GC Insights: Lessons from participatory water quality research in the upper Santa River basin, Peru

Sally Rangecroft[1,2], Caroline Clason[2,3], Rosa Maria Dextre[4,5], Isabel Richter[6~~5~~], Claire Kelly[2], Cecilia Turin[7~~6~~], Claudia V. Grados-Bueno[4], Beatriz Fuentealba[4], Mirtha Camacho Hernandez[4], Sergio Morera Julca[8~~7~~], John Martin[2] and John Adam Guy[2]

[1] School of Geography, Faculty of Environment, Society and Economy, University of Exeter, Exeter, UK
[2] School of Geography, Earth and Environmental Sciences, University of Plymouth, Plymouth, UK
[3] Department of Geography, Durham University, UK
[4] Instituto Nacional de Investigación en Glaciares y Ecosistemas de Montaña (INAIGEM), Huaraz, Peru
[5] Departamento de Geografía, Facultad de Arquitectura y Urbanismo, Universidad de Chile, Santiago, Chile
[6] Department of Psychology, Norwegian University of Science and Technology, Trondheim, Norway
[7~~6~~] Instituto de Montaña, Lima, Peru
[8~~7~~] Instituto Geofísico del Perú (IGP), Lima, Peru

Correspondence to: Sally Rangecroft (s.rangecroft@exeter.ac.uk)

Abstract. ~~Research around water security in the Peruvian Andes rarely includes a local perspective or engages in a participatory approach with local communities within the research process.~~ Here we share four key lessons from an interdisciplinary project (Nuestro Rio) that gathered community perspectives on local water quality ~~issues~~ in the ~~upper~~ Rio Santa basin (Peru) utilising a digital technological approach where we~~–~~ collected data via a novel photo elicitation app, supported with a field work campaign. The lessons explored in this article provide insights into challenges and opportunities for researchers considering developing technological tools for encouraging participation and engagement in marginalised communities. ~~Mixed-methods data was collected via a photo-elicitation app with a survey (Nuestro Rio), and a field work campaign. Our main learnings were i) the importance of in-person engagement; ii) the accessibility of technology for data collection; iii) the need for co-produced knowledge and solutions; and iv) the complexity of water quality as an environmental concept. Our research highlights the importance of effective participant engagement methods to support socio-environmental integration to support sustainable decision-making and water resource management.~~

1 Introduction

Water quality~~, is a key consideration for basic~~ crucial for survival as well as ~~both~~ socio-economic and environmental sustainability~~. However, due to~~ is threatened by both natural events and human activities~~, water quality is threatened~~ in many

regions of the world, ~~also~~ and ~~intensified~~ augmented by impacts of climate and land use change (Anderson, 2016; Magnússon et al., 2020; Saleem et al., 2024). Water quality directly impacts the lives of water users (Azevêdo et al., 2022), yet local perspectives, knowledge, and emotions are often not considered (Dextre et al., 2022). Furthermore, water *quality* can be a secondary consideration to water *quantity*, despite being closely intertwined in water insecurity (Clason et al., 2023; Rangecroft et al., 2023). Water quality is a complex, multifaceted issue, which can be judged by indicators such as acidity, clarity, smell, taste, or chemical composition (Flotemersch and Aho, 2021). Some aspects of water quality are visible (e.g. colour, turbidity ~~or litter~~), whereas others are "hidden" (e.g. heavy metal content) and ~~typically~~ only detectable by field or laboratory instrumentation and analysis (Flotemersch and Aho, 2021). Whilst water quality variables are ~~often~~ commonly measured and monitored through methodologies ~~commonly~~ available in the natural sciences (Saleem et al., 2024), local communities can provide unique information about the state of their ecosystem (Okumah et al., 2020, Richter et al., 2022). ~~Local w~~Water users not only directly depend on local water sources, but are also sensitive to changes in water availability, quality, and ecosystems over time, ~~contributing to traditional ecological knowledge (TEK), and~~ providing insights beyond the temporal and spatial scope of in-situ measurements (Pauly, 1995; Azevêdo et al., 2022). Furthermore, community participation and traditional ecological knowledge ~~TEK~~ can help decision makers to develop feasible solutions and facilitate tailor-made governance that is accepted and implemented by multiple parties (Mistry and Berardi, 2016; Albagli and Iwama 2022, Richter et al., 2022).

In the Nuestro Rio project we developed an app to engage communities and collect local insights on water quality in Peru's Santa River upper basin, addressing the lack of participatory research in the region's water security studies. Our novel data collection tool helped to provide a voice for social perspectives and knowledge within water quality. Here we present ~~focus on~~ the four key lessons from our approach, specifically the advantages and shortcomings of developing and using technology for this purpose. For full details on the methodology and results of the Nuestro Rio project itself, see Rangecroft et al. (2023). ~~from the Nuestro Rio project, an interdisciplinary and international collaboration that explored local community perspectives on water quality in the glaciated upper basin of the Santa River in Peru. The Santa River is incredibly important for food-water-energywater security, both locally and regionally (Baraer et al., 2012; Recharte et al., 2017), experiencing both water quality and availability issues related to glacier retreat and anthropogenic pressures (e.g. pollution; extraction; water governance) (Magnússon et al., 2020; Aylas-Quispe et al., 2021).~~

2 Methods

The Santa River is important for water security, both locally and regionally (Baraer et al., 2012; Recharte et al., 2017), but experiences both water quality and availability issues related to glacier retreat and anthropogenic pressures such as pollution, extraction and water governance (Magnússon et al., 2020; Aylas-Quispe et al., 2021). During a short pilot project (2021-2022), we used a multi-method approach to collect local insights on water quality, combining an app for user-uploaded photographs

and survey questions, and face-to-face interviews during fieldwork. The Nuestro Rio app was specifically designed to understand local perceptions and identify the drivers of water quality issues. ~~To gather insights on water quality from local communities, we applied a multi-method approach comprising of both an app for uploading pictures and responding to survey questions, and face-to-face interviews. The Nuestro Rio app was itself designed as a mixed methods approach to gather insights into local perceptions of water quality, in addition to identification of perceived water quality issues and their drivers in this region (for more details about the survey see Appendix A).~~ Geolocated photographs of local waters ~~and associated survey data from~~taken by participants were collected through the app. alongside a survey assessing~~.~~ perceptions of water quality and related emotions (see Appendix A). The app was designed in Spanish as the most accessible language for the study region. To aid the launch of the app and~~To~~ to facilitate data collection, in-country researchers also directly communicated with several communities across the upper Santa River basin (Fig. 1). Participants (aged 18+) were invited to engage with the app on tablets ~~provided by the researchers~~ (e.g. ownership of smart devices and advanced technological skills were not required), who offered~~ing~~ guidance, and translation where needed. Semi-structured interviews were also conducted during field visits with communities using the same questions as the app survey (Appendix A). ~~but are not considered in this article (for more information see Rangecroft et al. (2023)).~~ Quantitative data was analysed using descriptive statistics, and qualitative data coded and analysed using an emergent thematic framework to identify key themes (for more information on the methods and results see Rangecroft et al. (2023)). Throughout this research and community engagement process, key lessons were ~~learnt~~ identified, and are shared here ~~which will be shared here~~ as the focus of this insights paper.

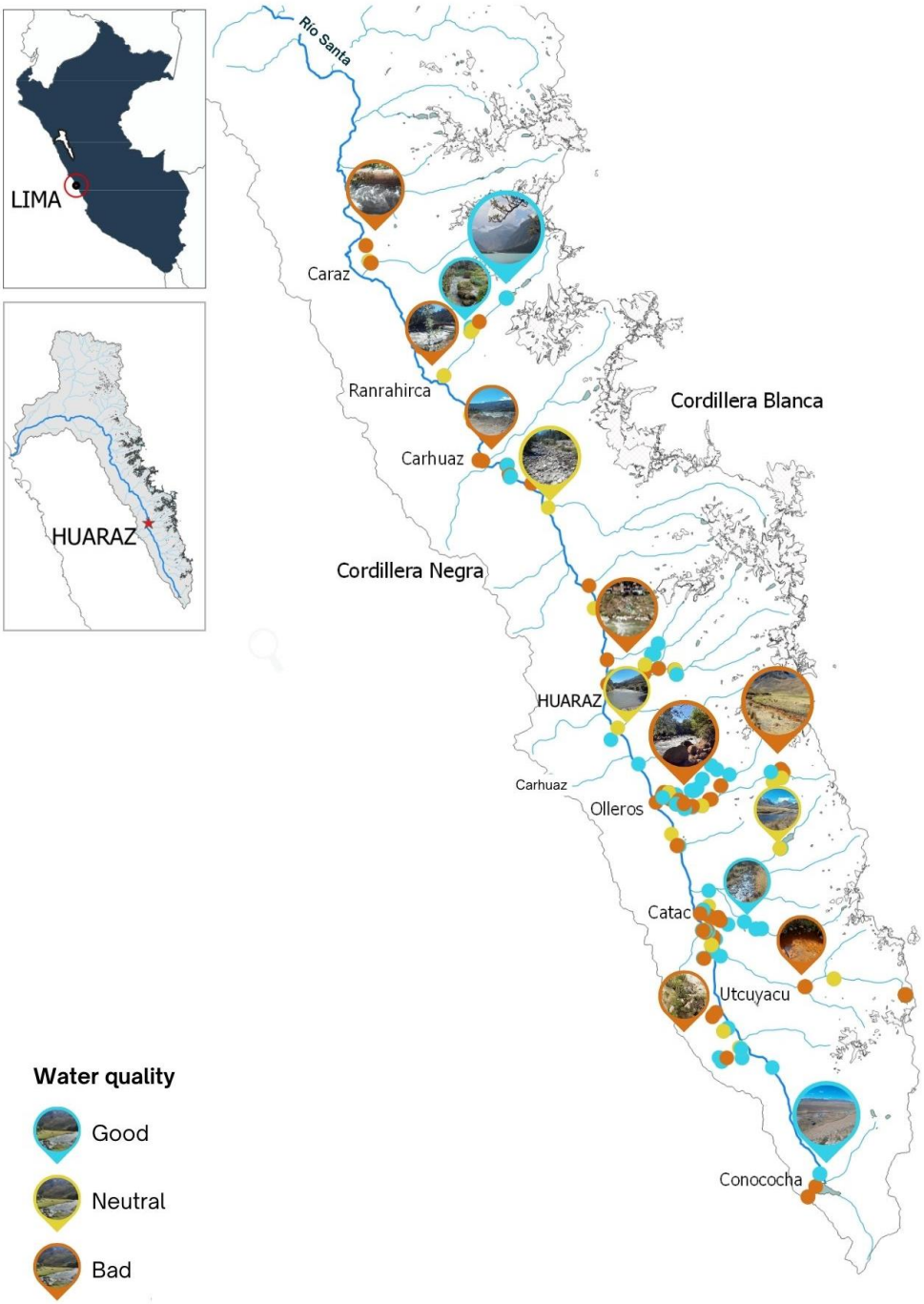

Figure 1: ~~Simplified M~~map of perceived water quality (collected via the Nuestro Rio app) ~~quality~~ across the study area of the upper Santa River basin, Peru. Point~~s outlined by~~ colour ~~to~~ represent~~s~~ the participant-rated water quality (good, neutral, bad), and ~~with~~ example~~s of~~ photos from participants are shown. Note that this figure is simplified to illustrate the project concept, and is not a representation of our full, in-depth research findings.

3. Key lessons

3.1 The importance of in-person engagement

Engaging directly with ~~local~~ participants during fieldwork proved ~~immensely~~ valuable, outweighing financial and time expenditures. This hands-on approach helped avoid~~also mitigated potential~~ research fatigue ~~in the region,~~ by ~~emphasising~~ focusing on the quality rather than the quantity of interactions ~~over their quantity~~. ~~The language used by the app (Spanish) could have been an additional barrier for participants in rural areas where Quechua is the primary language for many people.~~ The ~~significant~~ majority of the 350 data entries ~~collected~~ were the result of direct community engagement in the field. Participant engagement is known to be a challenge for citizen science and participatory data collection (Fraisl et al., 2022), which was~~as~~ reflected in the poor ~~app uptake by those not involved with~~ participation rate outside of the field activities. Direct in-person interactions can address potential obstacles, whether they relate to limited access to, or familiarity with, smart devices (as discussed in section 3.2) or issues of trust. Although the app's use of Spanish potentially posed a barrier in areas where Quechua is the dominant language, our in-field researchers facilitated communication by translating materials to and from Quechua (Rangecroft et al., 2023). Additionally, in-person interactions enabled us to clarify survey questions and research objectives through informal dialogues ~~In-person fieldwork also allowed for informal dialogues with participants, providing clarity on the survey questions or research aims if needed~~ (see section 3.4).

3.2 Challenges of digital (in)accessibility

Considering potential barriers such as device ~~reception~~availability, technological familiarity, ~~lack of access to smartphones, and perceptual challenges~~and limited internet access is critical when introducing an app for data collection in a diverse community setting. ~~There are numerous reasons why individuals might not have utilised the Nuestro Rio app on their personal devices during our study.~~ Originally, we planned in-person training sessions ~~for the app~~, but due to COVID-19~~,~~ we had to transition to training videos and online workshops, which may have limited the potential for recruitment ~~and promotion~~ outside of community-specific fieldwork. This change highlights the importance of designing technology with the target audience's needs in mind, potentially through co-developing apps with participants ~~This suggests that researchers should consider the target audience's comfort with installing and using technologies such as apps, and ideally co-develop apps with participant groups~~ (Daum et al., 2019). Such a participatory process however requires extended research project periods, particularly for complex, transdisciplinary projects such as Nuestro Rio. ~~Deliberate training strategies are also recommended (e.g. online, on-site, handout instructions) (Martin et al., 2021; Fraisl et al., 2022).~~ A ~~considerable~~ large portion of the local population of our study area either lack smartphones or are not tech-savvy, an issue intensified by factors of demographics, ~~and~~ intersectionality and poor reception. ~~The language used by the app (Spanish) could have been an additional barrier for participants in rural areas where Quechua is the primary language for many people.~~ ~~There was also a lack of internet access in rural areas, restricting digital accessibility even for those more familiar with smart devices. Conversely, while urban regions had better connectivity, the app's adoption rate remained low among younger users, potentially due to insufficient engagement incentives.~~ Even in

urban areas with better internet service, we observed low uptake, possibly due to inadequate engagement incentivises. Future research could further disentangle motivations for participation in regions where technology is a limitation, as well as regions where it is not a limitation, while deliberate training strategies are also recommended (e.g. online, on-site, handout instructions) (Martin et al., 2021; Fraisl et al., 2022).

3.3 Need for co-produced knowledge and solutions

Sustainable approaches to water management typically requires understanding how communities perceive and manage their resources, a facet often overlooked in research an engaged community (Dean et al., 2016). However, a critical first step to building this engaged community is to understand how the community perceives their water resources and the management thereof, an issue rarely examined in research (Steinwender et al., 2008; Dean et al., 2016; Okumah et al., 2020). Our work indicated a community desire for engagement and openness to co-design of solutions, in addition to a desire to communicate their perceptions to local and regional decision makers. Local communities are often not included in decision making processes around management of water resources in this region (Dextre et al., 2022), yet actively engaging with communities can be an entry point to inclusive resource management. Furthermore, engaging local people in the decision-making process itself can help to empower individuals and communities to influence water governance processes and also strengthen the acceptance and support for new resource management policies (Okumah et al., 2020; Albagli and Iwama, 2022). The positive reception to our project, particularly from participants familiar with being overlooked in past research, emphasising the importance of incorporating local expertise continuously throughout the research process for genuine global collaboration and ensuring equitable participation, especially in projects involving North-South dynamics. The Nuestro Rio project was well received by participants who were familiar with past research initiatives in the region in which they had often felt neglected. The app provided a vehicle for participants to make their perspectives known and contribute to knowledge generation. In designing and implementing a project, it is vital to think beyond publication of results and one-way dissemination, and to consider continuous, inclusive research efforts. From our work together in designing and sharing results, we have learned how important it is to include local experts at each step for true global collaboration. It is essential to make sure everyone has an equal say, especially in projects between the North and South where power asymmetries can be present. Furthermore, in project design and delivery it is vital that we return the knowledge generated to the participants who helped build it, however this can be extremely challenging in projects with limited funded time.

3.4 Complexity of "water quality" as an environmental concept

The term "water quality" was variously interpreted differently by groups of participants, and often requiredfrequently necessitating clarification during fieldwork-based data collection, especially particularly in rural areassettings. This discrepancy variation might stem from ambiguous communication of research objectives, participants' more pressing concerns, or varying terminologies concerning water across different languages and culturesor different cultural and linguistic understandings of water. For instance, some languages might have specific terms for unique types of water or aspects of water

quality that lack direct translations. This nuanced understanding underscores the importance of face-to-face interactions and the potential for qualitative data methods~~, such as interviews,~~ to bridge the comprehension gap between participants and researchers. Whilst ~~A~~a Quechuan-Spanish translator assisted ~~during~~ field-based data collection to support use of preferred language, ~~however~~ translation was not possible for participants engaging with the app independently. Language and worldview ~~cosmovision~~ are thus other key considerations, given indigenous perceptions of and emotions related to water, in addition to the importance of water beyond its role as a physical resource (Tipa, 2009; Azevêdo et al., 2022).

4. Recommendations for future participatory environmental research

The lessons learned from this project offer important considerations for design of future community engagement for co-production of knowledge and solutions around environmental issues, especially using digital technological approaches. A shift away from heavy reliance on monitoring and modelling data for environmental assessment, and towards a more holistic ~~integrated~~ approach, covering insights from ~~both~~ the natural and the social sciences, ~~for environmental assessment~~ is required for equitable and sustainable resource management (Drenkhan et al., 2023). The Nuestro Rio experience highlighted that while digital methods expand reach, in-person interactions are vital for deep engagement. Collaborative design with local partners from the outset ensures sensitivity to local contexts and enhances community buy-in. ~~Effective design of participatory research can play a crucial role here. Collecting local perceptions through digital technology potentially allows for wider uptake, however experiences from the Nuestro Rio project demonstrate that in-person engagement was essential for maximising participant response. Adapting approaches to different settings requires a deep understanding of the local context, emphasising the importance of familiarising oneself with the local landscape from the initial research design phase.~~ In many contexts, digital-only approaches cannot encapsulate the deeper understanding obtained through participant-researcher dialogue. It is also essential to ~~thoroughly~~ consider and address logistical challenges in data collection.~~ This includes ensuring~~ including accessibility (geographic~~, in terms of location,~~ technologically~~y~~, and linguistic)~~language~~; embedding research and researchers within communities; catering to community needs; and grasping the driving factors~~, or lack thereof,~~ behind participation. Effective communication along the community-research-policy-management continuum requires careful consideration of how data are understood and valued. Researchers must also be mindful of the time required to build trust and co-design research effectively ~~Additionally, it is vital to acknowledge the varied timeframes across research, decision-making, and execution phases. Researchers should recognise the temporal scale required for developing an understanding of place, stakeholder relationships, and building of community trust~~ (Rangecroft et al., 2021). Finally, there is also an important distinction to be considered here between citizen science and participatory research for giving participants *agency* in influencing decision-making (Albagli and Iwama 2022; Illingworth, 2023).

Author contribution:

All authors are part of the Nuestro Rio ~~research~~ project team, and enabled the research ~~to be possible~~ through various contributions. The manuscript was developed from insights discussed in project meetings and conversations related to other project outputs. SR & CC led on manuscript preparation with editing contributions from IR, CK and R~~D~~MD. RMD prepared the manuscript figure.

Competing interests:

The authors declare that they have no conflict of interest.

Ethical statement:

The research was conducted with ethical approval from the University of Plymouth. Considerations of good ethical practice included gaining informed consent for participation, only including participants aged 18 or over, and ensuring the anonymity of data. Other areas of good ethical practice included the dissemination of results and outputs back to involved communities and participants where possible.

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References

Albagli, S. and Iwama, A. Y.: Citizen science and the right to research: building local knowledge of climate change impacts. Humanit Soc Sci Commun 9, 39 doi:10.1057/s41599-022-01040-8, 2022.

Anderson, K. A.: Concerns of Water Scarcity and Water Quality among two Andean Communities in Peru. University of South Florida. Master Thesis. University of South Florida. 2016.

Azevêdo, E. L., lves, R. R. N., Dias, T. L. P., Álvaro, É. L. F., Barbosa, J. E. L. and Molozzi, J.: Perception of the local community: What is their relationship with environmental quality indicators of reservoirs? PLoS One, 17(1): e0261945, doi:10.1371/journal.pone.0261945, 2022.

Aylas-Quispe, A., Campos-Llantoy, A., Perez-Cordova, M., AlvarezMontalván, C. E., and Camargo-Hinostroza, S.: Evaluation of the Quality of Drinking Water and Rivers in the Mantaro Valley, Central Peru, IOP Conf. Ser.: Earth Environ. Sci. 943 012002, 2021.

Baraer, M., Mark, B. G., McKenzie, J. M., Condom, T., Bury, J., Huh, K. I., Portocarrero, C., Gomez, J. and Rathay, S.: Glacier recession and water resources in Peru's Cordillera Blanca. J. Glaciol., 58(207), 134-150, doi:10.3189/2012JoG11J186, 2012.

Clason, C., Rangecroft, S., Owens, P. N., Łokas, E., Baccolo, G., Selmes, N., Beard, D., Kitch, J., Dextre, R. M., Morera, S. and Blake, W.: Contribution of glaciers to water, energy and food security in mountain regions: current perspectives and future priorities, Ann. Glaciol., doi:10.1017/aog.2023.14, 2023.

Daum, T., Buchwald, H., Gerlicher, A. and Birner, R.: Times Have Changed: Using a Pictorial Smartphone App to Collect Time–Use Data in Rural Zambia. Field Methods, 31(1), 3–22, doi:10.1177/1525822X18797303, 2019.

Dean A. J., Fielding K. S. and Newton F. J.: Community Knowledge about Water: Who Has Better Knowledge and Is This Associated with Water-Related Behaviors and Support for Water-Related Policies? PLoS One. 11(7):e0159063, doi:10.1371/journal.pone.0159063. PMID: 27428372; PMCID: PMC4948862, 2016.

Dextre, R. M., Eschenhagen, M. L., Hernandez, M. C., Rangecroft, S., Clason, C., Couldrick, L., and Morera, S.: Payment for ecosystem services in Peru: Assessing the socio-ecological dimension of water services in the upper Santa River basin, Ecosyst. Serv., 56, 101454, doi:10.1016/j.ecoser.2022.101454, 2022.

Drenkhan, F., Buytaert, W., Mackay, J. D., Barrand, N. E., Hannah, D. M. and Huggel, C.: Looking beyond glaciers to understand mountain water security, Nat. Sustain., 6, 130-138, doi:10.1038/s41893-022-00996-4, 2023.

Flotemersch, J. and Aho, K.: Factors influencing perceptions of aquatic ecosystems. AMBIO. 50, 425–435, doi:10.1007/s13280-020-01358-0, 2021.

Fraisl, D., Hager, G., Bedessem, B. et al.: Citizen science in environmental and ecological sciences. Nat. Rev. Methods Primers, 2, 64, doi: 10.1038/s43586-022-00144-4, 2022.

Illingworth, S.: A Spectrum of Geoscience Communication: From Dissemination to Participation, EGUsphere [preprint], doi:10.5194/egusphere-2023-975, 2023, 08 Jun 2023.

Magnússon, R., Cammeraat, E., Lücke, A., Jansen, B., Zimmer, A. and Recharte, J.: Influence of glacial sediments on the chemical quality of surface water in the Ulta valley, Cordillera Blanca, Peru. J. Hydrol., 587: 125027, 2020.

Martin, J., Williamson, D., Łucznik, K., Guy, J. A.: Development of the My Cult-Rural Toolkit. Sustainability. 13(13):7128, doi:10.3390/su13137128, 2021.

Mistry, J. and Berardi, A.: Bridging indigenous and scientific knowledge. Science, 352, 1274–1275, doi:10.1126/science.aaf1160, 2016.

Okumah, M., Yeboah, A. S., and Bonyah, S. K.: What matters most? Stakeholders' perceptions of river water quality. Land Use Policy, 99, 2020.

Pauly, D.: Anecdotes and the shifting baseline syndrome of fisheries. Trends Ecol. Evol., 10:430, doi:10.1016/S0169-5347(00)89171-5, 1995.

Rangecroft, S., Rohse, M., Banks, E. W., Day, R., Di Baldassarre, G., Frommen, T., Hayashi, Y., Höllermann, B., Lebek, K., Mondino, E., Rusca, M., Wens, M. and Van Loon, A. F.: Guiding principles for hydrologists conducting interdisciplinary research and fieldwork with participants, Hydro. Sci. J., 66:2, 214-225, doi: 10.1080/02626667.2020.1852241, 2021.

Rangecroft, S., Dextre, R. M., Richter, I., Grados Bueno, C. V., Kelly, C., Turin, C., Fuentealba, B., Hernandez, M., Morera, S., Martin, J., Guy, A. and Clason, C.: Unravelling and understanding local perceptions of water quality in the Santa basin, Peru, J. Hydrol., vol 625 Part A: 129949, 2023.

Recharte, J., O'Donnell, C. and Castro, E.: Securing Mountain Water and Livelihoods Project, 2014-2017 Final report August 2017, The Mountain Institute. Available online at: https://www.globalwaters.org/sites/default/files/peru-securing-mountain-water-livelihoods-final-report.pdf, 2017.

Richter, I. Roberts, B. R., Sailley S. F., Sullivan, E., Cheung, V. V., Eales, J., Fortnam, M., Jontila, J. B., Maharja, C., Nguyen, T. H., Pahl, S., Praptiwi, R. A., Sugardjito, J., Sumeldan, J. D. C., Syazwan, W. M., Then, A. Y., Austen, M. C.: Building bridges between natural and social science disciplines: a standardized methodology to combine data on ecosystem quality trends. Philos T. R. Soc. B, 377(1854), 20210487, 2022.

Saleem, U., Torabi Haghighi, A., Klöve, B., and Oussalah, M.: Citizen Science Applications for Water Quality Monitoring. A Review, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2024-1170, 2024.

Steinwender, A., Gundacker, C. and Wittmann, K. J.: Objective versus subjective assessments of environmental quality of standing and running waters in a large city. Landsc. Urban Plan., 84(2): 116-126. doi:10.1016/j.landurbplan.2007.07.001, 2008.

Tipa, G.: Exploring Indigenous Understandings of River Dynamics and River Flows: A Case from New Zealand, Environ. Commun., 3(1), 95-120, doi:10.1080/17524030802707818, 2009.

Appendix A: **Nuestro Rio survey**

[Please note that this is the English translation for Appendix 1; the original questions on the Nuestro Rio app were in Spanish]

START

[Participant to take photo of water]

SECTION 1 – About your photograph

Q1: What is this river or stream called? (Do you have any other names for it?) [open text]

Q2. On a scale of (1) "very bad" to (5) "very good", how would you rate the water quality of the river or stream?

1 Very bad
2 Bad
3 OK (Neutral)
4 Good
5 Very good
Don't know

Q3: Why do you think the water quality of the river or stream is like this? There is no right or wrong answer, we just want to hear your opinion. If you are not sure, please just write "I don't know". [open text]

SECTION 2 – Your photograph

What do you feel when you see the water of the river or stream? For each of the following moods, please record how you feel on a scale of (1) Not at all, to (5) Extremely.

Q4. ANGRY?

1. Not at all
2. A little
3. Neither yes, or no (Neutral)
4. Very
5. Extremely
Don't know

Q5. AFRAID?

1. Not at all

2. A little

3. Neither yes, or no (Neutral)

4. Very

5. Extremely

Don’t know

Q6. HAPPY?

1. Not at all

2. A little

3. Neither yes, or no (Neutral)

4. Very

5. Extremely

Don’t know

Q7. SAD?

1. Not at all

2. A little

3. Neither yes, or no (Neutral)

4. Very

5. Extremely

Don’t know

Q8. SURPRISED?

1. Not at all

2. A little

3. Neither yes, or no (Neutral)

4. Very

5. Extremely

Don’t know

SECTION 3 – About you

Q9. Where do you live (name of place)? [open text]

Q10. What is your age? [open text]

Q11. Please indicate your gender: [multiple choice]

Male

Female

Choose not to identify

Other

Q12. What is your MAIN occupation – CHOOSE ONE [multiple choice]

Agriculture/livestock

Teaching

Student

Commerce/business

Public administration (Civil servant)

Mining (or related)

Transport

Household work

Other

Other please specify (Optional) [open text]

END