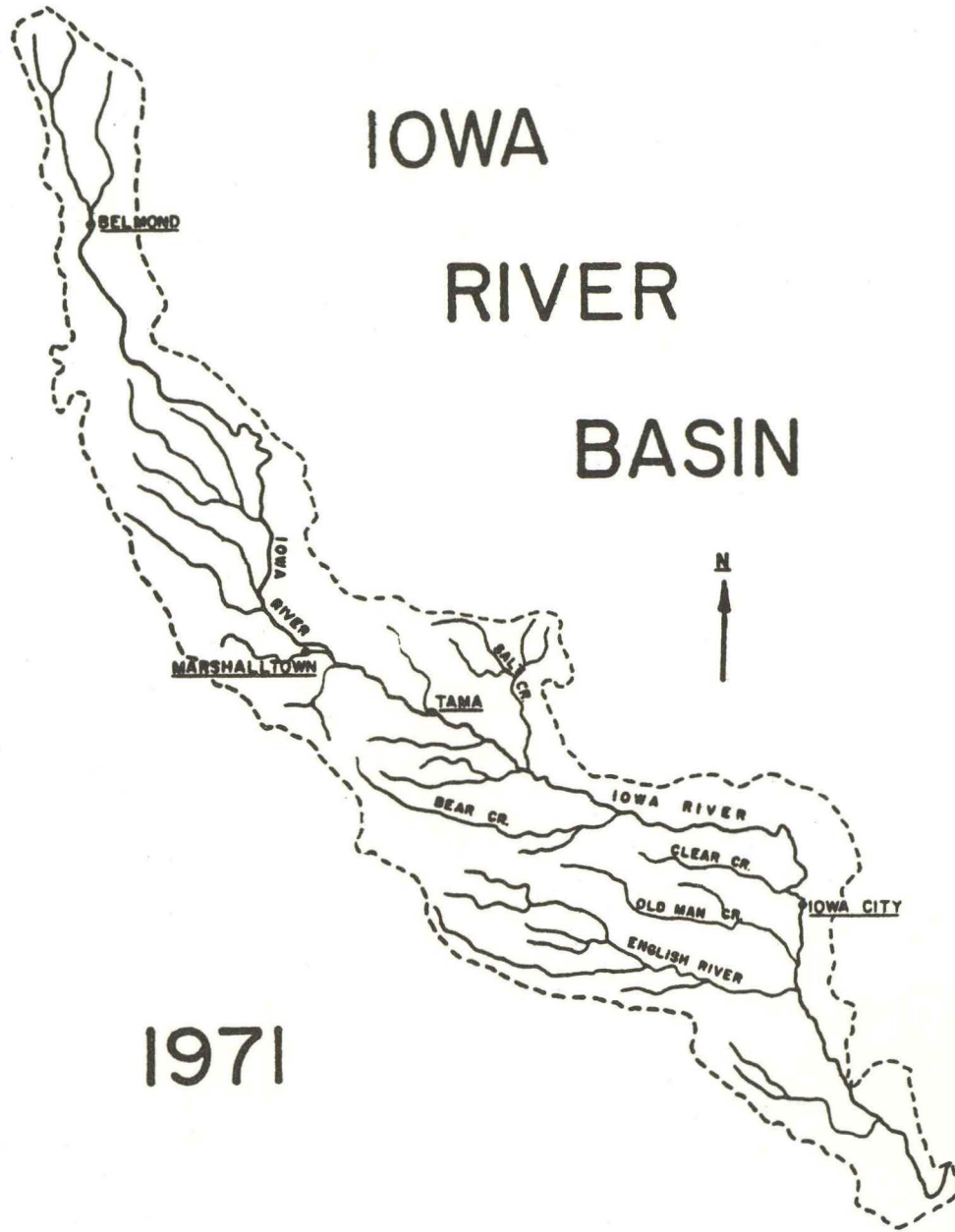
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# IOWA RIVER BASIN

1971

NOTE: Please answer all questions, even if you aren't sure about them. If you have comments, please feel free to explain yourself in the margins. Your complete feelings are very important to the success of this project.

All cities and rural areas in the United States have issues, some of which could be thought of as problems. Below is a list of common issues faced by communities. Which do you feel are problems in your community? For each issue listed below, please check whether you consider it: 1) a very important problem; 2) an important problem; 3) a somewhat important problem; or, 4) not important now.

For example:	very important	important	somewhat important	not important
hailstorm damage to crops	___	___	X	___

Please check the following:

- |                                                     |     |     |     |     |
|-----------------------------------------------------|-----|-----|-----|-----|
| 1. maintenance of streets, roads                    | ___ | ___ | ___ | ___ |
| 2. lack of public parks and recreational facilities | ___ | ___ | ___ | ___ |
| 3. high property taxes                              | ___ | ___ | ___ | ___ |
| 4. lack of technical training opportunities         | ___ | ___ | ___ | ___ |
| 5. lack of law and order                            | ___ | ___ | ___ | ___ |
| 6. inadequate water supply (amt)                    | ___ | ___ | ___ | ___ |
| 7. unemployment                                     | ___ | ___ | ___ | ___ |
| 8. air pollution                                    | ___ | ___ | ___ | ___ |
| 9. inadequate housing                               | ___ | ___ | ___ | ___ |
| 10. welfare                                         | ___ | ___ | ___ | ___ |
| 11. water pollution                                 | ___ | ___ | ___ | ___ |
| 12. traffic tie-ups                                 | ___ | ___ | ___ | ___ |
| 13. drug taking                                     | ___ | ___ | ___ | ___ |
| 14. racial discrimination                           | ___ | ___ | ___ | ___ |
| 15. excessive noise                                 | ___ | ___ | ___ | ___ |
| 16. litter                                          | ___ | ___ | ___ | ___ |
| 17. population control                              | ___ | ___ | ___ | ___ |
| others (please list)                                |     |     |     |     |
| 18. _____                                           | ___ | ___ | ___ | ___ |
| 19. _____                                           | ___ | ___ | ___ | ___ |

Of the problems which you checked "very important" or "important" on the preceding page, please indicate the ones that you would want to get attention first (and second):

(1) \_\_\_\_\_ (2) \_\_\_\_\_

What town or city is included in your mailing address? \_\_\_\_\_, Iowa

Are you located within its city limits? yes \_\_\_ or no \_\_\_

If different from your mailing address, what is the town or city closest to your home? \_\_\_\_\_, Iowa

What is your sex? male \_\_\_ or female \_\_\_

What is your marital status? single \_\_\_, married \_\_\_, or other \_\_\_

What is your occupation? \_\_\_\_\_ Spouse's occupation \_\_\_\_\_

How many people live in your household? \_\_\_\_\_

Please check the appropriate description of the formal education you have had:

- |                          |                                      |
|--------------------------|--------------------------------------|
| ___ elementary           | ___ some college or technical school |
| ___ some high school     | ___ college graduate                 |
| ___ high school graduate | ___ post graduate work               |

What is your age? \_\_\_\_\_ (YEARS)

What are the ages of the children living in your house?

males: \_\_\_ \_\_\_ \_\_\_ \_\_\_

females: \_\_\_ \_\_\_ \_\_\_ \_\_\_

Are any of your children away at college? yes \_\_\_ or no \_\_\_

We need a rough idea of your family income. We don't need the exact amount, just check the class which comes closest to the combined yearly income of all working members of your family:

- under \$2,500
- \$2,500 to 4,999
- 5,000 to 7,999
- 8,000 to 9,999
- 10,000 to 12,999
- 13,000 to 15,999
- 16,000 to 24,999
- 25,000 or more

What are the advantages of the area in which you now live? \_\_\_\_\_

\_\_\_\_\_

Are there any disadvantages? yes  or no

If YES, what? \_\_\_\_\_

\_\_\_\_\_

How long have you lived in this area? \_\_\_\_\_ (YEARS)

Where did you live before? (name of city and state) \_\_\_\_\_,

How long? \_\_\_\_\_ (YEARS)

When you were between the following ages, where did you live for the greatest part of the time? For each age group, please check whether you lived in a: 1) farm; 2) town; or 3) city.

ages	farm	town	city
1 to 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 to 10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 to 15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15 to 20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

On the first page you marked concerns in your community--now consider two politically bounded areas, the State and County. Their problems may overlap, or they may be entirely different. Please consider each level and check the specific problems you recognize:

STATE OF IOWA (1) Which of the following concern you as the primary problems in Iowa? (please check)

- poor urban-rural cooperation
- high taxes
- insufficient educational funds
- water pollution
- lack of progress in state government
- use of drugs
- other: \_\_\_\_\_

YOUR OWN COUNTY (2) Which of the following concern you as the primary problems in your county? (please check)

- dishonesty in government
- use of drugs
- water pollution
- high taxes
- road conditions
- other: \_\_\_\_\_

What is the NAME of the river or stream nearest your house? \_\_\_\_\_

Please list below what makes that stream appealing? \_\_\_\_\_

\_\_\_\_\_

What is unappealing about that stream? \_\_\_\_\_

\_\_\_\_\_

What is your definition of water pollution? \_\_\_\_\_

\_\_\_\_\_

According to your definition, is the Iowa River suffering from water pollution in your area?

yes \_\_\_ or no \_\_\_

If YES, do you think in the future the water pollution in the Iowa River will:

LESSEN \_\_\_; INCREASE \_\_\_; or REMAIN THE SAME \_\_\_

If YES, when was the Iowa River NOT polluted? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Please check those items in the following list which you think are SOURCES of water pollution in the stream you named as nearest your house:

- runoff from cultivated fields       people
- city and town sewage                 industry
- feedlot runoff                          it is not polluted

other: \_\_\_\_\_

Please check those items in the following list which you consider as SIGNS of water pollution noticeable in the river or creek nearest your house:

- trash and junk in the water       foam and suds
- abundance of rough fish           bad smell
- bad taste of water                  muddy water
- green scum or algae                 there are no signs of pollution

other: \_\_\_\_\_

Does your family spend several days each year in outdoor activities in Iowa such as camping, fishing, or swimming in rivers, creeks, and lakes?

yes \_\_\_ or no \_\_\_

Please complete the following sentences:

1. When water pollution is especially bad I feel \_\_\_\_\_

\_\_\_\_\_

2. When water pollution is really serious the people I am concerned about are

\_\_\_\_\_

3. When water pollution is very bad in a community, the feelings among the people would be

\_\_\_\_\_

If you had a serious water pollution situation in your immediate area, in what ways do you think your household would be affected?

\_\_\_\_\_

Does water pollution affect you financially? yes \_\_\_ or no \_\_\_

Of the following water systems, please check which one your house presently uses:

CISTERN \_\_\_; WELL \_\_\_; or PUBLIC WATER SUPPLY \_\_\_

Have you changed your water system in the past ten years? yes \_\_\_ or no \_\_\_

If YES, why? \_\_\_\_\_

Please indicate the amount of money you would be willing to pay, assuming it was well spent, in taxes each year for the next 10 years, to end water pollution in the Iowa River Basin? (please check one)

\_\_\_ none \_\_\_ \$3 \_\_\_ \$5 \_\_\_ \$10 \_\_\_ \$15 \_\_\_ \$20 \_\_\_ more

Comment:

What kinds of problems do you think are associated with water in the Iowa River Basin? (please check one or more)

- pollution
- water purification
- floods
- water shortage
- water cost
- there are no problems

other: \_\_\_\_\_

The following are four methods used in controlling water pollution. Which do you feel would be the best for controlling water pollution in the Iowa River Basin?

1. Government regulations to control pollution from industries and/or municipalities and/or farm land. \_\_\_\_\_
2. Government warnings to industries and/or municipalities and/or farmers after water pollution reaches a danger level to health. \_\_\_\_\_
3. Government subsidies or loans to industries and/or municipalities and/or farmers to help them curb water pollution. \_\_\_\_\_
4. Charges to the polluter depending upon the amount of water pollution he causes. \_\_\_\_\_
5. Other ( please specify ): \_\_\_\_\_  
\_\_\_\_\_

Who do you think should pay for the costs of controlling water pollution in the Iowa River Basin?

1. Government: through higher taxes. \_\_\_\_\_
2. Government: by spending more money on water pollution and less on other items. \_\_\_\_\_
3. Industry: through less profits. \_\_\_\_\_
4. Citizen: through higher prices and/or higher costs. \_\_\_\_\_
5. Other: (please specify) \_\_\_\_\_  
\_\_\_\_\_

Starting on this page and continuing on the next are a series of statements. Would you please indicate exactly how you feel about each statement, by checking the one that most agrees with your feelings. Please give only one answer for each statement, but feel free to write in the margins.

For example:	strongly <u>agree</u>	<u>agree</u>	don't <u>know</u>	dis- <u>agree</u>	strongly <u>disagree</u>
In recent years there has been a definite decrease in the quality of the environment.	—	<u>X</u>	—	—	—
* * * * *					
Please check the following:					
The quality of our natural environment has been decreasing for many years, but in recent years there has been more awareness of it than in the past.	—	—	—	—	—
The cultural benefits of a big city are more important than are the benefits from life in a rural area.	—	—	—	—	—
The Iowa River is polluted enough that I would never allow my children to swim in it.	—	—	—	—	—
The benefits from pesticides and fertilizers far outweigh the water pollution they create.	—	—	—	—	—
Water pollution is a major threat to me.	—	—	—	—	—
Good fish can adapt to polluted waters if given time.	—	—	—	—	—
Water pollution makes my taxes higher.	—	—	—	—	—
If my drinking water is properly treated, water pollution would never affect me.	—	—	—	—	—
Every child should live in a big city at some time in his life.	—	—	—	—	—
Fish from the Iowa River are safe to eat.	—	—	—	—	—
High nitrate levels in drinking water can be harmful to young children.	—	—	—	—	—
The advantages of city life outweigh the disadvantages.	—	—	—	—	—

	<u>strongly agree</u>	<u>agree</u>	<u>don't know</u>	<u>dis-agree</u>	<u>strongly disagree</u>
If I knew that someone or some industry was polluting a nearby stream, I would take some action.	—	—	—	—	—
If water pollution isn't slowed down immediately, many people will be hurt by it.	—	—	—	—	—
I don't care what the condition of the stream is below me, because it doesn't directly affect me.	—	—	—	—	—
The stress of urban life has led to increased mental illness.	—	—	—	—	—
I feel that all leaded gasoline should be banned immediately.	—	—	—	—	—
Soil runoff from construction adjacent to streams will pollute the water.	—	—	—	—	—
Urban areas contribute to water pollution just by being there.	—	—	—	—	—
There is no bad water pollution around here.	—	—	—	—	—
More of my tax dollar should be used for water pollution research.	—	—	—	—	—
Construction on floodplains should never be allowed, even with a dam upstream.	—	—	—	—	—
All forms of water pollution can be handled by present technology if cities or industries will spend the money for necessary equipment.	—	—	—	—	—
In my area, the Iowa River's wildlife and fish population is being affected by pollution.	—	—	—	—	—
I would be willing to share the costs needed to police water polluters.	—	—	—	—	—
I would sit on a water pollution control board to protect the water quality in my community.	—	—	—	—	—
The pollution in the Iowa River comes more from city sewage than from agricultural runoff.	—	—	—	—	—

	<u>strongly agree</u>	<u>agree</u>	<u>don't know</u>	<u>dis-agree</u>	<u>strongly disagree</u>
Rivers are beautiful additions to the landscape and should not be used as sewers.	—	—	—	—	—
Agricultural pollution (feedlot or field runoff) should be prevented.	—	—	—	—	—

If you agree, have you any suggestions as to how this can be done?

\* \* \* \* \*

Assume you have a chance to declare which way you want your taxes distributed. Below is a list of areas where this money might go. Please read them all carefully and then decide what order of importance you would attach to each one.

Please rank the following 16 areas from 1 (being the most important) through 16 (being the least important). Use each number only once.

Examine New Sources of Energy (other than coal or oil)	—
Earthquake Research .....	—
Fire Fighting Research .....	—
Sewage Treatment Methods .....	—
Urban Engineering Problems.....	—
Nuclear Research .....	—
Excavation Technology .....	—
Weather Modification Research Program .....	—
Study of Ecological Systems .....	—
Regional Environmental Systems Research .....	—
Environmental Aspects of Trace Contaminants (Mercury or pesticides) .....	—
Research on Social Well-being .....	—
Municipal Services .....	—
Social Data and Community Structure .....	—
Crime .....	—
Research to Evaluate Social Programs (e.g., welfare)....	—

THANK YOU VERY MUCH FOR YOUR HELP

Barcode Inside