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Experimental application of the "total maximum daily load" approach as a tool for WFD implementation in temporary rivers

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In this presentation, the experience gained in the first experimental use in the UE (as far as we know) of the concept and methodology of the “Total Maximum Daily Load” (TMDL) is reported. The TMDL is an instrument required in the Clean Water Act in U.S.A for the management of water bodies classified impaired. The TMDL calculates the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. It permits to establish a scientifically-based strategy on the regulation of the emission loads control according to the characteristic of the watershed/basin.
The implementation of the TMDL is a process analogous to the Programmes of Measures required by the WFD, the main difference being the analysis of the linkage between loads of different sources and the water quality of water bodies.
The TMDL calculation was used in this study for the Candelaro River, a temporary Italian river, classified impaired in the first steps of the implementation of the WFD.
A specific approach based on the “Load Duration Curves” was adopted for the calculation of nutrient TMDLs due to the more robust approach specific for rivers featuring large changes in river flow compared to the classic approach based on average long term flow conditions. This methodology permits to establish the maximum allowable loads across to the different flow conditions of a river.
This methodology enabled: to evaluate the allowable loading of a water body; to identify the sources and estimate their loads; to estimate the total loading that the water bodies can receives meeting the water quality standards established; to link the effects of point and diffuse sources on the water quality status and finally to individuate the reduction necessary for each type of sources.
The loads reductions were calculated for nitrate, total phosphorus and ammonia.
The simulated measures showed a remarkable ability to reduce the pollutants for the Candelaro River.
The use of the Soil and Water Assessment Tool model (SWAT), was applied in order to obtain a daily flow and water quality dataset of the Candelaro River for a longer period than the available measured data. The use of the model permitted to obtain a robust assessment of the present and future water quality status overcoming the lack of measured data.
The results highlighted the critical condition of water quality particularly during the dry/low flow periods and the necessity to adopt specific measures for each flow conditions to restore the water surface quality status of the Candelaro River.