Phytoplankton Blooms
Localized by Sentinel-2 Images and Hydrodynamic Modelling – Sulejów Reservoir, Pilica River, Poland

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A b s t r a c t

Reservoirs created by damming rivers significantly modify the abiotic and biotic elements of the environment. One of the problems is the storage of nutrients and organic matter in reservoirs, resulting in the lowering of water quality due to eutrophication. The Sulejów Reservoir in Central Poland was the subject of the research presented in this article; it focused on gaining a better understanding of the balance of nutrients and the use of Sentinel-2 remote sensing data to detect phytoplankton blooms, and on finding the pattern of wind-driven surface currents using the CCHE2D – a depth-averaged hydrodynamic model. Hydraulic conditions such as average in cross-section velocities have been shown using HEC-RAS model. The calculation of the total phosphorus load has shown that the reservoir mainly acts as a place for nutrient storage. Still, during low flow and intensive phytoplankton blooms, it can be a source of nutrients. The distribution of phytoplankton blooms on the Sulejów Reservoir was documented using eight Sentinel-2 satellite images from the vegetation season of 2020 and the Normalized Difference Chlorophyll Index (NDCl). Coupling remote sensing data and 2D numerical modelling helps to interpret the hydrodynamic model results and understand nutrients and sediment dynamics within the reservoir.