Geophysical Research Abstracts
Vol. 19, EGU2017-12274, 2017
EGU General Assembly 2017

Development of a methodological tool for the assessment of the hydromorphological conditions of lakes in Europe

Aurore Gay (1), Christine Argillier (1), Nathalie Reynaud (1), Delphine Nicolas (2), and Jean-Marc Baudoin (3)

(1) Irstea, UR RECOVER, Pôle AFB/Irstea hydro-écologie des plans d'eau, 3275 route de Cézanne – CS 40061, 13182 Aix-en-Provence Cedex 5 – France (aurore.gay73@gmail.com), (2) Tour du Valat, Institut de recherche pour la conservation des zones humides méditerranéennes, Le Sambuc – 13 200 Arles – France, (3) AFB, Pôle AFB/Irstea hydro-écologie des plans d'eau, 3275 route de Cézanne – CS 40061, 13182 Aix-en-Provence Cedex 5 – France

The assessment of the ecological status of surface waters considering the biological, physico-chemical and hydromorphological conditions is requested by the European Water Framework Directive (WFD). If research efforts have particularly concentrated on rivers, lakes have yet received less attention. Nevertheless, due to their function of receptacles of inland waters, the habitats they provide to an important biodiversity and the numerous services they support (water supply, recreational activities, hydroelectricity), assessing the ecological quality of lakes becomes crucial for their protection. Still, this task remains challenging, especially considering the hydromorphological compartments. Indeed, while promising tools already exist to assess the lake biological and physico-chemical status, our comprehension of the impact of hydromophological impairments on the global ecosystem functioning remains poor and existing tools to assess such impacts often focus only on morphological aspects and in a qualitative rather than quantitative way.

In this context, our study aims at providing stakeholders with a methodology to assess quantitatively the hydrological and morphological quality of lakes in Europe. The developed methodology, LAKe HYdromorphological Conditions tool (LAKHYC tool) is based on our current knowledge of the functioning of lakes and pre-existing works (e.g., Rowan et al., 2012; Rinaldi et al., 2013). The LAKHYC tool integrates the six parameters requested by the WFD, each one being assessed by at least three descriptors that are calculated as Ecological Quality Ratios, i.e. as the deviation from a reference condition. The originality of the present method lies in the fact that specific reference conditions are defined for each descriptor. In this way, we avoid using a predetermined set of lakes considered as not impacted by human activities and which often corresponds to natural lakes in specific areas (e.g., mountains) and do not represent the diversity of lakes in Europe. Moreover, the combination of all descriptors provides a score that reflects the overall hydromorphological conditions of each lake and allows for a strict comparison of the results between different systems. The range of values is subdivided into five classes corresponding to various level of impairment (from low to high degradation).

The application of the LAKHYC tool on lakes across Europe is necessary to improve the tool (i.e. for intercalibration) and enable the comparison of the conditions of lakes on a European-large scale. Further developments of the LAKHYC tool will also include the estimation of associated uncertainties and a sensitivity analysis of this multimetric index.

Rinaldi M., Surian N., Comiti F., Bussettini M. (2013) A method for the assessment and analysis of the hydromorphological condition of Italian streams: The Morphological Quality Index (MQI). Geomorphology, 180-181:96-108

Rowan J.S., Greig S.J., Armstrong C.T., Smith D.C., Tierney D. (2012) Development of a classification and decision-support tool for assessing lake hydromorphology. Environmental Modelling & Software, 36:86-98.