

Managing Pluvial (Rain-Related) Flood Risk

Supervisors: Prof Nigel Wright and Dr Rizwan Nawaz

Overview:

The aim of this research is to investigate the effectiveness of a range of urban planning initiatives in helping to reduce urban flood risk. There will be a particular focus on the effectiveness of 'green' and 'blue' space such as roof gardens and storage areas. In many cities across the world, the most common source of flooding occurs as a result of river overtopping (fluvial flooding). As cities continue to expand, another form of flooding which is less well known is becoming more widespread. These events, termed pluvial flooding, result from excess water in the aftermath of short, intense downpours which the drainage systems cannot cope with and which cannot infiltrate into the ground.

Pluvial floods often occur with little warning in areas not prone to flooding. In the UK, it is estimated that 2 million people in urban areas are at risk from pluvial flooding. By 2050, this figure is expected to rise to 3.2 million.

Despite pluvial flooding moving up the policy agenda in recent years, important gaps in knowledge remain – in particular, the impact that climate change is likely to have on the extent and pattern of flooding (as a result of changes in extreme rainfall), and the effectiveness of green and blue spaces in helping to reduce flooding.

In conducting this research, the student will be expected to focus on three key areas:

- Review the mechanisms for pluvial flooding during several notable events both in the UK and overseas. It will be useful to investigate why some cities are particularly vulnerable to flooding whereas others cope well under similar rainfall conditions.
- Review developments in extreme rainfall forecasting to enable effective flood warnings.
- Identify the strengths and weaknesses of a range of urban planning initiatives that can help reduce flooding. There will be a particular emphasis on the role of 'green' and 'blue' spaces such as roof gardens and storage areas.

Investigation into the above will enable development of a GIS-based pluvial flood model that would be able to run in both design and forecasting modes. Issues to consider in model development will include the scale, available data and validation. The research will be based around case study regions in the UK and overseas and findings will help to inform policy.

Supervision

The student will benefit from an interdisciplinary team of supervisors. Prof Nigel Wright is Director of Research in the Department of Civil Engineering with over 25 years experience in modelling fluid flow in the built and natural environment. Particular applications are inundation prediction, vulnerability assessment, river flows and low-head hydropower. Dr Nawaz is a Research Co-ordinator with water@leeds, a cross-faculty research centre with 100 personnel involved in or associated with water research. The proposed research will build on previous work on urban flooding carried out by Dr Nawaz. See: <http://news.bbc.co.uk/1/hi/england/7494420.stm>.

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