



*Supplement of*

## **Shrinking lakes, growing concerns: exploring perceptions of lake level decline as a prism for understanding socionatural hazards**

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Supplement

An empirical survey was conducted on households within an 8 kilometer-radius surrounding the Lake Groß-Glienicke in order to elicit public perceptions and preferences concerning this lake. The region was sampled through 5,000 hand-delivered postcards to houses in the immediate vicinity of the lake as well as 25,000 commercial postal deliveries within the study area.

Each postcard contained a link to the online survey, hosted through SurveyEngine (www.surveyengine.com). Organized into three sections, the survey captured respondent’s personal connections and interactions with the lake, implemented a discrete choice experiment (DCE) and concluded with socio-demographic questions and perceptions on climate change. Overall, the survey took approximately 20 minutes to complete and data was collected from June to September 2023.

The DCE was composed of five attributes that were developed in collaboration with the authors following initial interviews with residents (Tab. S1). For the water level and quality, reasonable estimations of possible changes were discussed with hydrological experts. For water level, maintaining the current level already requires action or else the status quo of further sinking by 5 cm per year is maintained. For several of the attributes, both improvements and declines in comparison to the status quo are assumed as they represent likely scenarios of development for the lake. The cost vector was not developed through estimations of the implementation costs to achieve the provision of different attribute levels, but rather spanned a range of values considered plausible in connection with society’s willingness to pay in other studies.

Table S1. Description of the attributes and the levels.

| Attribute     | Definition                                                          | Levels                                                                                                                        |
|---------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Water level   | The depth of the lake                                               | Preservation as today<br>As from 20 years ago (+1m)<br>Status quo: Further decreasing by 5 cm per year                        |
| Water quality | The visibility of the lake water                                    | 1 m visible depth<br>4 m visible depth<br>Status quo: 2.5 m visible depth as currently                                        |
| Lakeside path | The existence of lakeside path                                      | No public lakeside path<br>Lakeside path around the entire lake<br>Status quo: On 2/3 of the lakeshore no public path         |
| Facilities    | The existence of lakeside toilets and bins                          | More trash bins and clean toilets<br>More trash bins<br>Status quo: Current state                                             |
| Biodiversity  | The number of different species of plants, animals in the lake area | No fish to be seen, only a few birds<br>Many fish and birds to observe, diverse plants<br>Status quo: See some fish and birds |
| Cost per year | A yearly payment must be made for a certain scenario to be achieved | 6 €<br>12 €<br>24 €<br>60 €<br>120 €<br>240 €                                                                                 |

Initially, a fractional factorial design for the attributes was estimated, in which respondents received 8 random choice sets from an orthogonal array of 18 sets, in which each set comprised two alternatives and one status quo. After completion of the survey by the first 100 respondents, priors were estimated and used to obtain a D-efficient design with the Ngene software from ChoiceMetrics ([www.choice-metrics.com](http://www.choice-metrics.com)), resulting in 3 blocks of 8 choice sets.

Following Johnson and Geisendorf (2022), the choices were modeled using a conditional logit model in preference space on the basis of Lancaster's theory of demand (Lancaster, 1966) and random utility maximization theory (McFadden, 1974). The marginal willingness to pay was estimated by dividing the attribute coefficient by the coefficient of the cost variable (Hoyos, 2010). Climate change skepticism was introduced to the model as an interaction term with the corresponding attributes to approach an understanding of which direction climate change skepticism affects the willingness to pay, and only significant interactions were included in the final model. The model was estimated in R using the gmn1 package (Sarrias et al., 2017).

## References

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