Effective River Restoration in the 21st Century: From Trial and Error to Novel Evidence-Based Approaches (Friberg et al. 2016) [1]

This paper is a comprehensive and updated overview of river restoration and covers all relevant aspects from drivers of restoration, linkages between hydromorphology and biota, the current restoration paradigm, effects of restorations to future directions and ways forward in the way we conduct river restoration. A large part of this paper is based on the outcomes of the REFORM (REstoring rivers FOR effective catchment Management, http://reformrivers.eu/ [2]) project that was funded by EU's 7th Framework Programme (2011–15). REFORM included the most comprehensive comparison, to date, of existing river restorations across Europe and their effect on biota, both in relation to preintervention state and project size in terms of river length restored. The REFORM project outcomes are supplemented by an extensive literature review and two case studies to illustrate key points.

We conclude that river restorations conducted up until now have had highly variable effects with, on balance, more positives than negatives. The largest positive effects have interestingly been in terrestrial and semiaquatic organism groups, in widening projects, while positive effects on truly aquatic organisms groups are only seen when in-stream measures are applied. The positive responses of biota are primarily seen as increased abundance of organisms with very little indication that overall biodiversity has increased: specific traits rather than mere species number or total abundance have benefited from restoration interventions. This modest success rate can partly be attributed to the fact that the catchment filter is largely ignored; large-scale pressures related to catchment land use or the lack of source populations for the recolonisation of the restored habitats are inadequately considered. The key reason for this shortfall is a lack of clear objective setting and planning processes. Furthermore, we suggest that there has been a focus on form rather than processes and functioning in river restoration, which has truncated the evolution of geomorphic features and any dynamic interaction with biota. Finally, monitoring of restoration outcomes is still rare and often uses inadequate statistical designs and inappropriate biological methods which hamper our ability to detect change.

Keywords: Ecosystem; Biodiversity; Catchment; REFORM; Hydromorphology; Water Framework Directive

Publication Date:

Thursday, 29 September 2016

Full reference:

Friberg, N., N.V. Angelopoulos, A.D. Buijse, I.G. Cowx, J. Kail, T.F. Moe, H. Moir, M.T. O'Hare, P.F.M. Verdonschot, C. Wolter (2016) Effective River Restoration in the 21st Century: From Trial and Error to Novel Evidence-Based Approaches In: A.J. Dumbrell, R.L. Kordas & G. Woodward [eds.] Large-Scale Ecology: Model Systems to Global Perspectives. Advances in Ecological Research 55: 535-611.

Link to DOI:

http://dx.doi.org/10.1016/bs.aecr.2016.08.010 [3]

Links
[1] https://reformrivers.eu/effective-river-restoration-21st-century-trial-and-error-novel-evidence-based-approaches-friberg-et
[2] http://reformrivers.eu/
[3] http://dx.doi.org/10.1016/bs.aecr.2016.08.010

REFORM has received funding from the European Union's Seventh Programme for Research, Technological