Submitted Abstract

ID IMC22-FSAbstr- 359

First Author First Name Last Name	 Gabriele (1) Consoli
Submitting Author First Name Last Name	 Gabriele Consoli
Correspondence	gabriele.consoli@eawag.ch
Co-Authors **>> E-Mails will be not listed**	Kastenhofer, Olivier (2); Doering, Michael (2); Chanut, Pierre (1); Robinson, Christopher T. (1)
Organisations	1: Institute of Natural Resource Sciences, Zurich University of Applied Sciences (ZHAW), Wädenswil, Switzerland 2: Department of Aquatic Ecology, Eawag, 8600 Duebendorf, Switzerland
Country	Switzerland
Region	Western Europe
Title	Long-Term Functional Responses Of Macroinvertebrate Community To Experimental Floods In An Alpine Stream.
Keywords	Dams, Environmental Flows, Traits, Disturbance
Type	List Of Focus Session
Focus Session ID	04

Abstract

Dams cause major hydropower-related environmental change in alpine streams, altering natural flow and sediment regimes, and releasing stable flows. This shift in the habitat template affects the assembly of aquatic organisms, thereby modifying ecosystem function by filtering for specific traits favoured by stable flow conditions. Adaptive dam management aims at mitigating flow-related alterations, implementing ecologically-based water releases (environmental flows). In alpine rivers, seasonal floods play a fundamental role for stream and riparian ecosystems, sustaining important ecological processes. In regulated rivers, these seasonal high flows are lost but can be partly restored by releasing experimental floods (i.e. controlled high-flows from dams). Understanding how stream ecosystems respond to flow restoration enables the design of ecologically-sound environmental flows based on empirical evidence. In this study, we analysed macroinvertebrate and environmental data collected during the monitoring of a 17-year experimental flood program on the Spöl, a regulated alpine river, and of two unregulated streams in the same catchment. We used fuzzy correspondence analysis, and calculated functional diversity indices and individual trait patterns, to detect functional adaptations of macroinvertebrates to the experimental floods. We observed a progressive adaptation of the macroinvertebrate community to the new flow regime, with multiple functional shifts following an increase in the frequency of traits linked to resistance/resilience. Despite notable improvement of the river's ecological conditions, the experimental floods did not result in a complete ecological restoration, indicating that the environmental impacts of flow regulation may be deeply embedded in the system. This study supports the importance of long-term monitoring to evaluate the ecological effects of flow restoration on stream ecosystems.