BInd04: Mean duration of high pulses within each year

Quality element: Hydromorphology

Water category and water body types: Rivers, all types

Selection rationale: Indicator of extreme hydrological events related to flood risk

Indicator type (DPSIR): Pressure, State, Impact

Description: Streamflow is the 'master factor' in stream ecosystems, establishing the physical mosaic of habitats and influencing the water quality conditions (e.g. temperature, dissolved oxygen, and nutrient concentration). The hydrological river regime is characterised by five general features: flow magnitude, frequency, duration, timing and rate of change, usually addressed within the 'range of variability approach' (Richter et al. 1997). Thus, a broad range of relevant streamflow indicators have been proposed (e.g. 32 Indicators of Hydrologic Alteration; Richter et al. 1996).

The 'mean duration of high pulses within each year' characterises the annual extreme streamflow conditions. High pulses are defined here as periods during which the daily mean flow exceeds the 75th percentile of the mean annual discharge.

The natural flow regime including high pulse magnitude, frequency, duration and timing represents an intrinsic hydrological feature of a river. Drivers influencing this feature include river regulation (e.g. damming, water abstraction and diversion), groundwater pumping, climate change (e.g. precipitation, evapotranspiration), catchment land use (e.g. impervious surface, deforestation) and river structure (e.g. straightening, embankment).

High pulses affect various hydraulic parameters (hydrodynamic forces, turbulence and shear stress) and impact on stream habitats and biota. High pulse magnitude and duration are related to flood risk.

Spatio-temporal scale: Field data: gauging station, representing upstream sub-catchment

Unit: Number of days per year

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

Richter, B., Baumgartner, J., Powell, J., & Braun, D. (1996). A method for assessing hydrologic alteration within ecosystems. Conservation Biology, 10(4), 1163–1174.

Richter, B., Baumgartner, J., Wigington, R., & Braun, D. P. (1997). How much water does a river need? Freshwater Biology, 37, 231–249.