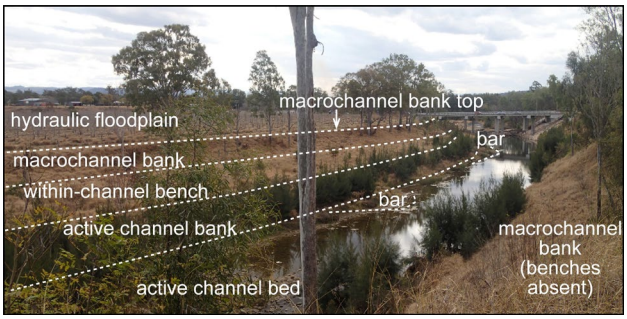
THE BIG FLOOD:
WILL IT HAPPEN AGAIN?

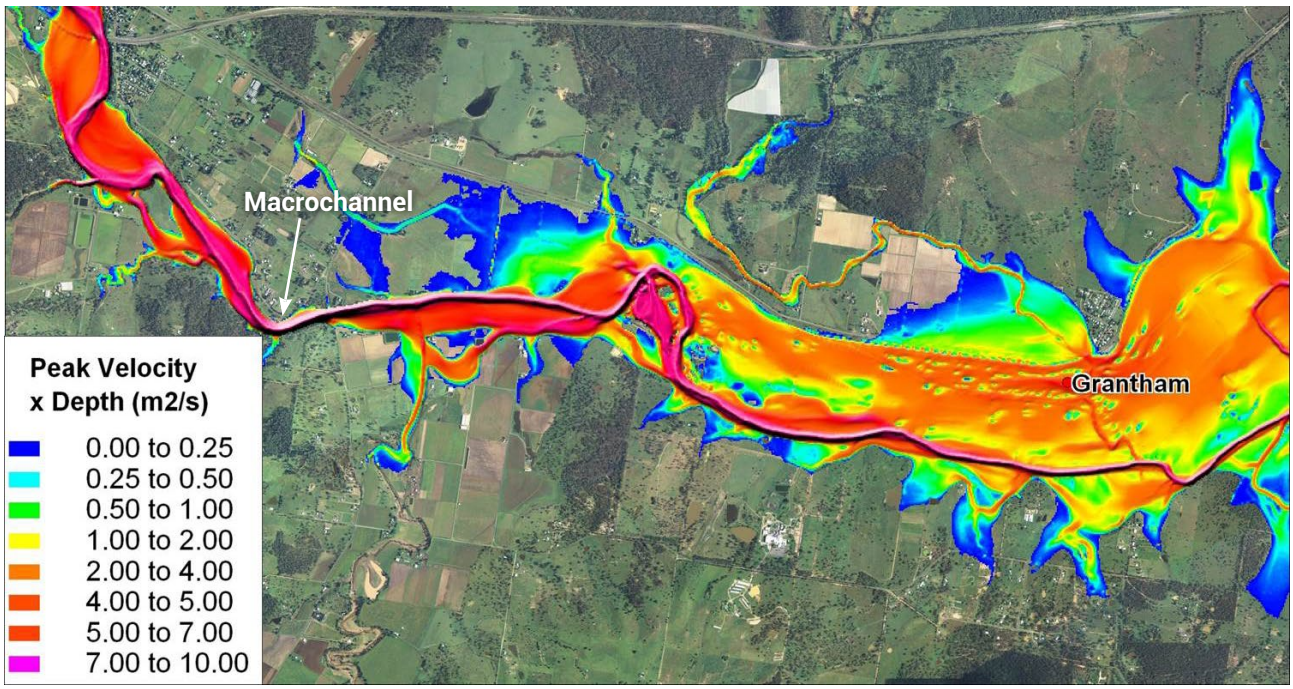
Macrochannels = flood risk

Macrochannels are large channels that contain all except the most extreme floods. Typically macrochannels display an inner channel and depositional features such as benches. Catchments with macrochannels tend to have very high hydrologic variability, such as the Lockyer Creek.

Macrochannels pose flood risks because of the very high stream power that can be generated in the reach, and also lead to flash flooding of floodplains after exiting the macrochannel e.g. Grantham is directly downstream from a macrochannel zone.

Mapping the location of macrochannels using LiDAR data can help identify areas of high flood risk relative to natural assets and built infrastructure, which will improve planning decisions and ultimately save lives.





FURTHER READING

Thompson, C and Croke. J. 2013 Geomorphic effects, flood power, and channel competence of a catastrophic flood in confined and unconfined reaches of the upper Lockyer valley, southeast Queensland, Australia. Geomorphology 197:156-169.

Croke, J., Reinfelds, I., Thompson, C. and Roper, E. 2013. Macrochannels and their significance for flood-risk minimisation: examples from southeast Queensland and New South Wales, Australia. Stochastic Environmental Research and Risk Assessment DOI 10.1007/s00477-013-0722-1

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ORIGINAL PAPER

Macrochannels and their significance for flood-risk minimisation: examples from southeast Queensland and New South Wales, Australia

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Abstract Understanding the frequency and causes of extreme events is crucial for environmental, social and economic protection and planning. In Australia this was never more apparent than January 2011 when widespread flooding across Queensland, New South Wales (NSW), and Victoria resulted in the loss of human lives and devastating impacts to infrastructure and local economies. However, understanding the interplay between the geomorphology of catchments and their hydrology remains poorly developed in floodplain planning guidelines. This paper seeks to explain spatial patterns of flood inundation in terms of downstream variations in channel morphometry; and to discuss the significance of these findings within the context of improving flood risk avoidance strategies and environmental outcomes for urban streams. A prominent characteristic of streams draining catchments in the Lockyer Valley south east Queensland and the Illawarra region of NSW, for example, are well developed macrochannels that have formed in mid-catchment zones. Detailed hydraulic modeling using HEC-RAS, HEC-GeoRAS and ArcGIS indicates that these macrochannels are scaled to accommodate high magnitude floods by operating as 'bankfull' channels during such events. In south east Queensland, locations where macrochannels debouch onto unconfined low gradient floodplains appear especially vulnerable to catastrophic flooding because of the efficient delivery and minimal attenuation of flood peaks generated in headwater catchments. Macrochannels and associated landforms can be clearly distinguished and mapped on fine-scale digital elevation models, offering the opportunity to integrate analyses of fluvial landforms and channel processes into hydraulic modeling studies, and ultimately, flood-risk avoidance strategies. Such an approach has the potential to improve on traditional flood risk avoidance methods that are focused primarily on design-flood heights by enabling the interpretation of hydraulic modeling outputs in the context of fluvial landforms that exert a significant control on flood behaviour.