

Assessment of sediment quality using different pollution indicators and statistical analyses: Begej Canal (Serbia-Romania)

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Introduction: The Begej Canal is located in the West part of Timis County. It has a total length of 120 km, of which 75 km on Serbian territory. The navigable part of the Begej Canal starts in Timisoara, then flows to southwest, crosses the Romanian-Serbian border and continues in southwest direction to the river Tisa. In the Serbian territory, the Begej Canal crosses the middle Banat region and cities of Zrenjanin and Žitište. Relatively slow water flow in canal led to intense sedimentation and reduction in water depth making this canal non-navigable for many years. Since Begej Canal is envisaged as a living boulevard between the two countries there is an urgent need for restoration and revitalization measures to be undertaken. That means that about 300,000 m³ of sediments needs to be removed from Serbian part of canal. Since historical data show that sediments are contaminated with heavy metals and organic pollutants [1,2], any action must follow specific measures to minimize negative impacts on other environmental compartments along with proper dredged material treatment, disposal and/or beneficial use. Along with environmental benefits, Begej Canal revitalization will significantly strengthen cross-border cooperation between Serbia and Romania by promoting socio-economic development and by increasing the region's competitiveness.



Fig. 1: Begej canal

Methods: This work will present results of sediment quality assessment of a 32.3 km stretch of canal from the border between Romania and Serbia to the weir

and shipping lock near Klek. Samples were taken at about every 2–3 km, from different depths to assess the horizontal and vertical distribution of pollutants. Number of samples depended on the sediment deposit thickness. If the thickness of the sediment layer was up to 30 cm one sediment sample was taken, for deposits up to 60 cm two samples were taken (surface and bottom) and for sediment deposits over 60 cm three samples were taken (surface, medium and bottom). The analysis of the samples included the physical and chemical parameters defined by national legislation (sediment texture, dry and organic matter content, heavy metals, PAHs, PCBs, TPHs) [3].

Results: Sediment quality will be assessed using several pollution indicators: geo-accumulation index (I_{geo}), ecological risk index (RI) and total benzo[a]pyrene equivalent ($B[a]P_{eq}$). The results of the current monitoring campaign will be compared with data from two previous monitoring campaigns performed in 2008 and 2016 [1,2]. To determine and predict trends, multivariate statistical methods (factor analysis of principal component analysis (PCA/FA)) will be carried out on the organic and inorganic parameters analyzed.

Discussion: Current data show that Serbian stretch of Begej canal is in urgent need of sediment revitalization measures. Due to inorganic and organic pollution accumulated, sediment dredging and its disposal must include the principle of immobilization of pollutants and preventing the spread of pollution into the environment through air, water or surrounding soil.

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