

Editorial

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Water in all its forms has many implications for society and civil infrastructure. A core function of all buildings is to keep their occupants and contents dry. Infrastructure such as roads, tunnels and airports must prevent the accumulation of water to perform as intended, and drainage in the urban environment is a constant challenge. For some structures, such as dams, river walls or coastal defences, their only purpose is to protect other assets from water damage.

Water can impart relatively large loads onto a structure, and is therefore often the cause, or contributory factor, of failure in buildings and infrastructure. This is true for obvious cases such as flooding or wave damage to a coastal or offshore structure, but also for inshore buildings, where it affects foundation capacity and accelerates corrosion.

However, because of its transient nature, it isn't always obvious as to what extent water and its actions are responsible, and the exact mechanisms of damage can be hard to predict. As such, the purpose of this themed issue is to explore forensic case studies and technological developments that might help us better understand the role of water in these failures, and design to avoid them in future.

The first paper (Allsop and Bruce, 2020) covers the power of water in wave action, and is the second part of an already published paper

(Allsop and Bruce, 2019), and explores the failure analysis of historic breakwaters. It includes case studies in the UK at Alderney and Dover, and aims to determine factors of safety for a range of representative wave conditions.

The second paper (Webb *et al.*, 2020) again covers waves, showing that relative sea level rise as a result of climate change can amplify the impact of waves and storm surge over time. It investigates the contribution of this to infrastructure vulnerability, in particular the failure of the Escambia Bay bridge in the USA (Figure 1). It highlights the importance of assessing future hazard risk and incorporating appropriate projections of relative sea level rise into the design of major infrastructure.

The third paper (Shan *et al.*, 2020) also relates to water's impact on bridges, but this time from the perspective of scour action due to current flow around the piers. The paper explores the NextScour software for improving bridge scour design in the USA, and potentially preventing future failures.

The fourth and last case study (Mehmood and Farooq, 2020) moves the focus away from the sea. It discusses the combined impact of groundwater pore pressure; as well as how water can be a stabilising force, causing failure when it is removed. The paper examines a failure analysis of the Khaliqabad landslide along the Mangla reservoir rim in Pakistan. The findings of this study can serve as a guideline for the modelling of slopes experiencing a reservoir drawdown scenario with the consideration of more realistic distribution of soil moisture/properties across the slope.

Although these are all the water related papers covered in this issue, keep an eye out in future issues for more studies of the impact water can have on structural or geotechnical failure.

REFERENCES

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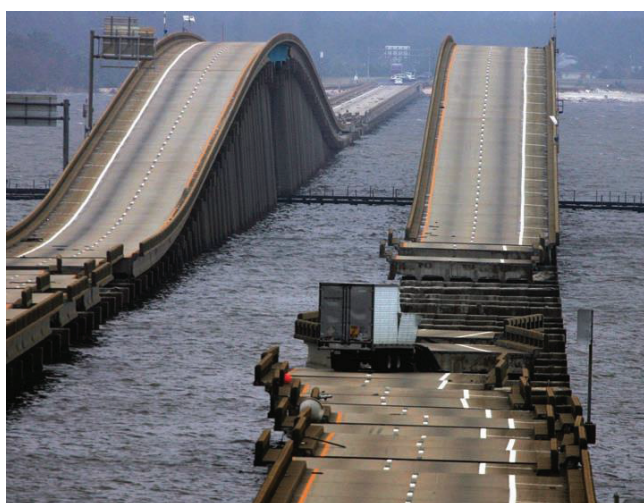


Figure 1. Taken from Webb *et al.* (2021)

Shan H, Pagenkopf J, Kerenyi K and Huang C (2020) NextScour for improving bridge scour design in the United States. *Proceedings of the Institution of Civil Engineers – Forensic Engineering* **173(4)**: 121–129, <https://doi.org/10.1680/jfoen.20.00017>.

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