Plant basket hydraulic structures (PBHS) as a new river restoration measure

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HIGHLIGHTS

- Plant basket hydraulic structures (PBHS) initiate changes in hydrodynamic conditions.
- PBHS modifies sediment accumulation and river bottom type diversification.
- The mechanism relies on initiating of morphological forms typical for natural rivers.
- The increase values of shear stress were observed after a year from PBHS introduction.

ABSTRACT

River restoration has become increasingly attractive worldwide as it provides considerable benefits to the environment as well as to the economy. This study focuses on changes of hydromorphological conditions in a small lowland river recorded during an experiment carried out in the Flinta River, central Poland. The proposed solution was a pilot project of the construction of vegetative sediment traps (plant basket hydraulic structures - PBHS). A set of three PBHS was installed in the riverbed in one row and a range of hydraulic parameters were recorded over a period of three years (six measurement sessions). Changes of sediment grain size were analysed, and the amount and size of plant debris in the plant barriers were recorded. Plant debris accumulation influencing flow hydrodynamics was detected as a result of the installation of vegetative sediment traps. Moreover, various hydromorphological processes in the river were initiated. Additional simulations based on the detected processes showed that the proposed plant basket hydraulic structures can improve the hydromorphological status of the river.

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1. Introduction

To achieve at least a good ecological status of surface waters, a principal target of the European Union Water Framework Directive