

## ***Interactive comment on “A Q methodological approach to identify practitioners’ viewpoints on citizen science in Dutch regional water resource management” by E. Minkman et al.***

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We would like to thank both reviewers for their extensive reviews. We noticed that the reviewers’ comments overlap to a certain extent, thus we would like to address both reviews in one reaction. We are glad to hear both reviewers think our paper would suit the special issue, although requiring rewriting. Below we would like to respond to the comments made by both reviewers, first focussing on topics brought up in both reviews, before reacting to the individual reviews.

Reducing the ‘general’ method section, detailing the ‘case specific’ method description Both reviewers suggested that the method explanation is too extensive, albeit for different reasons. We opted for this extensive method description, because we assumed

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not many hydrologists would be familiar with the method. However, it seems we overdone it. A method summary and a solid reference to an explanation of Q methodology will suffice. Doing so, we will reduce the amount of specific terminology of the method section, as was suggested by reviewer #1. We will only be able to reduce the statistical terminology to a certain extent, as we think it is important to provide the reader insight in the idea and the reasoning behind the method choices. Some terms and information (e.g. correlations between factors and eigenvalues of factors) are essential in doing so, as it will enable the reader to value the results in the discussion.

Reducing the method description will enable us to the case specific implementation of the method, as was suggested by reviewer #2. That way we create room to elaborate on the method, guided by remarks 5/13; 5/20; 5/22 and 6/23. In these remarks reviewer #2 rightfully asks for specifications on the method (process and choices made). Reducing the method explanation will further give us more space to discuss the insights, as suggested by reviewer 2.

#### \*Design implications\*

Both reviewers had a similar remark on our claim that this study enhances design of citizen science projects. These comments made us realise that we have not been clear about our definition of design. We extend our definition of design beyond the final design of a citizen science project, thus focussing on the process of designing the interaction between citizens and water authorities. This study was part of a larger, design-oriented research and in our enthusiasm we ill-defined what we mean by 'design'. We believe our study provides useful insights that can help water authorities to recognise viewpoints of their employees and incorporate these insights in the design process. We further speculated that they can subsequently match project managers with a certain viewpoint to project goals, target audience and project resources. But, as reviewer #1 pointed out: these results will not directly influence or change the final project design though, but merely help understanding why projects are designed as they are. In that respect they may be used to enhance the design process. In a revised manuscript we

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should pay more attention to this.

\*Conclusion/discussion\*

Both reviewers suggested to have the discussion before the conclusion. In social sciences it is common to present conclusions, to discuss the meaning of these findings after. However, if it is in line with HESS we could discuss our results before coming to a conclusion.

\*In response to reviewer #1\*

Above we already responded to the issues of the design implications and the statistical and methodological-oriented nature of the paper. We also welcomed suggestions to match our text and content more to the target audience, such as simplifying the title and introducing terms before using them. The reviewer indicated to be unfamiliar with the terms of figure 1, but we hope the reviewer understands that using some statistical and method-specific terms is necessary. Although this special issue is aimed at non-experts in Q methodology, there may be readers familiar with the method. Therefore we would like the results to be complete (e.g. mention the eigenvalues and the level of significance). Using the suggested 'basic' or laymen description of these terms would only lengthen and complicate the explanation in our opinion. We do realise that we can improve figure 1 by adding a more self-explanatory caption.

We will introduce the concept of citizen science more thoroughly in the revised version. In the research we considered three levels of participation, nine goals related to citizen science and three types of governance, but we did not include them in the paper. In hindsight this was a pity, as incorporating these would have prevented the improper introduction of terms such as the 'goals' and 'higher levels of citizen engagement'. The awareness gap referred to is the lack of awareness of Dutch citizens on water issues in the Netherlands, their own influence on water (quality) management and the activities of water authorities. We will enhance the description of these and other concepts/ideas.

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The paragraph level needs improvement and an example was given in the review (being 2/13-19; stating a growth in citizen science and causes for that growth). We struggle to split this particular paragraph as it only consists of 4 sentences, but believe that a proper introduction of concepts (see above) will solve the issue of paragraph structure.

The reviewer firmly states that the general structure needs thorough improvements, but limits the remarks to changing the order of the conclusion and the discussion. We think that a shift in focus from the method (Q methodology) to a focus on citizen science will improve the structure significantly. We propose to limit the method section to a brief introduction of key terms and focus on the relevance of the method for this case. Simultaneously, we will elaborate on the citizen science part, by properly introducing objectives that can be achieved with citizen science and by distinguishing clearly between different levels of citizen participation, based on existing citizen science literature. Both are used to structure the discussion, but more attention will clarify the structure and readability of the article.

\*In response to reviewer #2\*

The reviewer indicated that the contextualisation and analysis of citizen science is rather shallow. We will not deny this. In the research we made a distinction between three levels of participation and three types of governance, but we did not include them in the paper. In hindsight this was a pity, as it would have clarified why we focus on a certain type of citizen science (with citizens as 'assistant').

The three levels of participation range from the 'assistant' (contributory citizen science) to citizens taking the initiative (co-creative citizen science). As the reviewer points out, citizen science may be 'conflictive'. Governance-wise we expect a water authority led governance for two reasons. As the reviewer already indicated, conflictive citizen science is more likely in areas with environmental or governance issues, which is not the case in the Netherlands. On the contrary: Dutch citizens lack awareness of water issues and are ignorant towards water management, reducing the likelihood of citizen

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science initiated by citizens. The reviewer is right though, that this is not mentioned in our introduction and as a consequence, not addressed in the discussion. We can address this briefly in an updated version of the paper.

In this updated version we shall also specify how we implemented the method of Q. This update could include the following answers to remarks by reviewer #2: 5/13; The students performed the whole Q sort. During and afterwards they commented on individual statements. In a form they reported statements with an unclear formulation, statements similar to another and statements that were too broad for the topic. 5/20; We selected water authorities first. We approached either the communication department, people we had been in touch with before or the eco-hydrologists (because of the link with ecology, where citizen science is common practice). 5/20: Explorative interviews suggested a difference between urban citizens and rural civilians regarding attitude towards water authorities and water issues. Therefore we distinguished between the predominantly urban Randstad and the more rural non-Randstad. 5/22: The number of participants was aimed at four per water authority. Due to time constraints we were only able to visit some water authorities once. Some people cancelled our appointment (e.g. illness). To reach our total target of >30 participants we compensated at other authorities, hence the difference. 6/23: The interview was reduced by focussing on the +4 and -4 statements and 'statements of choice', as described in 6/16-18

Regarding the results: 8/5: We emailed participants, most replies only stated that they recognised themselves. Few elaborated, for example: 'viewpoint A is my ideal, but B is closer to reality'; 'I always look for collaboration and have a let's-go-for-it mentality, thus A is a match'; 'I think extra data is very welcome, thus I recognise myself in A'. 8/10: Convincingly is a combination of eigenvalues  $>1$ , having people with high factor loadings. People with viewpoint C relatively often had a significant loading on one of the other viewpoints as well. 8/14: 'overlap' refers to two statements being equally high/low ranked by two viewpoints (e.g. A & B), but clearly higher/lower than the third

(e.g. C). In the table these are all entries but the diagonals.

We would further like to thank reviewer #2 for pointing out inconsistencies in numbering, referencing and figures and for suggesting other literature.

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