



Assessing river health in Europe and Switzerland

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River conditions and welfare of aquatic ecosystems are threatened by anthropogenic and climatic changes. The release of personal-care products, pharmaceuticals and crop protection products is increasing and climate change is likely to cause significant changes in hydrological regimes affecting water resources' capacity to dissolve pollutants. Assessing river health, i.e. the ability of a river to support and maintain a balanced ecosystem close to the natural habitat, is thus of major concern to ensure the development of ecosystems and to provide enough clean useable water to users. Such studies involve physical, chemical and biological processes and characteristics.

In Europe and Switzerland, standardized procedures have been developed to assess the hydromorphological, ecological and toxicological status of rivers. The European Water Framework Directive sets ecological requirements and chemical guidelines while the Swiss Modular Stepwise Procedure suggests methods to apprehend ecological deficits and promote water management plans. In this study, both procedures were applied and compared in order (i) to address their capacity to follow-up the spatial and temporal variability of the river's water quality and (ii) to identify challenges that still need to be addressed to assess river's health. Applied on the Boiron River (canton of Vaud, Switzerland) for a 11-year period (2005-2015), both frameworks highlight that no section of the river currently meets a good environmental state. This river flows through a diversified agricultural area causing a progressive deterioration of its chemical and biological quality. The two methods also identify two periods of time with significant changes of the river's water quality. The 2009-2011 period is characterized by a significant deterioration of the river's ecological and toxicological state due to severe low flows and an increased use of pesticides. However, since 2013, an improvement in water quality is identified in relationship with spatial planning and landscaping projects and the first Swiss pilot crop protection product control program developed by the canton of Vaud with the support of the Swiss Confederation. Therefore, the Swiss and EU frameworks are useful tools to address the annual evolution of watercourses' quality but major challenges remain. They relate to (i) experts' training and monitoring, (ii) environmental target values and evaluation rules, (iii) the relationships between modules and (iv) the incorporation of water uses.