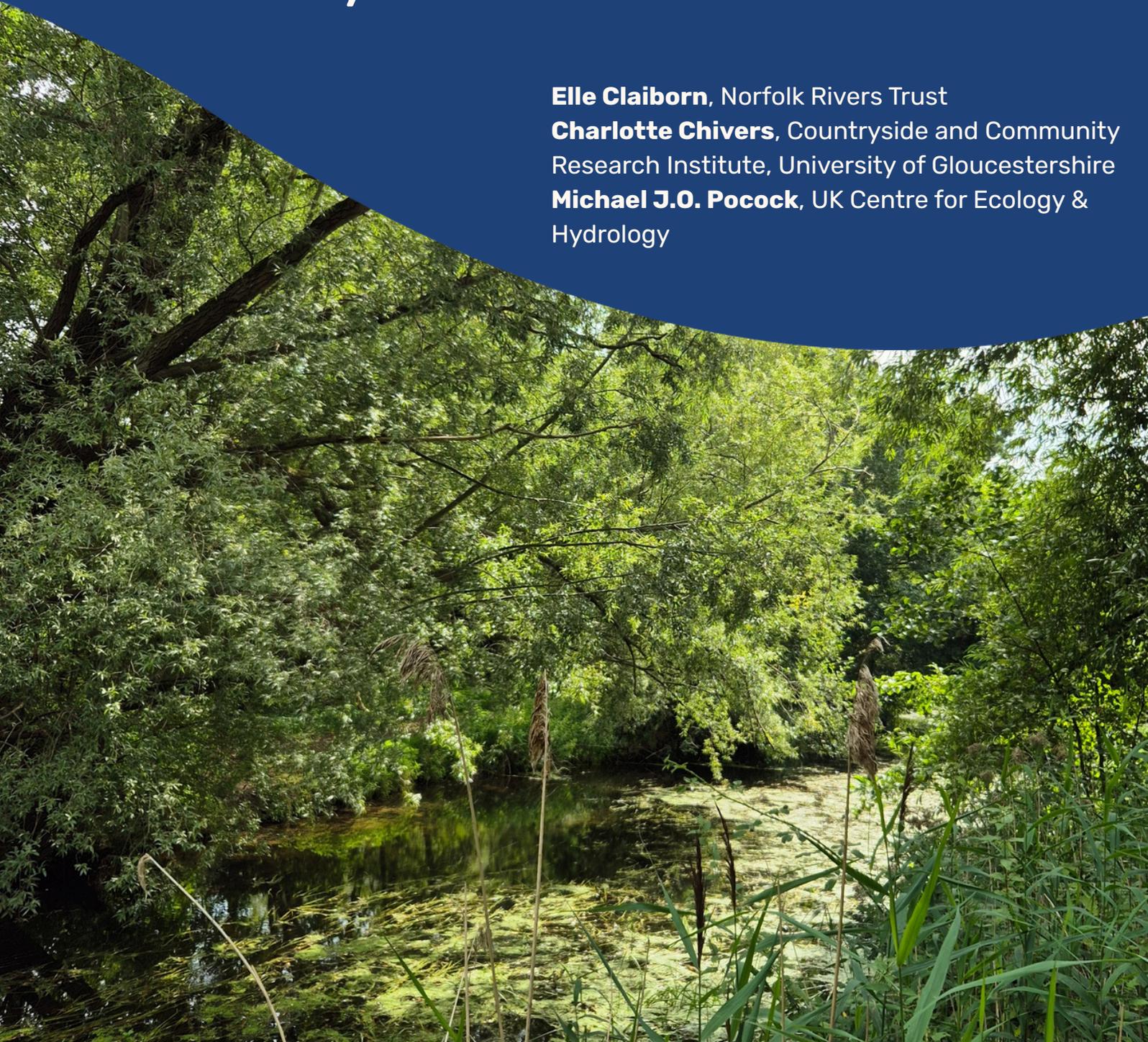


Evaluating the Social Health & Wellbeing Benefits of CaSTCo Citizen Science: Summary

Elle Claiborn, Norfolk Rivers Trust
Charlotte Chivers, Countryside and Community
Research Institute, University of Gloucestershire
Michael J.O. Pocock, UK Centre for Ecology &
Hydrology





Overview

Citizen science is a valuable source of data for environmental monitoring, but citizen science has many more benefits than just producing scientific data – it benefits society by informing effective decision-making, and benefits participants directly. Here we evaluated the benefits to participants in taking part in river water monitoring.

This study was commissioned by Anglian Water as part of the multi-stakeholder Catchment Systems Thinking Cooperative (CaSTCo) project. CaSTCo is creating a national standardised framework for how citizen science can be integrated with professional monitoring to generate impactful data and decisions for rivers.

We explored the range of benefits to citizen scientist participants through three approaches:

- a review of evidence in the scientific literature;
- a survey of CaSTCo-trained volunteers; and
- a case study of the ‘photovoice’ methodology used by volunteers in Norfolk.

Based on these, we make recommendations for future citizen science project design.

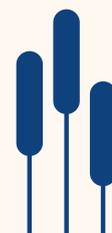
Literature review

The scientific literature shows that there is a wide range of potential benefits of participating in citizen science (see References for key citations, with the full list available in the main report).

These benefits can be divided into:

- **Increasing knowledge, skills and science capital.** Participants can gain more knowledge about rivers, gain skills in data collection, communications and teamwork, and better understand the scientific method. This can support increased job prospects.
- **Benefitting health and wellbeing.** Citizen science is an activity that participants often describe as enjoyable and worthwhile; it can support greater wellbeing and nature connectedness, and even increased physical activity.
- **Forming and strengthening meaning and connection.** Citizen science can build community amongst volunteers, which links to wellbeing and motivation to participate. Citizen science can strengthen connection to a place.
- **Increasing empowerment, by supporting development of values, motivation and action.** Project organisers can use citizen science to raise awareness of environmental issues: participants’ greater knowledge and connection to a place supports greater care, stewardship and action. Individuals can be motivated to more pro-environmental behaviours, but it also supports empowerment and the capacity of the public to participate in decision-making.

The evidence for different benefits varies in quality. Further research is required to strengthen the evidence for some benefits. For freshwater citizen science, the benefits gained by participants often align well to their motivations for being involved, which in turn supports greater recruitment and retention. Intentional design of citizen science by project organisers is important to maximise the benefits for participants, while also supporting collection of data that is high quality and fit-for-purpose.



Survey

We developed a survey to evaluate the benefits gained by CaSTCo-trained volunteers, using a mix of open and closed questions. It was circulated to all CaSTCo-trained volunteers in July 2025, and we received 86 responses (about 25% response rate).

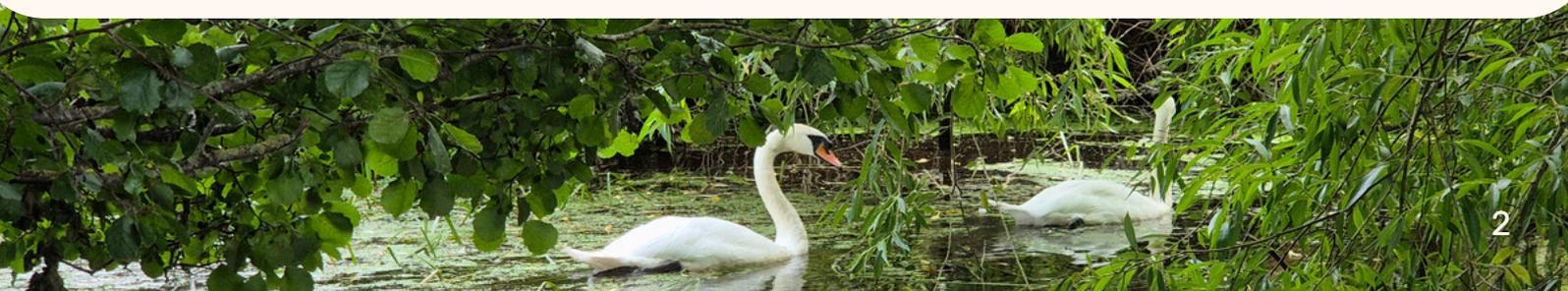
Respondents were predominantly older (92% were older than 55; 80% were retired), almost exclusively white in ethnicity, had high educational qualifications (84% had degree-level qualifications; and half of the total had postgraduate qualifications), and did not consider themselves to have a disability (96%). 70% said this was the only citizen science they did. Respondents were motivated to take part in citizen science river monitoring through CaSTCo because of concern for the environment, especially pollution and water quality, and a desire to contribute scientific data. These were often reinforced by personal circumstances, enjoyment of nature, and the success of promotion by local project organisers.

Overall, the survey responses show that taking part in CaSTCo citizen science had strong positive impacts on personal benefits such as: gaining new skills, learning more about their river, being involved in a social group and connecting to nature. It had some positive impacts on time spent outdoors and physical activity. Taking part in CaSTCo citizen science boosted the multiple pathways to nature connectedness.

'Great for mental health being out in nature, helping improve data sets...'
'It is an opportunity to take part in activity that enhances health and wellbeing'
(survey respondents)

Respondents strongly felt that taking part in CaSTCo citizen science was worthwhile. Overall, they enjoyed being part of a group and passing knowledge to others, but also enjoyed spending time on their own while taking part. They felt it was vital that the data they collected was accurate and there was good expectation that their involvement would influence decision makers, but some expressed uncertainty about this. Overall, respondents tend to speak up more for rivers.

'It's a worthwhile activity. You don't need to have scientific skills as you will be adequately trained and supported by the team. it's not going to take a lot of your time'
'There is some risk of it contributing to climate anxiety / grief and a level of helplessness when the data seems to be having little impact'
'My data has influenced decision making and funding for conservation work by our Parish Council'
'Part of a groundswell of support with everyone pulling in the same direction with a common goal of improving our watercourses'
(survey respondents)



Photovoice case study

Photovoice is a participatory action method used in one of the CaSTCo demonstration areas (Wensum, Norfolk). The participants collaborated to create and curate a set of captioned photos illustrating their experience in CaSTCo. Overall, this benefited the project because it:

- Publicised the insider perspective of tackling environmental threats;
- Encouraged discussion, strengthens partnership and community;
- Helped foster reflection on personal connections to the issue;

After the photovoice workshops, one citizen scientist said:

'I want to thank you for bringing this to us. We have become very, very good at looking at datasets. This has asked us to look at what we do through a creative lens and that has reminded each of us of WHY we do this. I feel more motivated to continue- Thank you!'



Discussion

Citizen science provides many more benefits than simply contributing data. People find that taking part is meaningful, centred around them wanting to help the environment. They gain many different benefits, which keeps them motivated and likely to stay involved in the project.

'Overall, my involvement in CaSTCo has been rewarding on multiple levels, strengthening my environmental knowledge, supporting my local community, improving my wellbeing, and contributing to meaningful scientific and ecological progress.'

You are a vital cog in the bigger wheel of improving and safeguarding the environment. It is a great way to engage with the natural world around you and the benefits of spending time outdoors has to be a positive for health and wellbeing. (Survey respondents)

Currently, the cohort of CaSTCo-trained volunteers appear to be mostly older, white and with high levels of education. While CaSTCo recruitment was influenced by the (mainly rural) regions in which the demo projects took place, there is opportunity to grow the diversity of participants engaged with place-based river monitoring - so that more people can contribute to evidence for decision-making, and also gain direct benefits from participating.

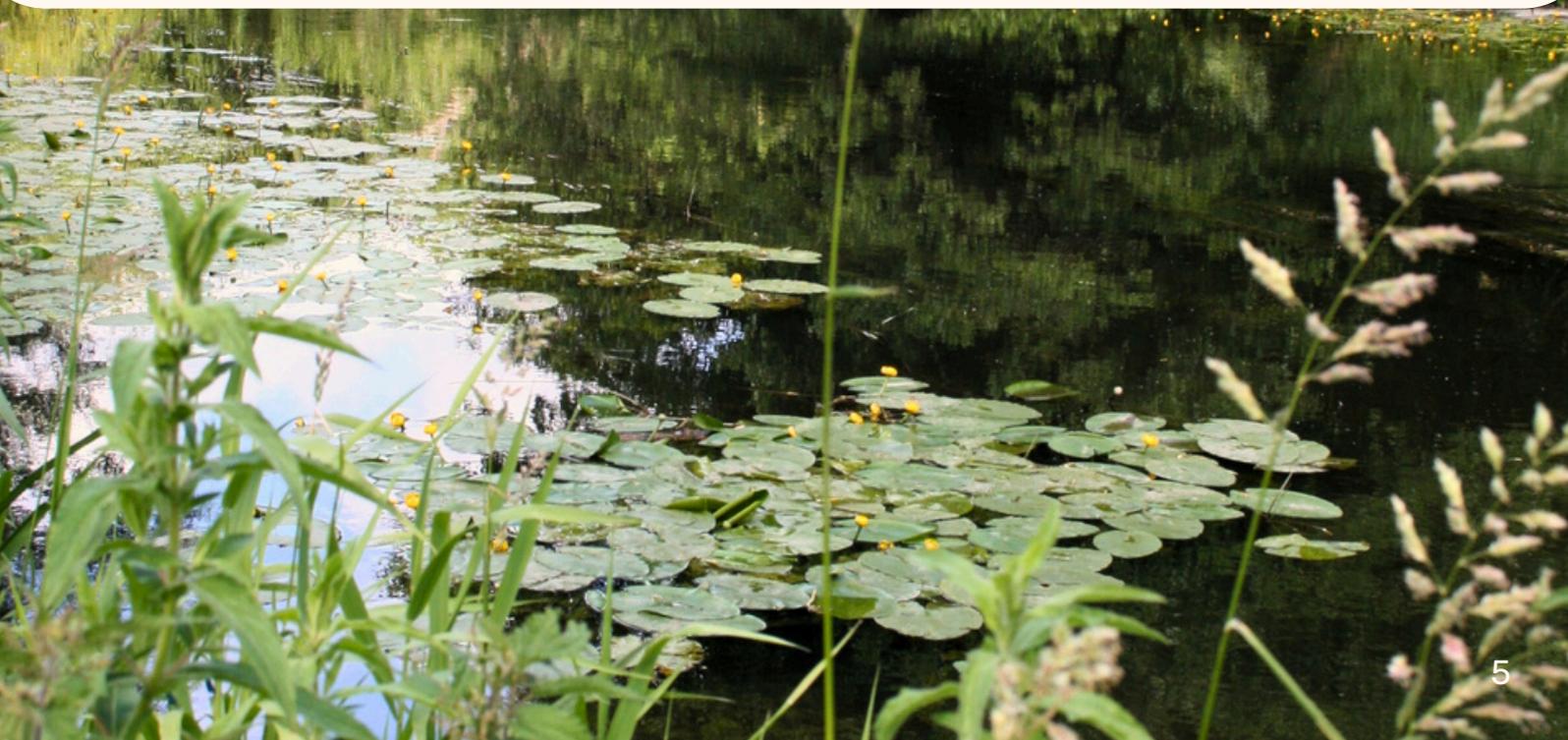
Program organisers can increasingly seek to design citizen science to align with participants' motivations, boost social connections, deepen nature connectedness and grow connection to place. Achieving this should: benefit the collection of robust, fit-for-purpose scientific data; benefit the participants directly and, ultimately, benefit the environment.



Recommendations

To advance the success of freshwater citizen science, we recommend that:

- **Evaluation of participant benefits needs to be built into the design of freshwater citizen science programmes** to develop and share best practice. Mixed methods evaluation approaches should be used to gain the benefits of both quantitative and qualitative methods.
- When communicating with current and potential participants, **project organisers should promote the benefits of taking part**, including health and wellbeing, as well as the value of scientific data collection. This should support better recruitment and retention. Communicate well to ensure participants understand the project as a whole and feel included, supported, and appreciated.
- **Project organisers can intentionally design their programs to boost benefits for participants**, such as nature connectedness, social connections, skills development and connection to place.
- Programme design should be iterative and learn from the citizen scientists as well as the data. **Take regular feedback** to learn and adapt. Pay attention to the negative or and demotivating factors and look for whose voices are not being heard. **Co-design** with potential participants to align activities to their priorities.
- Our participants in freshwater citizen science are not representative of the whole community, so **investigate motivations and barriers of those who are under-represented** in our citizen science (including those of working age). Explore ways to **overcome barriers to participation. Make the project accessible and appealing** to a diverse range of participants by providing appropriate training and creating a diversity of tasks.



References

The full report associated with this overview provides an extensive list of 67 references giving evidence about the benefits of citizen science participation. Six key, open access references are:

Bishop, I. J et. al. 2021. The Role of Citizen Science in UK Freshwater Monitoring. Earthwatch Europe, Oxford, UK.

Eichholtzer, A.C. *et al.* (2024) 'The co-benefits of biodiversity citizen science for well-being and nature relatedness', *Applied Psychology. Health and Well-Being*, 16(2), pp. 515–536. Available at: <https://doi.org/10.1111/aphw.12502>.

Lumber R, *et al.* (2017) 'Beyond knowing nature: Contact, emotion, compassion, meaning, and beauty are pathways to nature connection', *PLoS ONE* 12(5): e0177186. Available at: <https://doi.org/10.1371/journal.pone.0177186>

Oh, R.R.Y., Fuller, R.A., *et al.* (2024) 'Enhancing the health and wellbeing benefits of biodiversity citizen science', *Frontiers in Environmental Science*, 12. Available at: <https://doi.org/10.3389/fenvs.2024.1444161>.

Pateman, R.M. and West, S.E. (2023) 'Citizen Science: Pathways to Impact and why Participant Diversity Matters', *Citizen Science: Theory and Practice*, 8(1), p. 50. Available at: <https://doi.org/10.5334/cstp.569>.

Pocock, M.J.O. *et al.* (2023) 'The benefits of citizen science and nature-noticing activities for well-being, nature connectedness and pro-nature conservation behaviours', *People and Nature*, 5(2), pp. 591–606. Available at: <https://doi.org/10.1002/pan3.10432>



