The Impact of Perceived Water Pollution Contribution on the Valuation of Water Quality Changes in the Northeast U.S.

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Introduction

Ensuring sustainable water quality is a critical endeavor, requiring a comprehensive understanding of how individuals perceive and value water quality changes.

- **Evaluate the preferences of residents regarding a specific water quality change ladders, considering the initial water quality condition and the different perceived water pollution contribution.**
- **Identify key characteristics among respondents of varying perceptions.**

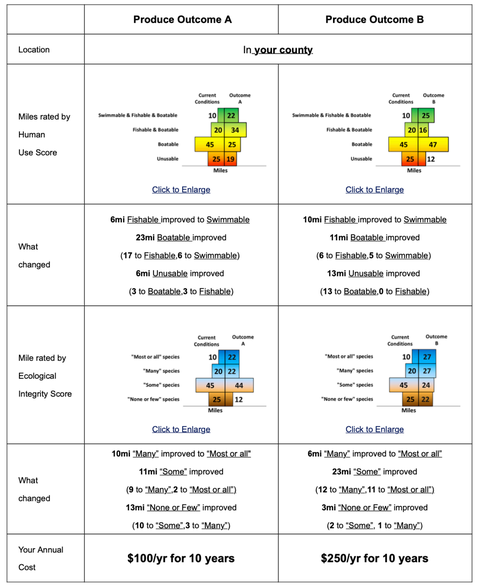
By doing so, we aim to foster a more comprehensive approach to water quality management that not only considers the technical aspects but also recognizes and factors that shape individuals' perceptions and responses to environmental challenges.

Survey Instrument and Data

Survey Instrument

Choice Experiment

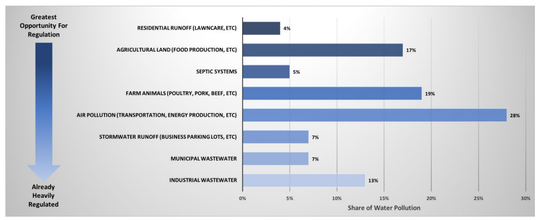
Attribute	Attribute levels
Distribution of 100 river miles for Human Use Score	Swimmable; Fishable; Boatable; Unusable
A Breakdown of how 100 river miles may change for Human Use	Number of miles that change from: Unusable to Boatable; Unusable to Fishable; Boatable to Fishable; Boatable to Swimmable; Fishable to Swimmable
Ecological Integrity Score	"Most or all" species; "Many" species; "Some" species; "None or few" species
A Breakdown of how 100 river miles may change for Ecological Integrity	Number of miles that change from: "None or few" to "Some"; "None or few" to "Many"; "Some" to "Many"; "Some" to "Most or all"; "Many" to "Most or all"
Location	In your county; Receive water from your county; Send water to your county; Disconnected
Cost/year for 10 years	$0 $40 $60 $100 $250 $300 $500



- Six distribution of current conditions for both Human Uses and Ecological Integrity:
  - [0, 0, 60, 40], [10, 10, 50, 30], [10, 20, 45, 25], [20, 20, 30, 30], [25, 45, 20, 10], [25, 55, 15, 5]
  - The skewness measure is used to depict cumulative frequencies leaning towards lower quality.

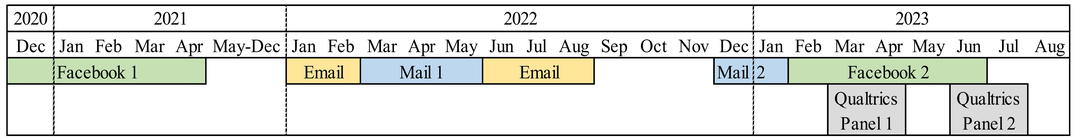
Respondents' Perceptions: Lower, Similar, Higher Contribution in adding Pollutants to Water

- Two identical survey questions before and after an information instruction:
  - *"In your opinion, compared to other households, how significant is the relative contribution of you and your household, through products you purchase and consume and through your daily activities, in adding pollutants to water?" (100-point scale)*
  - Classify into 5 groups Q1-Q5, e.g. Q1: [0, 20)-Very much Lower
- Information instruction (Right Figure)
  - The assumption is that individuals will hold a precise-toward perception following the instruction
  - Category --
    - Lower: q1toq1, q1toq2, q2toq1, q2toq2
    - Similar: q3toq3
    - Higher: q4to4, q4to5, q5to4, q5to5

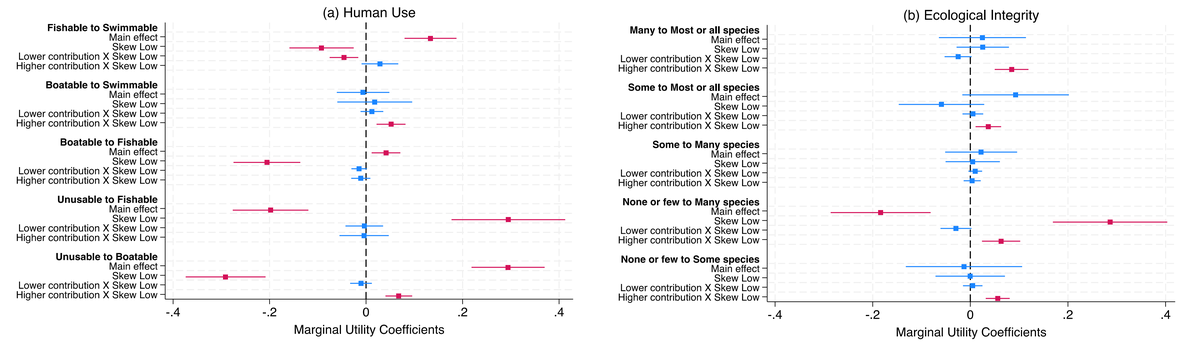


Data Collection

- Our study was conducted in 245 counties spanning 11 states: MD, NJ, DE, PA, NY, CT, RI, MA, VT, NH, and ME.
- Design: 9 Blocks * 4 Scenarios
- Respondents were randomly assigned one block of choice scenarios
- Out of 7,028 valid responses, 5,602 were used in this study to conduct the Condition Logit Model



Results and Conclusions



Notes: Figure reports utility parameter values (dot) and 90% CI's (line) obtained using Conditional Logit Model. The pink ones indicate that the coefficients are statistically significant at the 90% level. The parameters shown in the figure represent coefficients associated with the interactions among miles moved from a lower category to a higher category in human use or ecological integrity ladders, skewness measure of baseline water quality, and a categorical variable indicates respondents' perceptions regarding their contribution to water pollution compared to other households, categorized as lower, similar, or higher.

- As has been shown in our previous study, individuals' marginal utility of a specific water quality improvement, as measured by miles moving from a lower category to a higher one in human use or ecological integrity ladders, are different. Furthermore, the preferences associated with a specific water quality improvement vary across the baseline distributions of water quality.
- Regarding the interactions related to respondents' perceptions, the results suggest that compared to those who perceive their contribution to be similar, those who believe their household adds more pollutants attribute significantly positive marginal utilities on specific water quality improvements in areas where the baseline water quality is lower, including boatable to swimmable, unusable to boatable in human uses, and "none or few" to "some" species, "none or few" to "many" species, "some" to "most or all" species, "many" to "most or all" species in ecological integrities.
- However, those perceiving lower contributions assign lower marginal utility to specific water quality improvements in regions where the baseline water quality is lower, although the results did not demonstrate considerable significance.
- Interestingly, higher perceived contributors are more likely to come from counties with lower economic status and lower intensity of local employment in industries that negatively impact water quality.
- Moreover, they tend to be aged 30-45, more educated, with a higher minority representation, support environmental policies, and more inclined towards conservation efforts while displaying less government trust.