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Effects of different modified river habitats on carbon cycling and nutrient dynamic in the river Danube

Master thesis

Abstract

As one of the large rivers with greatest biodiversity in Europe, Danube nowadays rapidly loses its ecological functions and ecosystem properties due to excessive anthropogenic alteration. The research takes places at the impounded and free-flowing section of the Danube River, where both sections' structure and hydrology were altered without the interference of pollution and extensive rehabilitation. In each of the two sections, three modified inshore habitats with different hydrological connectivity were selected for water and sediment chemical investigations.

Our focus was about the hydrological connectivity effects on carbon cycling and nutrients dynamics. By measuring carbon and inorganic nutrient stocks and associated microbial activities in the habitats, results show that shoreline habitats in the impounded section have comparatively lower surface water exchange rates. Such evidences have shown low dependency of hydrological associated parameters with connectivity. Compare to impounded habitats, higher algal production was detected in free flowing habitats since such conditions yield richer nutrient inputs due to higher connectivity levels. Changes in water chemistry were unable to reflect the habitat connectivity conditions. Sediment nutrient and organic matter stock showed significant hydrological connectivity differences between impounded and free flowing habitats. Benthic organic matter serves as the source for microbial decomposition, thus high organic matter results in high benthic respiration efficiency. Furthermore, decomposition of organic matter controlled the ammonium concentration in water.

With its ability to elongated nutrient retention time which contributes to the primary production, increased hydrological connectivity provide increase carbon cycling capacities which should be emphasized as an effective approach in terms of river habitat restoration in the future studies.