

Blnd06: Annual water-level fluctuations

Quality element: Hydromorphology

Water category and water body types: Lakes; all types

Selection rationale: Indicator of extreme hydrological events related to water supply and recreation

Indicator type (DPSIR): Pressure, State

Description: Lake water levels fluctuate naturally, caused by different amounts of water entering and leaving the lake. Water supply, hydropower generation or flood prevention can alter the natural hydrological regime towards more excessive fluctuation. In lakes used for recreation or navigation, water-levels are often more stable than natural ones. Climate change is an additional driver of a changed hydrological regime.

Especially the littoral zone, i.e. the belt of shallow water around the shoreline of a lake to the maximum depth at which light still reaches the bottom sediments, is affected by excessive water-level fluctuations. This zone is often more productive than the open water (pelagic zone) and provides important ecological functions (food resources, hiding places from predation, fish spawning sites). Anthropogenic fluctuations destabilize the littoral zone integrity, including the weakening of keystone species, proliferation of nuisance and invasive species, loss of biodiversity, and increased internal nutrient loading. The lake can become more eutrophic with large and more frequent cyanobacterial blooms occurring. In Mediterranean climates lake salinity may increase.

Modified water-level regimes are threats to the sustainable water supply and recreation services.

Spatio-temporal scale: Water level station, monthly measurements

Unit: Annual range of water-level fluctuation in centimetres

Standardisation: To be standardised against natural hydrograph (e.g. % deviation from natural hydrograph)

Data requirements: Field data, modelled data (e.g. JRC LISFLOOD model)

Other: none

MARS spatial scale: River-basin and European scale

References

- Sutela, T., Aroviita, J., & Keto, A. (2013). Assessing ecological status of regulated lakes with littoral macrophyte, macroinvertebrate and fish assemblages. *Ecological Indicators*, 24, 185–192.
- Wantzen, K. M., Rothhaupt, K.-O., Mörtl, M., Cantonati, M., G.-Tóth, L., & Fischer, P. (2008). Ecological effects of water-level fluctuations in lakes: an urgent issue. *Hydrobiologia*, 613(1), 1–4.
- Zohary, T., & Ostrovsky, I. (2011). Ecological impacts of excessive water level fluctuations in stratified freshwater lakes. *Inland Waters*, 1, 47–59.