

ECOHYDRAULIC 2D SIMULATION OF AN ABANDONED RECLAMATION CHANNEL COVERED BY RIGID COMMON REED

Abstract type

Oral presentation

Session type

Special Issue Session - S1 - Organism-scale interaction with hydraulic conditions

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Abstract

An Ecohydraulic 2D simulation has been carried out for interpreting and predicting the effect of the hydrodynamic e vegetational characteristics on the riparian ecosystem within an abandoned reclamation channel, colonized by stiff emergent *Phragmites australis* (Cav.) Trin. ex Steud. plants, also known as common reed, at fully developed phenological stage. It belongs to a lowland protected by the patronage of Migliarino-San Rossore-Massaciuccoli Regional Natural Park, located in northern Tuscany, Italy. The two-dimensional model allows taking into account spatially e temporally changing vegetative hydraulic roughness coefficients for considering the variations in the cross sectional vegetation distribution and morphological features. The real-scale riparian vegetation density has been measured along six measuring cross sections distributed along the experimental reclamation channel and then modeled for estimating the composite hydraulic roughness coefficients at field scale, in order to be considered in the model. The outcomes of the simulation are compared with those derived from field hydrodynamic measurements carried out employing an acoustic Doppler velocimeter (ADV), positioned at the experimental channel's upstream cross section. It was arranged a measuring grid composed by fifteen measuring points uniformly distributed in the cross section. The evidences of the comparison between simulated and measured flow and vegetative features are discussed for assessing the reliability of employing the proposed model for predicting the impacts of flow - common reed interaction at field scale. The present research aims to provide useful support to environmental and hydraulic engineers and to reclamation land managers for a better addressed riparian vegetation maintenance activity planning, for assuring appropriate levels of hydraulic conveyance preserving the riparian ecosystem quality in vegetated water bodies.

Keywords

Flow dynamics, Aquatic ecosystem quality, ADV, Riparian vegetation, Vegetational morphometric features.