

EGU2020-8400

<https://doi.org/10.5194/egusphere-egu2020-8400>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Recent nitrate transport response to extreme weather conditions in the Bode lower-mountain range catchment, central Germany

Seifeddine Jomaa¹, Alexander Wachholz¹, Xiaoqiang Yang^{1,2}, Dietrich Borchardt¹, and Michael Rode¹

¹Helmholtz Centre for Environmental Research - UFZ, Department of Aquatic Ecosystem Analysis and Management, Germany (seifeddine.jomaa@ufz.de, alexander.wachholz@ufz.de, xiaoqiang.yang@ufz.de, dietrich.borchardt@ufz.de, michael.rode@ufz.de)

²Department of Ecohydrology, Leibniz Institute of Freshwater Ecosystem and Inland Fisheries, Berlin, Germany

There is mounting evidence that the extreme weather conditions, either droughts or floods, could likely be more frequent than what was thought before, resulting in increased impacts on our ecosystems. This study aims to investigate the effect of the extreme drought events that occurred in the period 2015-2019 on the nitrate-N concentrations and loads in the Bode catchment (3300 km²) located in the transition areas of central uplands and northern lowlands of Germany. To this, a combination of high-frequency (15 min data in the period 2011-2019) and long-term (1993-2010) of continuous discharge and biweekly nitrate-N records in five typical gauging stations, representing different landscape features and dominant-runoff components of the catchment, were utilized. In the period 2015-2019, mean annual precipitation decreased by about 10%, and mean temperature increased by 1.46 °C compared to the period 1969-2014. Results suggested no evident changes in nitrate-N concentrations and loads in the upper mountainous areas of the Bode catchment (mainly forest) and groundwater-dominated gauging station, reflecting no impact of the droughts on these two archetypical sub-catchments. However, results showed that the nitrate-N concentrations and loads declined significantly in the lowland, agriculture dominated areas of the Bode catchment. This can be explained by the reduction of nitrate-N contribution from the lower part of the catchment during the spring and summer periods. It seems that the drought-induced increased evapotranspiration and decreased precipitation resulted in the reduced runoff from lowland areas of the catchment, affecting the nitrate-N mixing of different N source areas within the catchment. These findings suggest that recent changes of temperature and precipitation unlikely change considerably nitrate-N dynamics in terms of yearly load, but significantly reduce nitrate-N concentrations during low-flow periods in summer.