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Editorial

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This issue of *Municipal Engineer* is the second in a pair of themed issues that deal with the management of disasters and ways of responding to disaster. The 'theme of the theme', as it were, is the need to 'build first time better' and to 'build back better' after a disaster. We begin with two papers that consider resilience at the outset and, secondly, replacing infrastructure after a disaster with other infrastructure that is fit-for-purpose. This is followed by two papers with the theme more specifically related to transport; firstly, relating to land management practices that may have an even greater impact on level of risk for road schemes than climate change, and secondly, relating to the use of transport networks for escape from disaster situations. The final paper deals with the critically important issue of community engagement in the reconstruction process in the especially challenging environment where a disaster has occurred after a long war.

Gallagher and Cruickshank (2016) recognise that climate change is leading to more extreme events and that the least resilient communities and infrastructure are those in the developing world. They discuss resilience theory in this context and develop a framework based on planning with system complexity, adaptive capacity and equitable governance in mind. They provide a case study example of a vulnerable coastal community in Honduras and reveal unintended consequences of usual approaches to planning that in fact exacerbate vulnerability to climate change. The better understanding offered by resilience thinking in infrastructure planning is an approach that civil engineering practitioners and scholars ought to be adopting, they suggest.

Fitzmaurice (2016) discusses the same theme of infrastructure planning in the context principally of the developing world, but rather from the perspective of ensuring that, after a disaster, replacement infrastructure is fit-for-purpose, and hence is superior to the predecessor infrastructure. He describes the difference between immediate emergency relief and long-term recovery plans as a 'development gap' and uses post-tsunami Banda Aceh in Indonesia, and post-earthquake Haiti, Nepal and Christchurch, New Zealand as case studies.

Hearn (2016) deals with a more specific issue – the management of roads in relation to the risks posed by climate change as well as the risk of land management practices. Transport infrastructure, by its very nature of carving an engineered line through a landscape, is prone to the effects of natural hazards over a wide area. Hearn suggests that the risks posed by flooding and the geotechnical issues that are a consequence of this, such as landslides, are increasing in Asia and Africa and there is a requirement to better understand the relation between geology, climate change and land use change. Using a case study in Ethiopia, he suggests that risks posed by geo-hazard uncertainty and design deficiencies may be more important to understand and control than simply proofing infrastructure against future climate change. These risks are the result of inappropriate land use change and land management practices.

When a disaster happens there may be an immediate requirement to evacuate an area of people. To be effective, evacuation plans need to be determined before an event occurs and Coutinho-Rodrigues *et al.* (2016) deal with this issue for areas that have a high population density and have infrastructure that is constrained. They present an approach based on movement to safe areas, which accounts for the numbers involved, the relative location of facilities, and the routeing algorithms required to complete the translation of people to safe havens in an efficient and effective way.

Sadiqi *et al.* (2016) deal with issues where communities that have been subject to war are then also subject to natural disaster. The challenges of long-term reconstruction are magnified by an additional lack of disaster readiness. In the context of Afghanistan, they identify factors derived from principal component analysis of questionnaire responses concerning lack of community participation in reconstruction projects and these components include: opaque reconstruction processes; the sponsor's desire for hasty reconstruction; low community capacity and commitment; gender issues; lack of non-governmental organisation competency; community-inherent difficulties and weaknesses; slow land acquisition; and government policies and practices.

Taken as a whole, the papers demonstrate the great complexity surrounding disaster management: whether it is the complexity of the risks from not only natural environment forces but also anthropogenic decisions about land management; whether it is the complexity of short-term and immediate relief compared with long-term and more complete solutions; or whether it is

the complexity of decision making and management involving not only those with the skills to assist but also those who are most affected. We hope you find many matters of great interest in these papers, whatever your more specific interests are in disaster management.

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