

Implementation of a monitoring system on the ecological effects of anthropogenic interventions on the Danube morphology for the Gemenc-Béda-Karapanca floodplain

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Index Terms: wetland, nutrient retention, ecological monitoring.

Wetlands are the vital link between water and land. Plant vegetation and soil of floodplains could play paramount role in retention of plant nutrients, reduction of pollutant materials and assimilation of suspended solids that transport adsorbed pollutants in aquatic ecosystems. Apart from the potential nutrient reduction capacity of floodplains, the enhanced biodiversity, nature conservation value and recreation potential mean a wide variety of ecosystem services [1].

The increasing area demand of human settlements often initiates structural changes of water bodies (e.g., flood protection intervention, navigation) as well, which in turn impacts the natural self-purification capacity of water bodies. The situation is similar at floodplains of the Danube River, where due to flood protection measures their area were greatly reduced during the past centuries. The other disadvantageous anthropogenic effect is related to dam construction plus dredging of the main arm and consequent decrease of river bed height and filling up of floodplains [2]. These problems are present in one of the greatest floodplain area of the Danube: Gemenc – Béda-Karapanca (in short: GBK).

The main riverbed has sunk significantly, nearly 1.5 m in the Gemenc and Béda areas [3]. As the consequence of this the excess water level of the connected floodplains and the area of the active floodplains reduced significantly, furthermore the frequency of the low floods reduced by an order of magnitude. At the beginning of the twentieth century the number of flooded days was around 50, which reduced to 12 days as an average at present. The mouths of the dead channels and river branches were filled up and were totally or partially locked from water supply coming from the main channel and with this the slow process of transformation into inner lakes has started, which cannot be mitigated at the moment [4]. These changes have a harmful impact on the nutrient retention of the river and on the flora and fauna of the evolved and protected wetland here.

Assessing wetland state through monitoring is the condition of their protection. Wetland resources support healthy environments, communities, and economies, effective watershed management should include conservation and restoration of wetlands and their functions.

This study focuses on the development of a monitoring system for GBK area in accordance with the WFD requirements which measures the environmental effects of changing environmental conditions in the Danube's main river channel via monitoring of surface and groundwater hydrology, water and sediment chemistry and ecological state of the aquatic ecosystem elements. The monitoring system primary focuses on the plant nutrients (i.e., various N and P forms), hydrology (inundation, flooding effects, residence times in temporary inundated river branches, role of groundwater), sedimentation, sediment quality and habitats and hydro-morphological state of the area and indicator taxa of keystone and/or other ecologically significant species. The monitoring system provides an indispensable database for the design of further technical measures aiming the improvement of the ecological status and nutrient retention capacity throughout the amelioration of water supply of the floodplain.

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