Editorial

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Over recent years, hurricanes, tsunamis and storm surges have caused untold damage in many countries around the world. The scale and power of the larger events mean that some damage is unavoidable, if we wish to occupy land close to the coast. However, by improving our understanding of how, when and where these events are likely to occur, we can be more proactive in how we seek to minimise the damage. For example, the 5-day forecasts for the recent hurricane Sandy allowed the emergency services in New York to be far better prepared than they otherwise would have been. So the importance of understanding the source of these events is clear and the scientific community continues to improve the skill of such forecasts.

As engineers, we tend to be more involved in trying to understand the pathways. Once the storm or tsunami wave hits the shore what will it do, where will it go? We may also be interested in the subsequent consequences. What does the wave hit, what are the impacts, what is the damage? These can be wide ranging and the receptors might be buildings, infrastructure, people or important habitats depending on the circumstances.

The significance of the impacts is typically measured in terms of financial losses. However, there is an emerging awareness of some complex interactions with the social dimension. This takes many forms and is difficult to disentangle from the myriad of other influences on human society. Before an event, it may be difficult to raise awareness – leading to the view that each generation needs to experience such events for the ‘reality’ of the risk to be maintained.

During an event, responses can vary reflecting degrees of trust in the information being issued, individual awareness of the risk and capacity to respond (especially for the more vulnerable members of society). Responses can also be dependent on how different aspects of infrastructure perform (or do not perform) during the event and what individuals expect the infrastructure to be capable of (stop the water, provide electricity whatever the weather and so on). The increasing complexity of our urban environments means that this is becoming an ever more difficult issue to manage (Engineering the Future, 2011). An illustration of this is the way that corporate computing was impacted during the recent floods in New York because many of the computer servers were located in the basements of the office blocks – a cool environment until there is a flood.

Finally, there is a range of post-event responses, from developing new forms of protection, through reinstating the status quo to (occasionally) abandonment. However, there is also emerging evidence of significant mental health impacts (Defra, 2012), which should perhaps be given greater attention when considering how these risks are managed, so that our social as well as infrastructure systems are more resilient.

For individual projects, we may only need to consider specific aspects of the sources, pathways and receptors, but for strategic planning and thinking about how we develop better system resilience, the source–pathway–receptor concept provides a useful scalable view of the system. It also provides a framework for consistently assessing the implications of future climate change projections (Thorne *et al.*, 2007). Recent events make clear that there is still much to do, both for practitioners but also in terms of focusing the research agenda on many of these issues (Townend and Rogers, 2011).

The papers in this issue deal with specific aspects of the design process that are constituents of the source–pathway–receptor view, and reflect the conditions found in different parts of the world. So we start with how to derive the loading conditions, follow that with representing complex tsunami wave conditions in a physical model to look at loadings on buildings and conclude with a review of existing breakwater crown wall design methods. The first paper, by Banton and Dowding (2013), reviews the many approaches that have been used to sample and predict extreme conditions in the Caribbean. The occurrence and tracking of hurricanes in the Caribbean make the prediction of extreme design conditions a statistically complex problem. This paper reviews a number of possible methods using historical hurricane data and Monte Carlo simulation techniques as the input to a number of different storm surge models. These are then evaluated in terms of their suitability for the task.

The second paper also considers the nature of waves impacting on the shoreline. Chinnarasri *et al.* (2013) present a physical modelling approach that reproduces the propagation of a tsunami wave. This is then used to examine the impact loading on buildings close to the shore. The authors characterise the resulting bore in terms of velocity for a given maximum flow depth and present a useful summary of the vertical loading profile on a building a short distance back from the shoreline.

The final paper, by Negro *et al.* (2013), again concerns wave loading, this time on the crest or crown wall of a breakwater. In this case, extreme wind-wave loading is considered and a number of currently available design methods are briefly summarised before being tested against selected data sets as a basis for a critical review of the different methods. This provides some valuable insights for the design engineer, highlighting as it does some of the strengths and weaknesses of the methods presented. For the researcher it points to areas that would benefit from further research.

Looking forward, we have a themed issue in preparation on coastal and estuary morphology. ICE Publishing have also introduced 'Ahead of Print' publication. This means that as soon as papers are ready to be published they will be given a digital object identifier (doi) and will be made available online through the journal web site. Publication in the printed journal will then follow as and when space allows. For those in academia, it is also worth noting that RCUK's requirement for Open Access (OA) publishing is actually exceeded by ICE Publishing's Green OA policy (which has no 6-month embargo on it). If you would like further details of the policy they can be found on the ICE Virtual Library at: <http://www.icevirtuallibrary.com/upload/openaccesspolicy.pdf>.

To discuss proposals for individual papers or collections please contact the editorial coordinator: Craig Schaper (tel.: +44 207 665 2240; e-mail: craig.schaper@ice.org.uk).

REFERENCES

- Banton JD and Dowding DD (2013) Caribbean storm surge mapping – an overview towards guidelines. *Proceedings of the Institution of Civil Engineers – Maritime Engineering* **166(1)**: 3–13, <http://dx.doi.org/10.1680/maen.2011.17>.
- Chinnarasri C, Thanasisathit N, Ruangrassamee A, Weesakul S and Lukkunaprasit P (2013) The impact of tsunami-induced bores on buildings. *Proceedings of the Institution of Civil Engineers – Maritime Engineering* **166(1)**: 14–24, <http://dx.doi.org/10.1680/maen.2010.31>.
- Defra (Department for Environment, Food and Rural Affairs) (2012) *UK Climate Change Risk Assessment*. The Stationery Office, London, UK. See <http://www.defra.gov.uk/environment/climate/government/risk-assessment/> (accessed 17/01/2013).
- Engineering the Future (2011) *Infrastructure, Engineering and Climate Change Adaptation – Ensuring Services in an Uncertain Future*. The Royal Academy of Engineering, London, UK.
- Negro V, Santos J and Polvorinos JI (2013) Comparative study of breakwater crown wall – calculation methods. *Proceedings of the Institution of Civil Engineers – Maritime Engineering* **166(1)**: 25–41, <http://dx.doi.org/10.1680/maen.2010.29>.
- Thorne CR, Evans EP and Penning-Rowsell EC (eds) (2007) *Future Flood and Coastal Erosion Risks*. Thomas Telford, London, UK.
- Townend IH and Rogers CDF (2011) Civil engineering research – time for a more radical approach. *Proceedings of the Institution of Civil Engineers – Civil Engineering* **164(4)**: 150.