



Environmental Flow Assessment for alpine rivers in Slovenia

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Natural flow regimes in many Slovenian alpine rivers are modified by dams, transfers and a variety of hydraulic uses. Licensing the water uses demands the determination of environmental flows (EF) for water abstractions from running waters because of the need for protection of the natural environment according to Water Framework Directive. In last years, the problem of determination EF has been tackled through the development of a number of different methods. The diversity of hydro-morphological types of running waters in Slovenian alpine region and great biological diversity demand special treatment and determination of EF for each individual section of the running water. EF provision requires definition of the quantity and quality of water, which is needed to preserve the ecological balance in the running water and in the riparian zone. On the basis of hydrological, hydraulic, morphological and ecological criteria in the section concerned, hydro-ecological and eco-hydrological methods are applied for EF evaluation. Hydro-ecological method is rapid to apply, but require hydrological data, an inventory of habitats, and ecological and morphological estimation. The application of eco-hydrological method demands the sampling of zoobenthos and phytobenthos in different habitats of the concerned sections of the alpine river. From 1992 more than 100 study sites in alpine streams and rivers have been examined for research and applications of the methods outlined above. The values of EF were determined mostly for existing water users, where the tolerance-limit of the user economy was considered. During the determination of the EF the results demonstrate that most water users abstract too large quantities of water in low-flow periods. We required the increasing water flow in the streambed and an improvement of conditions for organisms in the water and in the riparian zone. The evaluation of EF is presented for alpine running waters, where are water abstractions for hydroelectric power stations.