

**THE RELATIONSHIP BETWEEN
PERCEIVED MOTIVATION FOR
WATER POLLUTION ABATEMENT
PROGRAMS AND PREFERRED METHODS
OF FINANCING SUCH PROGRAMS**

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ABSTRACT

Current water pollution abatement programs are financed by federal, state, and local taxation, suggesting that the benefits of such programs are widely shared by all members of the community. Assessments of these efforts, however, have concentrated on use-related benefits, suggesting the notion that those who benefit from use of the waterways should pay for water quality improvements. This inconsistency is explored. A public opinion survey was administered to a random sample of the population in the Chicago metropolitan area ($N = 350$). Respondents' perceptions of the motivation for water clean-up efforts and their preferences on methods for financing such efforts were measured. The dominant motivation was non-use-related, supporting current financing mechanisms. However, inconsistent attitudes among the respondents suggest that policymaking to reconcile perceived motivation and preferred method of payment may be difficult.

The Federal Water Pollution Control Act of 1972 (P.L. 92-500) initiated a massive program with the goal of eliminating discharges into the nation's navigable waters by 1985 [1]. At the time of its passage, popular sentiment was highly in favor of such environmental legislation [2] and the language of the Act stated that it was a "national" responsibility to "prevent, reduce and eliminate pollution." In accordance with this view that the achievement of clean water was a shared responsibility, pollution control programs resulting from the Act have been largely financed by broadly based taxes at the local, state, and federal levels. The use of such taxes is consistent with the notion that clean water is a public good, and therefore should be paid for by all members of the community.

Subsequent efforts to measure the success of these water pollution control efforts have concentrated on the development of benefit estimates derived from use of the nation's waters [3, 4]. These efforts in general seek to characterize the increased availability of rivers and lakes for various withdrawal and recreational purposes. They then assign a dollar value to this increased availability. The results of such studies have indicated that recreational benefits dominate the benefits derived from implementation of the Act [5].

If, in fact, the primary benefits of water pollution control are use-related, and, if such use is not universal, the present method of payment for this program by broadly based taxation may be inequitable. A more equitable approach under such circumstances would appear to be to charge user fees sufficient to cover clean up efforts. The burden of payment would then fall on those who would reap the benefit.

The determination of whether present financing methods are inequitable is complicated by consideration of categories of non-use related motives for desiring clean water. This concept, of non-use based motives, was introduced by Krutilla [6]. These non-user motives involve so called preservation values.

Preservation values exist either because individuals wish to preserve the existence of water recreational opportunity for themselves for possible future use or because they simply derive satisfaction from knowing that water recreational resources will be preserved, even though they have no intention of using them personally. The first category of non-user motivation is referred to as an "option value." The rationale for option values is normally linked to the preservation of "irreplaceable environmental assets," e.g., the Redwood Forest of California. The conceptual basis of the option value for a water recreational site is that some type of uncertainty exists in an individual's mind either regarding the continued availability of the site or uncertainty regarding whether the individual may wish to use the site for recreation in the future. In either case, the individual wishes to assure that water recreational opportunities will exist in the future.

If individuals wish to preserve water recreational opportunities even though they never intend to use the site, this behavior indicates that they have some

“existence value” for these opportunities. They may either value these opportunities for the sake of the water’s use by future generations (bequest value) or for use by others in the community at the present time. Thus, in assessing the present strength of support for water quality improvements, the motivation for supporting clean up efforts may be based on use or preservation values.

If public support for water quality improvements is mainly related to preservation values rather than use-related motives, the argument can be made that taxation is, in fact, an equitable method of financing. When preservation values are considered, the benefits of the water quality program extend beyond users to a wider segment of the population. This is particularly so if these non-use motives are shared by a large segment of the public. On the other hand, if the motive for wanting clean water is use-related, and if users only constitute a fraction of the population, then user fees would seem more equitable.

The objective of the study described in this article was to examine the relationship of the public’s perception of the major motive for wanting clean water and their preferred methods of financing clean up efforts. This investigation involved a public opinion survey conducted in the Chicago metropolitan area, containing extensive lake and river systems [7].

STUDY DESIGN

The study area in the survey was defined by the 350 square mile combined sewer area of Cook County, Illinois. This area includes the city of Chicago and surrounding communities. The major bodies of water in this area are the Chicago, Calumet and Des Plaines Rivers, and Lake Michigan.

A random sample of 805 telephone numbers in the study area was selected using the Waksberg telephone sampling method [8]. This number of households to be contacted was set in order to complete a target of 350 interviews for the survey.

The questionnaire was designed to elicit information from the respondents in four areas:

1. their water recreational use behavior;
2. their perception of the primary motivation for cleaning the water;
3. their preference on financing methods; and
4. their socioeconomic profile.

The water recreational use pattern was sought by first asking the respondents whether they used Lake Michigan or the rivers for recreation. If the respondent did, he or she was asked if the use included outings (such as picnicking, hiking, bird-watching, or photography), boating, fishing, or swimming.

The second area of investigation concerned the respondent’s reasons for wanting improved water quality. Respondents were asked: “Which *one* of the

following reasons, if any, for reducing water pollution and having clean water is *most* important to *you personally*?

1. Your use of these waters for fishing, boating, or swimming.
2. Your use of areas immediately surrounding these waters for picnicking, hiking, bird-watching, or photography.
3. You get satisfaction from knowing other people may use and enjoy these waters.
4. You get satisfaction from just knowing that these waters are being kept clean.
5. Other (specify).
6. None of the above."

A third set of questions concerned the respondent's preferred method of financing water quality improvements. Five methods were identified in the questionnaire: income tax, property tax, water bills, sales tax, or user fees (e.g., an admission charge to the beaches). Respondents were asked to choose the most desirable method of financing water quality improvements and the least desirable method.

Finally, a socio-economic profile of the respondent was developed by inclusion of questions regarding age, household income, education, homeownership, and length of residence.

STUDY RESULTS

Slightly less than half of the respondents (161) use the waters in the Chicago area for recreation. The distribution of this use, as shown in Figure 1, indicates a preponderance of "outing" activity rather than sports uses (fishing, swimming, and boating). When the use responses were cross-tabulated with the respondents' ages, incomes and educational levels, it was found that users of water recreational opportunities tended to be a younger, more affluent, and more highly educated segment of the population ($p < 0.05$).

The distribution of responses regarding the reasons for wanting clean water is shown in Figure 2. Over 60 percent of the respondents answered that the primary reason for wanting clean water was knowing the water was clean or for others' use of the waters. The comparison of responses to the question regarding reasons for wanting clean water and use behavior of the respondents can be seen in Table 1. As expected, the majority of those respondents who do not use Lake Michigan wanted clean water for the sake of just knowing that it is clean. Unexpectedly, a majority of the Lake Michigan users also cited preservation-related reasons as well.

This comparison was made in order to establish a classification of motives for supporting water quality programs. The criteria applied were as follows:

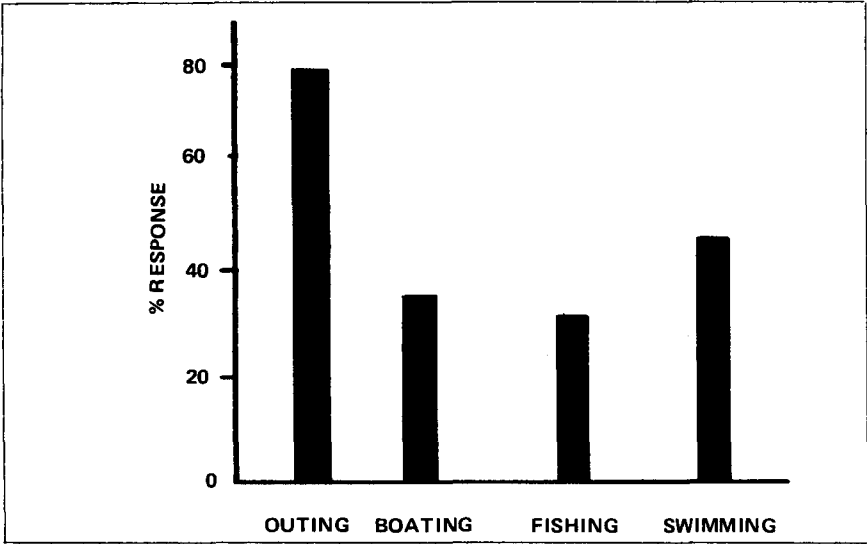


Figure 1. How respondents use Lake Michigan (N = 161).

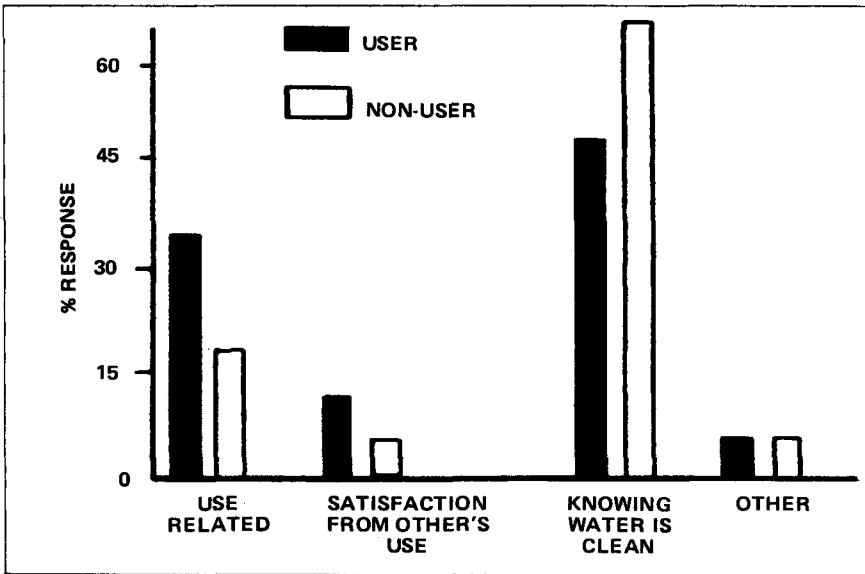


Figure 2. Primary reasons given for wanting water quality improvement (N = 350).

Table 1. Comparison of Reasons for Wanting Clean Water and Use Behavior of Respondents (in Percentages)

<i>Reasons</i>	<i>Lake Michigan Users (N = 161)</i>	<i>Lake Michigan Non-Users (N = 189)</i>	<i>Totals</i>
Fishing, Boating, or Swimming	30.4	13.2	21.1
Picnicking, Hiking, Bird Watching, or Photography	5.6	8.5	7.1
Knowing Others Use	9.3	6.3	7.7
Just Knowing that Water is Clean	47.2	64.6	56.6
Other Reasons	<u>7.5</u>	<u>7.4</u>	<u>7.4</u>
Totals	100.0	100.0	99.9

1. The respondent was classified as having a use-based motivation if he/she presently was a water recreation user and gave as a major reason for wanting clean water the use of the water for either sports or outing purposes.
2. The respondent was considered to have an option-based motivation if he/she was presently not a user, but gave a use-related reason for wanting clean water. In effect, the respondent, though not using the water at present, wishes to keep open the option to use these waters in the future.
3. If either a user or a non-user gave a reason for wanting clean water related to "other's use of the water" or "just knowing the water is clean," he or she was classified as having an existence-based motivation.

In fact, a respondent falling into any particular category may have more than just one class of motivation for wanting clean water. Someone labeled by the above criteria as use motivated (category one) may also want clean water for the sake of others or for future possible use. The classification scheme was employed, despite this potential for multiple motivations, in identifying the strength of the relationship between type of motivation and the preferred method of financing.

By applying the classification scheme defined above, the percentages of respondents having each of the three motivations (use, option, and existence) are shown in Figure 3. As shown, existence motivated respondents are in the majority.

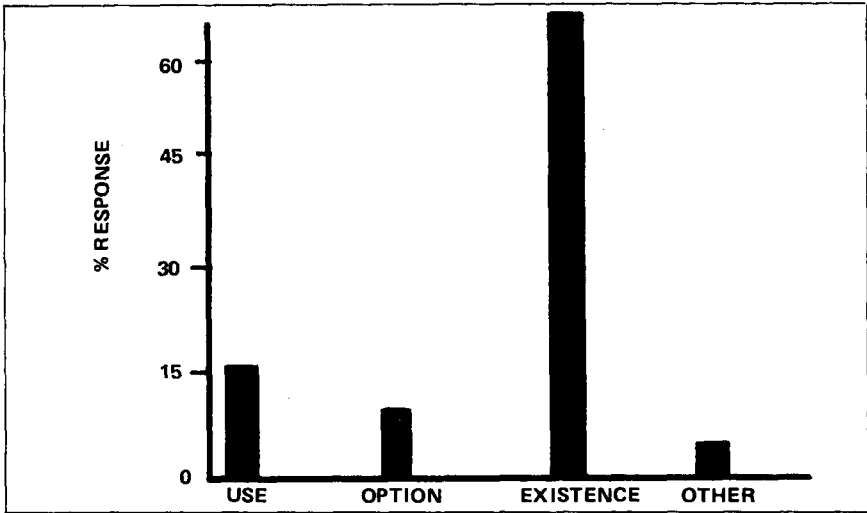


Figure 3. Classification of respondents by perceived motivation for water quality improvement ($N = 350$).

The response from the question regarding the preferred method of payment is shown in Figure 4. User fees are by far the preferred method of paying for water quality improvement programs. Responses to this question were cross-tabulated with the age and income of the respondents. No significant differences in payment preferences were found to exist based on these demographic variables ($p > 0.05$).

In order to test whether the motives of the respondents in the sample correspond to the appropriate (i.e., equitable) preference for financing water pollution control programs, the method of payment responses were aggregated into two categories: user fees and taxation. Motives for wanting clean water were also aggregated into two categories: use-related (category one from the criteria above) and preservation-related (categories two and three).

The results indicate a considerable inconsistency between the motives for wanting clean water and the preferred method of financing (see Table 2). A majority of those having preservation motives who, if equitable, would be expected to choose taxes as a preferred method, actually preferred user fees. For those having use-related motives, a sizable fraction chose taxation. It is not as clear that this choice represents inconsistent behavior, however. If this user group believes that the use of the waters is widespread or that user fees would create socially undesirable restrictions on access to recreational uses of the waterways for poorer segments of the population, the preference for taxation might not be an inconsistent or inequitable position.

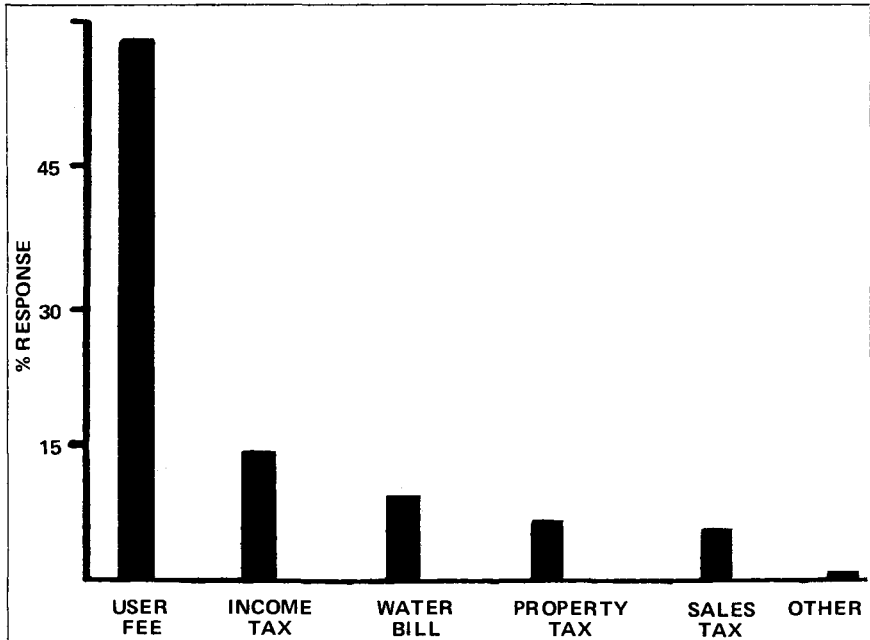


Figure 4. Preferred method of payment for water quality improvement (N = 350).

Table 2. Comparison of Respondent's Motivation with Respondent's Preferred Method of Payment (in Percentages)

<i>Motivation</i>	<i>Pay by User Fee</i>	<i>Pay by Taxation</i>	<i>Totals^a</i>
Use-related (N = 72)	54.2	43.1	97.3
Preservation-related (N = 278)	56.9	42.1	99.0
Totals (N = 350)	56.3	42.3	98.6

^a Percentages add to less than 100 due to missing values or other responses.

DISCUSSION

The present method of financing water quality improvement programs, through taxation, is inconsistent with the view that the benefits of water quality are primarily use-related, since the users in this survey constitute a minority of the population. Under this view, all members of the community are paying for the benefits of a few. This is aggravated by the fact that the user segment has higher income and educational levels.

However, as seen in this survey, consideration of preservation-based motives changes this conclusion dramatically. These motives are widely held by a majority of the public, a majority which represents a cross-section of the community. This dominant motivation provides a basis for rationalizing the choice of twelve years ago to use broadly based taxation mechanisms to fund clean up efforts.

Although the strength of the preservation motive may justify taxation methods on theoretical grounds, the survey results are problematic. The relationship between preservation motives and this justification does not seem to be perceived widely by the respondents. If the sentiments of the majority of the respondents were implemented, the benefits of water quality programs would be shared by most members of the community, but paid for by a small segment of the population.

This article began by noting the apparent discrepancy between decisions made twelve years ago on public financing of water quality programs and the assumptions of subsequent efforts to evaluate the usefulness of these programs. While the results down-play the nature of that original inconsistency (and, incidentally, point to possible new directions for future benefit-assessment work in this area, based on non-use related values), the further potential inequity found in the survey results indicates the possible difficulty that policymakers may face in achieving environmental policies which present a congruence between the benefits of the program and the methods of financing the efforts.

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