



# Integrating urban flood modelling & social vulnerability at the local scale: GIS-based Flood Risk Assessment Tool

## FRMRC2 has produced:

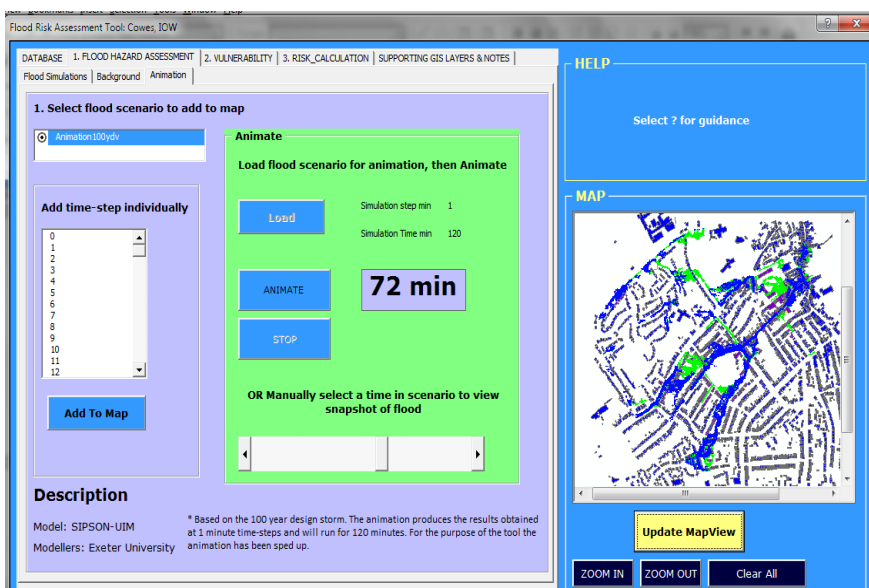
- Literature review on defining and mapping societal vulnerability and resilience
- Proof of concept report outlining the construction of a GIS-based flood risk assessment tool, tailored for and trialled with flood incident management emergency professionals

## Intended readership:

- Environment Agency and other operating authorities
- Consultants and researchers

## Summary

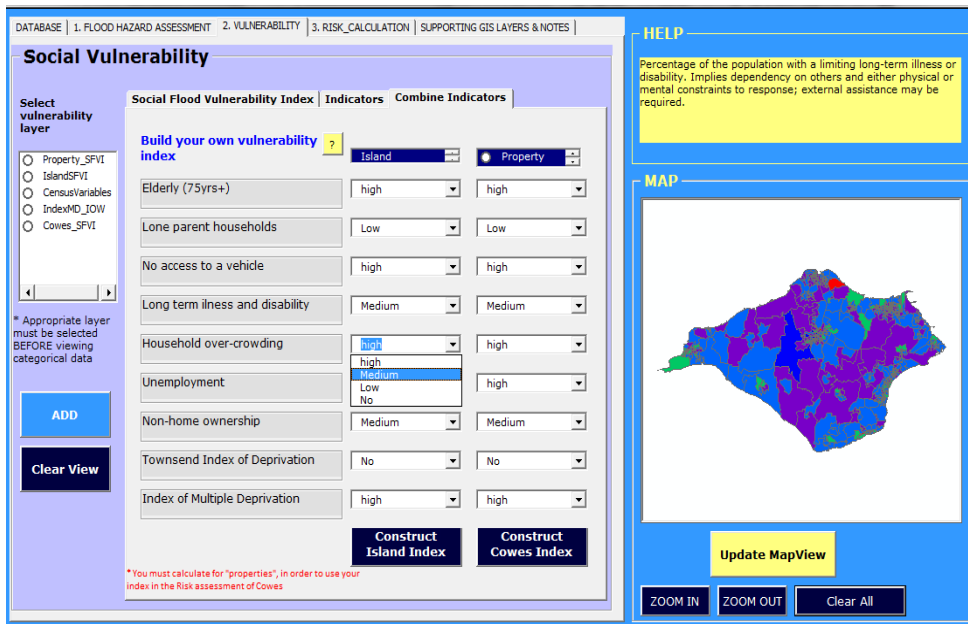
Flood incident management (FIM) in the UK employs a risk-based approach to manage the impact and likely consequences of flooding through a cycle of preparation, response and recovery. Mapping has become the cornerstone to this process as it visualises the spatial relationships between hazard (H) and vulnerability (V), and resulting risk. This research aimed to centralise both spatial hazard model results and mapped social vulnerability assessments in a GIS-based tool to facilitate local-scale risk profiling. The tool was not designed to roll-out in practice, but rather to inspire some practical recommendations for improving the visualisation of both the hazard and social vulnerability in future real-life risk applications. It was trialled in two socially contrasting locations: Keighley, West Yorkshire and Cowes, Isle of Wight. The tool was fine-tuned on the basis of preliminary interviews with emergency professionals (e.g. blue light services, emergency planning and the Environment Agency). After modifications, the completed product was demonstrated to these same local stakeholders.



For the hazard face H, we utilised 1D-2D urban flood models developed for two study areas (Figure 1).

Options to animate and interact with flood inundation modelling rated highly on the end-users 'wish list' and professionals commented on the application-potential of this feature for exercising / training, planning and responding to flood events.

**Figure 1:** The Hazard Face of the tool, whereby the user can launch an interactive animation of flood inundation.



**Figure 2:** The Vulnerability Face of the tool, whereby the user can create their own vulnerability index and weight each indicator according to its relative importance in decision making.

We then integrated these model outputs with metrics of social vulnerability (V) (Figure 2).

Stakeholders liked the vulnerability indicators, especially the ability to ‘build their own’ vulnerability index, and to weight the relative importance of each indicator themselves.

They found this face to be potentially valuable in planning and targeting future mitigation strategies.

**RECOMMENDATIONS:** Future vulnerability assessment needs to be malleable and flexible to the broad base of FIM practitioners, with varied demands, responsibilities and professional constraints. Interactive assessments and map-making is a powerful tool for not only communicating science at the professional interface, but integrating professional knowledge and supporting the increasing demands on FIM in the UK.

## Other sources of information

Alexander, M., Faulkner, H., Viavattene, C. And Priest, S. (2011) A GIS-based Flood Risk Assessment Tool; **Supporting Flood Incident Management at the local scale. Proof of concept report, FRMRC2.**

## Research Team

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- United Kingdom Water Industry Research
- Office of Public Works Dublin
- Northern Ireland Rivers Agency

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