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Long term research and monitoring along the brownwater river Tudovka (Tver Region, Russia)

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The LTERM project REFCOND_VOLGA is operated continuously since 2006 and collects limnological data (chemical, physical and biological samples as well as catchment characteristics), with the aim to analyse the inter-annual variation at reference or least disturbed sites. Sampling sites are located along the Volga as well as along the tributary Tudovka. This study concentrates on Tudovka River (length 106 km, catchment area 1126 km²), where scientists from Tver State Technical University started hydrochemical investigations in the 1990s and since 2006 also hydrobiological assessments are carried out. Tudovka was selected as a model system, because (1) a large part of its catchment is protected, (2) there are minor anthropogenic impacts and with its paludified catchment the river is typical for the region.

The headwater of Tudovka is located in the transition zone of the Central Forest State Nature Reserve Biosphere Reserve, which was established in 1931 to protect “typical forest associations and animals of the central forest region”, and nowadays the last virgin spruce forests of the Southern Taiga are found here. The river is highly influenced by the surrounding mires. Many diffuse inflows from these mires discharge into the river. E.g., during the survey in 2009, a pH of 2.82 and a conductivity of 51 µS/cm were observed at the edges of “Zherdovsky Mokh”. Since 1985 this Zapovednik (highest protection status in Russia: “prohibited from disturbance / forever wild“) is also classified as UNESCO Biosphere Reserve. In the lower course the Molodoitudskii Zakasnik (area of 80 km² between Redkino and Molodoi Tud), is protected by the regional government since 1992, meeting IUCN criteria III (Natural Monument) and IV (Habitat/Species Management Area).

In its upper reaches, the Tudovka River is heavily influenced by mires located in its catchment area. Flowing near three large mires (Staroselsky Mokh, Zherdovskoye and Pesochinskoye) along 20 km in the upper course, the river receives a large amount of organic-rich water. The minimum

measured pH of mire waters in the Tudovka catchment area was 2.8, and the maximum chromaticity value was 1006 degrees on the Cr-Co scale. As a result, in the Tudovka River, the pH of water can drop to 6.1, and the chromaticity can increase to 708 degrees.

Thus, six locations were selected along this 104 km long river in order to analyse longitudinal changes. At these six sites (four of them regularly sampled) macrozoobenthos samples were collected using a modified multi-habitat-sampling method. In our presentation, we focus on the analyses of the data for the years 2010-2019 and provide information on taxa composition, longitudinal distribution and temporal changes of the benthic fauna along the Tudovka. In addition, we analyse choritope-specific distribution of benthic taxa across samples from individual microhabitats.

We exemplify at the monitoring sites the spatial distribution of different choriotope types, according the longitudinal profile of the river. We show that it is historically influenced by the Valdai glaciation (moraines), and nowadays catchment characteristics (peat bogs and forest) as well as morphodynamics in the different river sections governs the zoobenthos fauna accordingly.