

Linking ecological sensitivity to hydrological information in perspective of flow-ecology compliance status and water management

Maria Lathouri (1), Megan Klaar (2), David Hannah (1), Mike Dunbar (3), Alison Futter (3), Judy England (3), and Mark Warren (3)

(1) University of Birmingham, United Kingdom (m.lathouri@bham.ac.uk; d.m.hannah@bham.ac.uk), (2) University of Leeds, United Kingdom (m.j.klaar@leeds.ac.uk), (3) The Environment Agency, United Kingdom

Increasing pressures and climate change effects on water resources suggest that we may need to re-consider flow regulations in the context of river ecological sensitivity to abstraction, and how this can be better integrated into flow standards.

An increasing number of ecosystems have been identified as vulnerable to hydrological change. Different flow pressures, especially very low flows, can be very destructive to aquatic biodiversity. However, although this vulnerability is recognized, knowledge is lacking regarding the most ecologically sensitive regimes to hydrology and associated water stress and habitat disturbance. In addition, any interaction between hydromorphology and river ecology is still generally poorly understood – particularly in quantitative terms.

To further understand the relationships between hydrology and ecology and to help us protect the long term future of the water environment for water resources management, the present study is focused on underpinning different aspects of flow pressures on ecology and establishing quantitative relationships between physicochemical factors, hydrological pressures and biological indicators.

This includes carrying-out a review of existing typology approaches to grouping water bodies on the basis of similar ecological sensitivity to flow and therefore to evaluate the ecological impacts of the flow regime alterations. Explicitly generalised additive models are applied to demonstrate a relationship between ecology (macroinvertebrate) scores and flow pressure data, including geographical, geological and physical habitat conditions.

This evidence base will be used to further recommend ecologically appropriate flow regimes in rivers to help provide efficient flow management practices and support the classification of the ecological status under the Water Framework Directive.