The Rappbode Reservoir Observatory: monitoring nutrients and organic carbon across a whole ecosystem

[a]Friese K, [a]Kuehn B, [a]Herzsprung P, [a]Schultze M, [a]Tittel J, [a]Rinke K

Climate change is one of the most essential and pressing challenges for water managers worldwide. An increase in concentration of dissolved organic carbon (DOC) in surface waters is noticed on the northern hemisphere for over 15 years (Monteith et al. 2007). Also in Germany, a notable increase of DOC concentration can be observed in several reservoirs. Some authors believe that this increase in DOC might be the result of increasing global average temperature. Increasing DOC concentrations are a big threat for waterworks since costs for purification increases simultaneously. On the other hand, the ecosystem might suffer due to unknown shifts within the nutrient balance.

To identify the sources and pathways of the organic carbon fluxes an extensive observatory was installed in the Rappbode reservoir system, the largest drinking water reservoir in Germany, located in the eastern Harz Mountains. Automatic probes for continuous registration of DOC, nitrate (NO3-), electric conductivity (EC), and temperature (T) were deployed in the inflow rivers of the pre-dams, overflow points to the main dam and at the outlet of the main dam. In addition, four automatic water samplers were placed at the four inflows. Three automatic probes complement the data acquisition with vertical profiles of T, EC, pH, and dissolved oxygen (DO) at the deepest points of both pre-dams and the main-reservoir. Finally, a meteorological buoy collects data of wind direction and speed, air temperature, amount of precipitation, and global radiation on the main reservoir. First results from a study at the Muldenberg reservoir (Ore Mountains, Saxony) showed a high positive correlation of DOC concentration and amount of precipitation or discharge, respectively.

For the sediment quality monitoring a step wise approach will be performed. A single sediment coring program is combined with bi-monthly pore water analyses and monthly sediment trap collection. In a later step the potential sediment source units will be characterized and classified. It is assumed that the sediment will act as an important carrier for the organic carbon balance of the system (source and sink, respectively depending on the environmental conditions).

[a] UFZ-Helmholtz Centre for Environmental Research, Department Lake Research, Brueckstr. 3a, D-39114 Magdeburg, Germany (kurt.friese@ufz.de)