CRC for
Water Sensitive Cities

Program B: Water Sensitive Urbanism | Project B4.2 | Project duration: August 2012 – August 2017

Social-technical flood resilience in water sensitive cities – Adaptations across spatial and temporal scales

Overview

In recent years the prolonged drought in Australia has been interrupted by heavy rainfall causing flooding in many urban and rural areas. Rules for responding and adapting to changing flood and drought risks, in an integrated fashion, are still evolving. Cycles of floods and droughts, for example in Europe, have prompted the development of new approaches for adaptation in the last few years on which this project is partially based. The project will further develop existing Dutch and other European flood risk management practices and adapt them to an Australian context.

The project aims to improve adaptation-related decision-making to focus expenditure on greatest return on investment to deliver robust infrastructure and achieve a community resilient to flooding and other risks.

Key outcomes

This project brings together a number of European approaches of embedding flood resilience into planning and will further develop the science and techniques required to integrate flood resilience into urban development processes.

The project will deliver guidance for urban planners, designers and policy-makers on how to achieve resilient social and technical adaptation to changing flood risks in the most cost-effective and efficient way. The implementation of the developed guidance will be demonstrated and tested in case studies in Australia, the Netherlands and Vietnam. It will build capacity in decision-makers to utilise the developed and enhanced methods and to inform policy-making in the regulatory process.

Early insights into flood risk management approaches

A case study on the management of flood risk in Can Tho, Vietnam, has provided initial insights into tolerable risk levels and available responses. These insights have been obtained through a literature review, stakeholder consultation and flood modelling.

- The community in Can Tho has a relatively high acceptance of flood with low depths. Flood depths of less than 20 centimetres (for about 1 hour duration) are acceptable to 90% of households. Yet, flood depths between 20 and 50 centimetres are acceptable to only 11% of households.
- 72% of the households have raised their floor levels to prevent floodwater from entering the houses. It has been found that the cost of raising floor levels beyond 50 centimetres is almost five times higher than the cost of raising floor levels up to 50 centimetres, as major structural adjustments are required such as raising of doors, windows and roofs.
- Four out of 270 hectares (1.5%) are expected to be inundated above 20 centimetres under the current design rainfall. The inundated area will double with a 30% increase in rainfall intensity. These modelling results reveal that an adaptation tipping point is reached already for the current situation, because the tolerable risk level is likely to be compromised.
- The tipping point analysis gives insight into the earliest date when the current strategy is no longer effective. This will help stakeholders decide on the selection of adaptation options and the timing of implementation of these options.

Figure 1. Raised floor levels in Can Tho, Vietnam (© UNESCO-IHE)

An Australian Government Initiative

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Project design

There are two key components being used in this research project: the Adaptation Tipping Point (ATP) method and the Real-In-Options (RIO) accounting tool. Both will be further developed for Australian application through literature review, analysis and stakeholder interviews and workshops.

A tipping point occurs when a system or a service reaches a point, where it no longer delivers the expected performance, for example, when the flow in a stormwater system exceeds the hydraulic capacity. Analysis of performance to define tipping points is in its infancy and this project will allow the approach to be developed beyond the standard application in climate change and hydraulic capacity to include the three domains of flood risk management: day-to-day challenges, technical standards and events that exceed the maximum capacity of infrastructure.

Real-In-Options (RIO) is a recognised procedure to handle uncertainties in infrastructure investments by providing physical choices about a system and more management flexibility in choosing the most effective option to maintain expected performance. Further developing RIO in this context would mean, firstly, to decide when, where and how best to adapt to comply with the technical standards for flood risk, and then to address day-to-day challenges and events that exceed the maximum capacity of infrastructure.

Outlook

While focusing on cultivating flood resilience in the most cost-effective and efficient way, this project will also take a closer look at water stress and associated critical urban infrastructure in the approaches developed. It will be essential to work with practitioners such as Melbourne Water and state and national planning agencies to assess these approaches and facilitate the take-up of the novel tools and outputs, which include:

- prototype software tool for an enhanced ATP method
- prototype RIO accounting tool with a user guide
- recommendations for the application of the enhanced ATP method and RIO accounting tool for flood risk management in Australian cities
- a set of policy recommendations for enhancing social and technical flood resilience in Australian urban systems.

About the Cooperative Research Centre for Water Sensitive Cities

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) brings together interdisciplinary research expertise and thought-leadership from Australia and the world to address current urban water management challenges facing our cities and regions. In collaboration with over 80 research, government and industry partners, it develops and synthesises knowledge into powerful tools and influences key players aiming to achieve sustainable, resilient and liveable water sensitive cities.

Further information

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