Editorial

Geoff Darch BSc(Hons), MSc, PhD, CSci, CWEM, MCIWEM,
FRMetS, FRGS
Editorial Advisory Panel member, UK

In the first paper of the second part of this themed issue on sustainable adaptation (see Darch, 2017), we continue our journey on railways, moving from a framework for the network to the specific issue of bridge scour. Scour is the primary cause of bridge failure in the UK and worldwide, and damage or loss of these integral structures has obvious safety risks as well as the potential for long-term disruption. Dikanski *et al.* (2017) develop a model that links climate change to bridge scour risk, using a series of data analysis and modelling steps. Risks increase in future but scour models are currently only used for the prioritisation of vulnerable sites. This is an essential early step, but as the authors note, the assessment of absolute risk will ultimately be required to support adaptation.

Dikanski *et al.* also identify a number of barriers to sustainable adaptation, including the inability to rely on historical weather events to estimate probabilities, use of historically-informed standards, and data quality issues. As noted, these issues have much wider applicability, along with others beyond the technical assessment of risk, including economic assessment and social preferences.

Another critical infrastructure is buildings. Low- and zero-carbon dioxide buildings have received significant attention, but it is equally important that new and existing buildings can cope with future weather. Flooding events have highlighted the vulnerability of buildings, streets and even whole districts to climate change. Buildings are also susceptible to overheating and designers must balance adaptation and mitigation needs in producing comfortable, efficient and affordable spaces.

Kinnane *et al.* (2017) focus on housing design and provide a detailed case study of a real, occupied, low-carbon dioxide adaptable home. The paper illustrates the future challenges associated with overheating, and different techniques for reducing this. It is clear that the way we use our homes, and preferences regarding thermal comfort, will have significant effects on building performance. Kinnane *et al.* conclude with an important point that we need to design for adaptability, allowing buildings to respond to both a changing climate and changing occupant needs.

In the final paper of this themed issue, we journey overseas, where adaptation is often intertwined with development, both of

infrastructure and adaptive capacity. Community-based adaptation (e.g. see Ensor *et al.* (2014)) has emerged as an approach to adaptation in which communities are at the centre of understanding climate change impacts and drive the adaptation process.

Mulligan *et al.* (2017) consider responses to flooding in Kibera, the largest informal settlement in Nairobi, Kenya. As population and urbanisation increase, informal settlements are rapidly growing; home to millions of urban poor they are typically located in vulnerable areas such as river floodplains. Mulligan *et al.* use surveys of almost a thousand households to assess vulnerability and adaptation. They consider the meaning of sustainable adaptation in the local context, adding two extra dimensions to conventional approaches suggested by Brown (2011): that measures should reduce poverty and/or vulnerability; that actions are sustainable in the long-term and do not undermine resilience. Insecure tenure was found to disincentivise household adaptation, whilst public-policy approaches are constrained by lack of effective community engagement. Mulligan *et al.* put forward a case for community-responsive adaptation that combines autonomous and local physical measures with market-based adaptation such as savings and loan groups, the latter being a rare example of a current sustainable measure.

The set of papers in this themed issue has illustrated critical components of the sustainable adaptation journey, including new science, innovative modelling approaches, better governance and integrated planning. However, to use an analogy from physics, there is a lot of 'potential energy' that needs to be converted into the 'kinetic energy' of action; let's make the next themed issue on sustainable adaptation about delivery.

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