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Effect of floodplain restoration measures controlling hydrological connectivity on water quality and nutrient retention.

Abstract

In the present paper I examine an example of impaired floodplains along the upper Danube where restoration measures were implemented to artificially increase the hydrological connectivity under controlled conditions. These measures aim on reestablishing hydrological dynamics in order to induce natural processes. Floodplains provide various ecosystem services of which the retention of nutrients is of high importance in urban areas. The floodplain forest at Neuburg / Donau (Bavaria, Germany), gets discharge from Danube water flowing through water bodies with different hydrological connectivity. Water and sediment samples were taken from that site at eleven, respectively five sites monthly from March to September 2013. By examining different parameters (pH, O2, temperature, conductivity, nutrient concentrations, dissolved and particulate organic matter, alkalinity and chlorophyll a) I try to explain how higher hydrological connectivity influences the nutrient retention capacity of the floodplain under the given artificial conditions. As an event of unexpectedly high hydrological connectivity, additional sampling was done during the flooding in early June. The demonstrated gradient of surface water connectivity within the floodplain water bodies results in a heterogeneous hydrochemical character and enables nutrient retention processes crucial for the river ecosystem. 11% of total phosphorus and 5% of nitrate imported by the river are retained in the restored floodplain. The implemented floodplain restoration measures serve as efficient management solutions for a trade-off between natural ecosystem dynamics to gain ecosystem services on one side, and minimizing risks to adjacent infrastructure on the other side.