

A desktop approach for assessing the hydromorphological status of Bulgarian lakes

Introduction and Methodology

The hydromorphological condition of waterbodies is a 'supporting element' in the Water Framework Directive. We assessed the hydromorphological conditions of 114 lakes and reservoirs across Bulgaria using remote technologies. This predominantly entailed using aerial and 360° imagery. Based on CEN guidance, 10 hydromorphological elements were assessed and were scored between 1-5. The 10 scores were averaged to provide a hydromorphological condition assessment.

CEN feature	Score Type
Water level variability	Semi-quantitative
Lake volume	Qualitative
Slope profile	Qualitative
Planform	Qualitative
Bank structure	Quantitative
Littoral substrate	Qualitative
Migratory movement	Qualitative
Sediment transport	Qualitative
Aquatic vegetation	Semi-quantitative
Riparian land cover	Quantitative

Hydromorphological features scored in the desktop assessment

Results



Okoto and Salzata lakes, part of the "Seven Rila" lakes.

Most lakes and reservoirs have been 'moderately modified' or 'extensively modified', representing 38% (n = 43) and 53% (n = 60) of the waterbodies assessed, respectively. These mostly stemmed from reservoirs significantly altering the water volume and planform of the lake, and dam walls restricting the movement of sediment and biota. The lake banks and riparian land cover were least modified, the former often restricted to the dam wall. The Tsonevo dam (right) in eastern Bulgaria conformed to these scoring assessments.

Waterbodies possessing 'near-natural' (n = 5) or 'slightly modified' (n = 2) hydromorphological conditions were natural lake systems (i.e. not reservoirs), many of which were found in the west of Bulgaria in the Balkan or Pirin mountains. This includes the "Seven Rila" lakes (left), which yielded the lowest hydromorphological modification score for all scoring elements.



The Tsonevo dam, eastern Bulgaria.

Implications

Our desktop approach allows a rapid, cost-effective approach for assessing the hydromorphological conditions of lakes and reservoirs. Our preliminary investigations highlight some congruencies between our desktop approach versus traditional field surveys, although the latter could detect some more localised pressures not identifiable from aerial imagery. In summary, our desktop approach is effective for providing a first assessment of hydromorphological conditions rapidly across large spatial scales, which can be supplemented with field-based techniques to provide a greater chance of detecting local pressures.

