
Shortfall of P budgeted in Orlík reservoir – statistical tryout among culprits with sparse data

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Orlík reservoir, the largest one in Czech Republic, is intensively affected by eutrophication. Concerted effort of main authorities in past few years resulted in aspiration with “simple” goal: restore attractiveness of popular site for regional tourism. Today intense cyanobacterial blooms disable bathing and limit boating at upper part of reservoir. Of course, at the beginning of the project precise phosphorus (P) sources apportionment according to their impact on summer algal growth is needed. Then thresholds will be set up below which individual sources/groups should be decreased. Finally, restoration measures can be sought and realized.

Preliminary synthesis has implied rough imbalance between P sources in watershed and total influx to reservoir. Nearly 75% of P influx have “unknown” origin. Nevertheless, main sources (most of point sources and load from agricultural land) are measured quite precisely. Erosion and widespread fishponds are now most suspected sources of uncertainty. Moreover, because calculation is based on monthly sampling, it is possible that resulting influx is overestimated in part. Here we decided to search for any “fast and cheap” approach independent to model processing at the same time (SIMCAT).

Whole basin was fragmented into five sub-watersheds. In addition to total area they differ considerably in characteristics such as: land use (proportion of arable land, area of ponds or forestry), hydrology (mean discharge, flow-duration curve and retention time) and habitation (ratio of sewerage, treated wastewater and population density). All these factors represent specific pollution sources as indirect markers. We will statistically discriminate variability according these markers. We presume correlation matrix of possible culprits and their share at uncertainty of annual load can focus our attention. Detail inspection of three years discharge data (Q_d values) will exclude if discrepancy is caused by inadequate influence of extreme values.

Reservoir characteristics: dam is 91 m high at crest, total volume 0.7 km^3 , surface area 27 km^2 , watershed area 12.106 km^2 of which 35% in arable land, $0.64 \cdot 10^6$ inhabitants, $Q_a = 82.5 \text{ m}^3 \text{ s}^{-1}$, theoretical retention time 100 days. Bottom outlet.