



Risk assessment of environmental changes associated with riverscape evolutions at a network scale: Application to the Drôme River basin, France

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Since the last 20 years, river managers have been more and more concerned by ecological improvement appreciated in a sustainable perspective. Such questions have been approached conceptually with opened discussion about the implementation of interdisciplinary research but very few experiences considered this perspective quantitatively. We aim to put into practice the conceptual framework defined in Pont et al. (2009) to the Drôme River Basin (France) in order to test the capacity of functional reach concept to be used to assess risks in environmental changes. The methodology is illustrated by examples focusing on the potential changes in functional reach diversity as a proxy of habitat diversity, and on potential impact on trout distribution at a network scale due to scenarios of sediment reintroduction.

We used remote sensing and GIS methods to provide original data and to analyze them. A cluster analysis performed on the components of a PCA has been done to establish a functional typology of planform reaches, used as a proxy of habitat typology following a review of literature. We calculated for the entire channel network an index of present and 1948 states of the functional reach diversity to highlight past evolution. Various options of changes in functional reach diversity were compared in relation to various increases in bedload delivery following planned deforestation. A similar risk assessment procedure is proposed in relation to changes in canopy cover and associated changes in summer temperature to evaluate impacts on brown trout distribution.

The methodological procedure is detailed as well as the different assumptions done to move from a theoretical framework to a more practical one. The two practical examples are used as pilots for evaluating the risk assessment approach based on functional reach typology and its potential applicability for testing management actions for improving aquatic ecology. Limitations and improvements are then discussed.