



Effects on the benthic community of hydropower-induced flow regime alteration

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Flow regime is widely considered as a main driver of the ecological condition of rivers. In Alpine streams the main alterations are due to hydropeaking downstream of hydropower plants, and to constant regime following application of minimum vital flows below dams and water abstraction structures. In order to assess the effects of natural, hydropeaking, and constant regimes on the same benthic community, we collected samples in three sites: i) a pristine Alpine stream (natural flow); ii) a set of five 20 m long, 0.3 m wide and 0.3 m tall artificial flumes directly fed by the same stream (constant flow); iii) an hydropower-impacted reach of the same stream, 200 meters downstream of the flumes. Five stations were selected in the natural flow reach of the stream, five in the hydropeaking-impacted reach and five in the flumes (i.e. one for each of the five flumes). Each station was sampled biweekly from mid-February to the end of July 2010 using a Hess bottom sampler and Hester-Dandy artificial substrates. A total of about 65000 invertebrates were identified to the lowest possible taxonomic level, and results analyzed to identify community changes due to the different flow regimes. The flume community resulted slightly more abundant as mean ind/m² than the community from the natural flow reach, while the hydropeaking reach hosted much a poorer community, both in abundance and diversity. Due to the constant flow, the flumes accumulated more particulate organic matter in the sediment and, as a consequence, they selected a higher relative abundance of gatherers and shredders. In the natural flow reach, predators were relatively more abundant. The different flow regimes appeared to have a selective effect on benthic community structure, suggesting possible remediation strategies in streams impacted by the operation of hydropower plants.