



Integrating scales in environmental flow assessments - What is the role of hydrology?

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It has been increasingly recognised over the past decade that river regulation and water abstraction should consider “ecologically acceptable” flows (EAF’s) that ensure that hydrological regimes are not changed in a way that damages the ecology of rivers and associated wetlands. The European Union’s recent Water Framework Directive, provides added policy impetus to ensure that water resource developments maintain, and where possible enhance, the ecological status of rivers. Thus, there is a clear research need to understand how hydrological regimes contribute to the physical template of rivers, that in turn influences the structure and function of aquatic communities. It can be argued that the hydrological community has been slow to respond to this challenge and the critical hydrological conditions and limits that are needed to maintain good ecological status are usually poorly understood. Despite this, a wide range of approaches - such as the incremental flow instream methodology (IFIM), the natural flow paradigm and various expert panel methods - are widely used to guide the settings of EAF’s. Although such approaches are undoubtedly an improvement on traditional - hydrometrically defined - methods of setting environment flows, it is likely that they are often sub-optimal and only crudely based on the real needs of riverine ecological communities. In this paper, the evolution of approaches used to establish EAF’s will be briefly summarised. Investigations into the flow requirements of Atlantic salmon - an ecologically and economically important species in many rivers in north west Europe - will be presented to show the complex, subtle and scale-dependent nature of the flow influences at different life stages. The way in which this understanding currently influences the management of flow regimes in regulated rivers will be examined with reference to rivers in Northern Britain.