



Using the latest paleoclimate insights to better quantify the risk of low probability, high impact floods and hydrological droughts – how robust are existing water resource management and supply systems in eastern Australia?

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Floods and droughts always have and always will occur. Both natural climate variability and anthropogenic change influence flood and drought risk but their exact roles, and proportional importance, are not yet properly understood or quantified. To address these challenges, and to move towards a more resilient, well adapted world, a paradigm shift is required that accepts and accounts for the non-linear and non-stationary nature of the processes that drive hydroclimatic risk. This study focuses on recent research from Australia that utilizes several independently derived paleoclimate reconstructions to better understand interannual to multidecadal climate variability and to provide improved quantification of the true risk of low probability, high impact floods and hydrological droughts in the heavily populated eastern Australian region. It is demonstrated that the instrumental hydroclimatic records (which cover only 100 years at best for most parts of Australia) do not capture the full range of flooding and drought that is possible. Also discussed are the implications for water resources management of the realisation that hydroclimatic risk changes over time and that fundamental questions of whether flood and drought risk in Australia will increase or decrease in the future (and where and when and by how much) are as yet unanswered, and how decision makers can robustly deal with such uncertainty.