

Project title:	Towards the co-production of groundwater flood resilience with GRACE
Research Theme:	Built Environment
Key words:	Community engagement, co-production, flood, groundwater, resilience
Supervisory team:	Alice Moncaster (OU), Karen Potter (OU), Jed Ramsey (Bucks Council)

Project Highlights:

- Understanding benefits of community co-production of groundwater flood resilience
- Understanding and evaluating the community response to and impact of technical and social innovations in groundwater management
- A focus on research closely connected with the GRACE partnership and affected communities, as an investigation in a real world context

Overview:

Flooding threatens and can cause considerable disruption to communities and their livelihoods. Climate change models indicate that the frequency and severity of flood events will increase over future decades. Community awareness and involvement in the implementation of flood risk measures is increasingly viewed as being important and efficient in building societal resilience. In England, Risk Management Authorities (RMAs) are now tasked by government with sharing their expertise and engaging with communities to help them understand and prepare for flooding (see the National Flood and Coastal Erosion Risk Management Strategy for England, 2020).

Whilst in the UK groundwater flooding has been experienced less frequently than surface or fluvial flooding, the consequences can be more devastating and extensive than flooding from other sources. Groundwater flooding is uncertain, can suddenly rise across a diffuse and wide area, floods basements, cellars and ground floors of homes and businesses, overwhelms sewage systems, and typically lasts for weeks or months. This results in long term, complex social, environmental and economic impacts, including mental health and wellbeing consequences.

Despite the consequences, groundwater flooding has not been widely recognised as a problem in the UK (or internationally). It therefore remains poorly understood and largely unrecognised by the public, and has seen the lowest levels of investment, action and consideration by RMAs compared to fluvial, surface water or coastal flooding. This raises many challenges for authorities supporting affected communities to better prepare and respond to flooding and make urban areas more resilient.

Groundwater flooding has also received less attention to date in the peer-reviewed scientific literature. While scholars have recently started to describe and evaluate co-production in broader flood risk governance, the wider societal consequences of groundwater flooding and the implications of a co-produced response to groundwater flooding remain so far under-researched.

This PhD project will be linked to 'GRACE' (Groundwater Resilience & Community Engagement), a six year (2021-2027) project led by Buckinghamshire County Council and funded by the Environment Agency and Defra. The project is largely based across the Chiltern Hills and Berkshire Downs, an area of unconfined chalk aquifers where the impact of groundwater flooding is common and severe. GRACE aims to transform how flooding from groundwater is managed and mitigated, through the development, trial, implementation and evaluation of innovative methods and activities to improve resilience. These include capturing community knowledge to refine locations for monitoring and modelling, and developing innovative measures for natural flood management (NFM), early warning systems (including via an app) and property resilience. These measures are being co-produced with local communities

working alongside technical experts. The PhD project will closely align with the GRACE programme. There may also be the potential to develop comparative case studies with other linked Defra-funded groundwater projects in other areas.

The research project is envisaged to straddle between the real world of community flood resilience, and building a contribution to academic knowledge which seeks to interpret, and create awareness and further understanding of co-produced groundwater resilience. The supervisors represent these contexts, having practitioner backgrounds across engineering, planning and stakeholder engagement, as well as interdisciplinary academic expertise in urban flood resilience and governance, improving sustainability and inclusivity in the built environment and flood infrastructure, and improved decision making for effective innovation.

Methodology

There is flexibility in both approach and focus, depending on the applicant's interests and skills. The project is currently envisaged as a form of engaged research, in close collaboration with the GRACE partnership, stakeholders and affected communities throughout the PhD project. A specialised area of interest could be developed around one or more of the innovations planned by GRACE, for example, groundwater flood alert systems, property level flood resilience (retrofit for flooding), or natural flood management (through nature-based solutions, NBS). Or the specialised area of interest could be the wider phenomenon of co-production in groundwater flood resilience, drawing insights from broader community based, flood risk governance research and academic knowledge. The research is expected to include qualitative methods such as semi-structured interviewing, focus groups, participant observation and document analysis, and potentially technical evaluation of specific flood resilience measures.

Partners and collaboration:

The project will be based within the [Built Environment group](#) at the Open University, within the School of Engineering and Innovation, and will be linked with the [GRACE project](#) led by Buckinghamshire County Council. The successful student will have the opportunity to make an important contribution to this nationally recognised Defra/EA funded project and to co-author high impact articles and reports.

Further reading:

-Fitton, S.L. & Moncaster, A. M. (2019) 'Arguments for a co-production approach to community flood

protection', *Proc. of the Institution of Civil Engineers. Engineering sustainability*, 172(7), pp. 335–344.

-Morris, S.E ; Cobby, D. ; Zaidman, M. & Fisher, K. (2018) 'Modelling and mapping groundwater flooding at the ground surface in Chalk catchments', *Journal of flood risk management*, 11, pp. S251–S268.

-Ntontis, E., Dury, J., Amlot, R. Rubin, G. G. & Williams, R. (2019) 'Community resilience and flooding in UK guidance: A critical review of concepts, definitions, and their implications', *Journal of contingencies and crisis management*, 27(1), pp. 2–13.

Potter, K. & Vilcan, T. (2020) 'Managing urban flood resilience through the English planning system: Insights from the 'SuDS-face'', *Philos. Trans. R. Soc. Series A: Mathematical, physical, and engineering sciences*, 378(2168), pp.1-18.

Further details:

Applicants should have a strong academic background, usually including a masters degree with a substantial research element passed at a high grade. They should also have an interest in any of community engagement, flood risk resilience, urban planning or building retrofit, an aptitude to learn, excellent written and spoken communication skills, and enthusiasm for real world research.

We invite you to contact Dr Alice Moncaster (alice.moncaster@open.ac.uk) or Dr Karen Potter (karen.potter@open.ac.uk) for further information and to discuss your application before submission.

Applications should include:

- A 1000 word cover letter outlining why the project is of interest to you and how your skills match those required
- an academic CV containing contact details of three academic references
- an Open University application form, downloadable from: <http://www.open.ac.uk/students/research/sites/www.open.ac.uk.students.research/files/documents/Application%20form.docx>
- IELTS (International English Language Testing System) scores where English is an additional language

Applications should be sent to

STEM-EI-Research@open.ac.uk by 04/03/2022

