**Irina Rohrmueller**

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**Bio**

My interest in hydrology and computational modelling started whilst studying for a BSc in ‘Water Resource Management’. After completing my degree, I worked for an engineering consultancy in Germany developing hydrological models, and subsequently completed an MSc in Hydrology and Water Management at Newcastle University, specialising in hydrological and hydraulic modelling in the context of hydro-informatic systems. I then worked for an engineering consultancy in the UK, focusing on statistical analysis of river flood records and calculation of flood-frequency behaviours for catchments across the UK and Ireland, before starting my PhD as part of the ONE Planet Doctoral Training Partnership.

**Research Question**

The research for my PhD lies in the intersection between computational hydrology, water risk modelling and climate change.

Observations show that climate change has increased the frequency and severity of extreme weather events around the globe. While droughts are becoming more severe, flooding now appears to affect many regions of the world with increasing frequency. Broad scale flood modelling is a growing discipline with applications in insurance, adaptation and emergency response. This has been fuelled by increasing computational power and the availability of continental and global scale gridded datasets providing inputs to a mounting array of models. However, outputs often differ and validation is challenging. One of the advantages of physically based models compared to other types of hydrological model is their ability to provide a closer representation of physical processes occurring in catchments. This means that they are theoretically more robust for simulations under non-stationary conditions, such as climate and land use change. Furthermore, ungauged catchments can be simulated, which presents a challenge to conceptual models as it is often difficult to specify all of the required parameters for direct calibration.

This research will therefore develop a global physically-based system for water risk analysis. The aims of this project are to:

1. Adapt SHETRAN, a physically-based hydrological model, for deployment on a cloud computing platform such as Azure.
2. Improve automated validation in areas with limited, or no, flow gauge data through use of alternative data sources, including data from citizen scientists, and remotely sensed observations to derive river flows.
3. Test a range of global and national climate and hydrological datasets to assess their suitability for global scale analysis.

**Supervisors**

* Richard Dawson, School of Engineering, Newcastle University
* Elizabeth Lewis, School of Engineering, Newcastle University
* Ben Brock, Department of Geography and Environmental Sciences, Northumbria University