Editorial

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It is now recognised that many economies, both local and national, have to become more climate resilient. Extreme climate impacts pose an ever-growing risk to lives and livelihoods, and in the global economy the footprint of these losses is growing larger and spreading faster than ever before.

The 2015 House of Commons *Commission of Inquiry into Flood Resilience of the Future* highlighted the challenge of dealing with increasingly frequent and severe floods, stating

In short, what is required is a fundamental change in how we view flood management, from flood defence where we protect ourselves to one of resilience, living with and making space for water and the opportunity to get ‘more from less’ by seeing all forms of water as providing multiple benefits. (APPG for Excellence in the Built Environment, 2015: p. 32)

Although this view was based on the UK’s recent experience, it is equally applicable to many developed and emerging economies.

In response, it is now widely recognised that the most significant contribution to risk reduction will stem from a whole-system approach to adaptation. This moves the focus away to getting new developments right to also improving the resilience of existing developments. The multiple benefits that come from green infrastructure and the wider sustainable drainage toolbox are seen as being a key part of that cultural shift.

It is within that context that this special edition of *Water Management* has been published. Each paper has been carefully selected to ensure this volume reflects the state-of-the-art in the green infrastructure field in terms of both the breadth and depth of the knowledge.

The edition begins with a thorough examination of the benefits of green infrastructure and the presentation of a framework that can be used to evaluate them. This approach from Ashley *et al.* (2018) uses benefits ranging from air quality improvements to biodiversity and amenity to show how their

consideration can be used to optimise the design process. The focus here is to move beyond simple water management criteria and on to optimise the wider benefits.

The second paper in the volume is from Alsubih *et al.* (2018) and focusses on the experimental evaluation of one of the most widely deployed sustainable drainage devices – permeable paving. The paper uses innovative methods to quantify how gradual clogging of these systems can degrade performance.

The third paper in the edition also deals with benefit estimation. Here Sonnenwald *et al.* (2018) use computation fluid dynamics to consider the movement of water through vegetated stormwater ponds and confirm that the current design guidance appears to be sufficient for producing functional stormwater treatment ponds and wetlands.

A significant challenge when retrofitting green infrastructure to urban areas is their footprint. The paper from Berretta *et al.* (2018) considers biofiltration systems that are considered to have significant retrofit potential where space is limited as, like permeable paving, water flow is vertical so leads to a relatively compact footprint. They find that a biofilter occupying only 3% of the impermeable catchment area would be capable of infiltrating 97% of annual rainfall typically experienced in central England.

The penultimate paper in the volume considers how non-academics use green infrastructure research. Academics should consider this paper from Sinnett *et al.* (2018) seriously as it provides useful insights into how those working in green infrastructure can work collaboratively to ensure research findings are relevant and usable.

While I hope there is plenty in the first five papers to encourage readers to consider more fully the multiple benefits that green infrastructure can provide, the final paper comprises a case study to fully illustrate the potential. Gunasekara *et al.* (2018) present their North West Bicester case study to show how a site, comprising almost 400 homes, will deliver natural

capital benefits of over £307 000 per year from the proposed green infrastructure – around £750 per household. This, together with the other papers in this volume, highlights the benefits of green infrastructure.

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