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Assessing the interconnections between the characteristics, perception, and valuation of Nature-Based Solutions: A case study from Aarhus, Denmark

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When assessing strategies for implementation of Nature-Based Solutions (NBS) it is fundamental to quantify all benefits for securing better, informed decision making. Particularly relevant is the quantification of their multiple co-benefits for communities and the environment. One of the most widespread techniques to quantify these values is to use contingent valuation (CV) methods, such as the Willingness-To-Pay (WTP) approach. Within the CV method, questionnaires are the main tool used to elicit the value attributed to a specific good by the respondents. However, many studies focus on site-specific economic valuation, whereby transferability to other locations is jeopardized. We therefore created a survey to explore how the valuation of an NBS is shaped by its relationship with the users (e.g. frequency and length of visits), and how these responses are linked to both the respondents and the sites' characteristics (e.g. socio-economic status, size of the NBS, etc.).

We applied this method to a case study comprised of two distinct areas located in Aarhus, Denmark, asking users to explore their perception of the two NBS sites with different features. Both NBS sites have as overarching goals to (i) prevent flooding from cloudburst or water bodies, (ii) improve the biodiversity in the area, and (iii) benefit the local population, e.g. by providing more recreational areas. Despite these common goals, the two sites differ by a number of characteristics, i.e. size, location, and time passed since construction. One NBS involves a large artificial lake in a peri-urban setting, while the other is a small urban park. Respondents were allowed the option of either expressing a value for only one, or for both of the sites.

We analyzed both responses that stated a WTP and protest votes, that is, responses that rejected the valuation scenario altogether. We found that older citizens are more likely to protest, as well as those not visiting the sites. For the respondents who accepted to state a WTP, their bids significantly increased when the improvement of nature and biodiversity was mentioned in the valuation scenario. Comparing the value given to the two different sites, the characteristics of the NBS seem to play a role in the respondents' perception and use of the sites, which in turn enhances valuation. In our case study, people's perception of the site and their relationship with it appear to have a stronger link with the WTP than their socio-economic characteristics. Specifically, frequency and length of visits, and interest in a good quality of nature were mostly related to a positive WTP.

The inclusion of people-NBS relational variables in benefit quantifications appears to be an essential tool to realize a more realistic economic valuation, as well as correctly design NBS in order to achieve the desired impacts. Understanding the underlying synergies between the multiple co-benefits of NBS, their features and the users' perception is decisive for maximizing these strategies' potential and avoiding missing opportunities.