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Effects of reduced load in the River Danube on nutrients and phytoplankton dynamics in the flood-relief channel New Danube (Vienna, Austria)

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With 11 figures in the text

Abstract: Spatio-temporal distributions of plant nutrient concentrations, turbidity, chlorophyll-a and phytoplankton biomass are evaluated for a 10-year dataset from both impoundments of the New Danube flood-relief channel at Vienna, including measurements from the main River Danube. Concentrations of phosphorus primarily are influenced by groundwater transfer of water and nutrients from the main river into the two impoundments, percolating through the gravel substratum of a newly constructed island separating the Danube from the New Danube. Variations of phosphorus input in turn affect the amounts of chlorophyll-a and phytoplankton developing in the impoundments. In the Danube, turbidity depends mainly on discharge, but in the New Danube, although influenced by wind and wave action, turbidity is basically associated with direct inputs from the river when flood-gates are opened. When the channel was first filled with water, all variables had concentration gradients down its 21-km length. Over time, trophic levels have fallen considerably, from hypertrophic to oligo-mesotrophic, with a concurrent reduction of phytoplankton biomass. Species composition of algae has changed to a lesser extent.

Introduction

In some respects the New Danube is a relatively unique water body. Designed and constructed primarily to prevent the city of Vienna from flooding by the River Danube, after construction in the 1980s the two narrow (ca. 200 m wide) but long (21 km overall) upper and lower impoundments of the flood-relief channel rapidly became a recreational attraction for local citizens, because there is easy access, 42 km of shoreline and reasonable water quality. For most of the year the impoundments are supplied by groundwater which percolates through the gravel of the newly constructed, narrow Danube Island which separates the New Danube from the River Danube flowing alongside (HUMPESCH et al. 2000).

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