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River channel morphology and hydraulics properties due to introduction of plant basket hydraulic structures for river channel management

Tomasz Kałuża (1), Artur Radecki-Pawlik (2,3), Karol Plesiński (2), Natalia Walczak (1), Krzysztof Szoszkiewicz (4), and Bartosz Radecki-Pawlik (5)

(1) Department of Hydraulic and Sanitary Engineering, Poznan University of Life Sciences, Poznan, Poland (tomasz.kaluza99@gmail.com), (2) Department of Hydraulic Engineering and Geotechnique, University of Agriculture, Krakow, Poland (rmradeck@cyf-kr.edu.pl), (3) Institute of Technical Sciences, Podhale State College of Applied Sciences in Nowy Targ, Nowy Targ, Poland, (4) Department of Ecology & Environmental Protection, Poznan University of Life Sciences, Poznan, Poland (kszoszk@au.poznan.pl), (5) Institute of Structural Mechanics, Faculty of Civil Engineering, Cracow University of Technology, Cracow, Poland (bartosz.radecki-pawlik@pk.edu.pl)

In the present time integrated water management is directly connected with management and direct works in river channels themselves which are taking into account morphological processes in rivers and improve flow conditions. Our work focused on the hydraulic and hydrodynamic consequences upon the introduction of the concept of the improvement of the hydromorphological conditions of the Flinta River in a given reach following river channel management concept. Based on a comprehensive study of the hydromorphological state of the river, four sections were selected where restoration measures can efficiently improve river habitat conditions in the river. For each section a set of technical and biological measures were proposed and implemented in practice. One of the proposed solutions was to construct plant basket hydraulic structures (PBHS) within the river channel, which are essentially plant barriers working as sediment traps, changing river channel morphology and are in line with concepts of Water Framework Directive. These relatively small structures work as crested weirs and unquestionably change the channel morphology. Along our work we show the results of three-year long (2013-2015) systematic measurements that provided information on the morphological consequences of introducing such structures into a river channel. Our main conclusions are as follows: 1. Plant basket hydraulic structures cause changes in hydrodynamic conditions and result in sediment accumulation and the formation of river backwaters upstream and downstream the obstacle; 2. The introduced plant basket hydraulic structures cause plant debris accumulation which influences the hydrodynamic flow conditions; 3. The installation of plant basket hydraulic structures on the river bed changes flow pattern as well as flow hydrodynamic conditions causing river braiding process; 4. The erosion rate below the plant basket hydraulic structures is due to the hydraulic work conditions of the PBHS and its calculated value was confirmed by direct measurements in the field. In our calculations we used VCmaster software.

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