

Natural Flood Management (NFM): Using all the geomorphological tools in the toolbox to achieve nature-based flood mitigation and river recovery

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ABSTRACT

The 2021-2022 floods across eastern Australia highlighted the vulnerability of rivers to changing climate extremes. They are the costliest natural disaster in Australia's recorded history with insured losses of ~\$6.41 billion, which is well ahead of the 2019-20 'black summer' bushfires (ICA 2022). By 2050, Australia's annual extreme weather cost is likely to be \$32.5 billion (ICA, 2022). The 2022 NSW Government inquiry into the floods calls for implementation of "nature-based flood mitigation ... using floodplains as assets ... and letting watercourses largely flow naturally rather than implementing engineering barriers such as flood levees and mitigation schemes to stop floods" (O'Kane and Fuller, 2022). In this context we must urgently re-examine how to live with rivers and build nature-based flood mitigation capacity and resilience into them, to prepare for an inevitable future where floods are forecast to be more intense and extreme. So, how do we achieve this?

Natural Flood Management (NFM) uses natural processes to slow floods down, reduce their erosive and destructive power, and reduce flood risk – all of which rely on core geomorphological understanding of landscapes and the geomorphic processes operating at channel and reach scales (riparian and instream hydraulic roughness), valley-scales (floodplains as sediment and water storage assets), and catchment-scales ((de)synchronisation and (dis)connectivity of tributary subcatchment flood peak flows). The realisation of NFM on-the-ground requires that we use and apply all the geomorphological concepts and tools we have in the toolbox, and implement river management and rehabilitation strategies that work with geomorphic processes to enhance river recovery while delivering flood mitigation to communities.

In this presentation I will describe what NFM is, what geomorphological concepts can be used to determine the NFM potential of rivers and catchments, and how this can be translated to on-ground actions to reduce flood risk and achieve mitigation. I will also use the 2021-2022 catastrophic floods in Eastern NSW as a case study to demonstrate the potential for delivering geomorphologically-informed NFM and river recovery in 21st Century river management (Fryirs et al., 2023).

REFERENCES

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