Current knowledge of river and floodplain restoration for effective uptake by flood risk and catchment managers

Mark Wilkinson (1), Stephen Addy (1), Lydia Burgess-Gamble (2), Steve Maslen (3), Rachelle Ngai (3), Tom Nisbet (4), Paul Quinn (5), and Steve Rose (3)

(1) James Hutton Institute, Aberdeen, Scotland, United Kingdom, (2) Environment Agency for England and Wales, Worthing, United Kingdom, (3) JBA Consulting, Saltaire, United Kingdom, (4) Forest Research, Farnham, United Kingdom, (5) School of Engineering, Newcastle University, Newcastle upon Tyne, United Kingdom

Flood risk continues to be a key concern and with rising pressures on funding traditional engineered defences, planners and policy makers are increasingly considering the scope for river and land management techniques to reduce flood risk through working with natural processes (WWNP). River and floodplain restoration has been implemented in recent decades to improve the ecological functioning of river valleys whilst delivering other ecosystem services, for example, in-channel sediment management. Such restoration can also help to attenuate flood peaks and, by decreasing sediment deposition, improve downstream conveyance and reduce the need for dredging. However, concerns remain over both what degree these techniques (amongst wider WWNP measures) can reduce flood peaks and the cost-benefit ratios involved. Incorporating a wider assessment of ecosystem services could improve the cost-benefit ratio and leverage extra funding sources. Consolidating the wider evidence concerning the relative effectiveness of these measures could in turn increase confidence levels for practitioners and policy makers.

The aim of this research was to summarise knowledge on the effectiveness of river and floodplain restoration to reduce flood risk at the catchment scale and provide wider ecosystem services. These findings are presented in an accessible format forming part of an evidence directory (amongst other WWNP measures, e.g. woodland planting, land management) to aid policy makers and practitioners. Critical to the review was to investigate the interlinkages between geomorphology, ecology and the management of hydrological extremes. We describe the evidence directory (https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk), key findings and confidence levels (utilising case study examples from the UK) alongside the identification of research gaps that still need to be addressed.