Impacts and indicators of change in lotic ecosystems (Friberg 2014) [1]

Fresh waters have seen the largest decline in biodiversity of any ecosystem, with lotic ecosystems particularly impacted by human activities. The main drivers of environmental change relate primarily to agriculture, urbanization, and industrial production that have resulted in severe habitat degradation in streams and rivers worldwide. The increasing impact of climate change and invasive species has put further pressure on these systems. For more than a century, status of rivers and streams has been assessed using biological indicators and represents a prime example of applying ecological knowledge to address societal issues. Today, legislative regulations and water management rely primarily on measurements of ecological status through the assessment of biotic communities. There has been a continuous development of these biological indicators but primarily based on fundamental approaches that date back to the original assessment systems. The indicators used today ignore large parts of what is occurring in the ecosystem and cannot, in most cases, diagnose the cause of degradation with a reasonable precision. There is clearly a need to improve existing assessment systems through new and innovative approaches that, as an example, include ecosystem processes and can be linked more closely to the services that lotic ecosystems provide. This article critically reviews the use of biological indicators in the context of inherent properties of lotic ecosystems and types of degradation, and suggests how assessment could be refined through applying a number of additional approaches to those already used.

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http://dx.doi.org/10.1002/wat2.1040 [2]

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