

GC8-Hydro-108, updated on 28 Mar 2024

<https://doi.org/10.5194/egusphere-gc8-hydro-108>

A European vision for hydrological observations and experimentation

© Author(s) 2024. This work is distributed under

the Creative Commons Attribution 4.0 License.



On the Key Eco-hydrodynamic Features of Vegetated Rivers: a Case Study in southern Italy

Giuseppe Francesco Cesare Lama and Mariano Crimaldi

University of Naples Federico II

The proper analysis and prediction of the hydrodynamic interaction between water flow and vegetation covering natural and manmade vegetated rivers are among the main objectives of Ecohydraulics. Riverine and riparian plants have a paramount impact on flow resistance and water quality associated with vegetated water bodies. Also, the presence of vegetation considerably affects the mean and turbulent flow fields with important implications on oxygen production and nutrient transport within vegetated open channels. In this perspective, the use of advanced field and remote sensing techniques to measure the most relevant features of plants constitutes a stimulating open research window. The interplay between riparian vegetation and water flow in vegetated water bodies has a key role in the dynamic evolution of aquatic and terrestrial ecosystems in wetlands and lowlands. The present study analyzes the effects of the spatial distribution of reed (*Phragmites australis* (Cav.) Trin. ex Steud.) beds, an invasive riparian species extremely widespread in wetland and lowlands worldwide, on the main hydraulic and hydrodynamic properties of an abandoned vegetated reclamation channel located in southern Italy. A field campaign was carried out to obtain Leaf Area Index (LAI) and Normalized Difference Vegetation Index (NDVI) of reed beds through both ground-based and Unmanned Aerial Vehicle (UAV) methodologies, and to correlate them to the channel's flow dynamic and water quality main features. Hydrodynamic simulations of the vegetated reclamation channel were performed and validated based on the experimental measurements of the hydraulic and vegetational parameters acquired in the field to build up a robust model to be employed also in future Ecohydraulic research. The evidence of this study constitutes useful insights into the quantitative analysis of the correlation between the spatial distribution of riparian vegetation stands in natural and manmade vegetated water bodies and their hydrodynamic and water quality main features. The outcomes of the present work can be seen as stimulating new viewpoints to be taken into account for the proper management of biomass belonging to riparian and riverine vegetation developing within vegetated water streams.