The effect of reed beds distributions on the Ecohydraulic dynamics of wetlands and lowlands: experimental analyses and simulations

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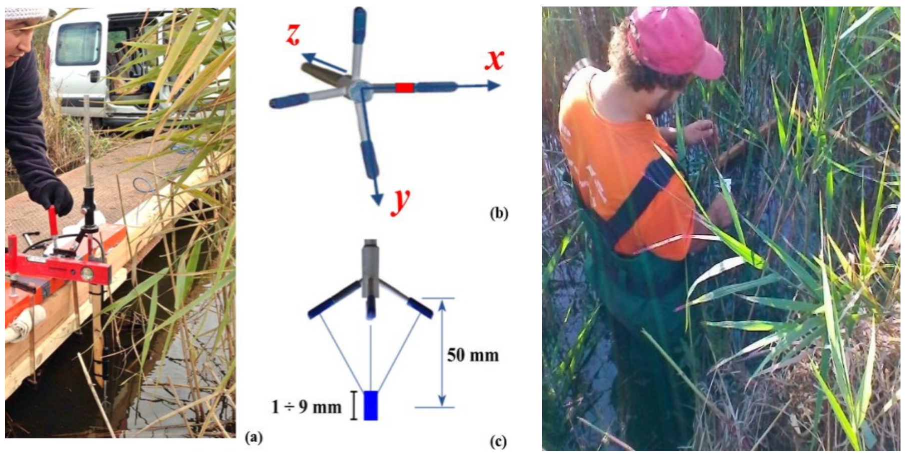
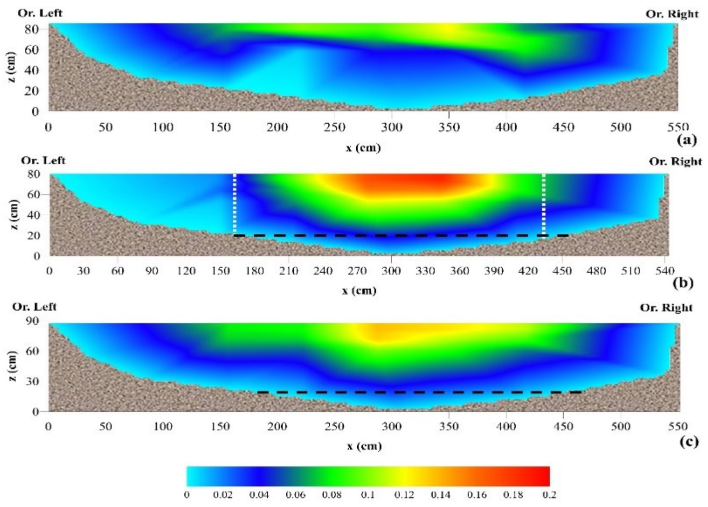
Ecohydraulic monitoring

We examined the hydrodynamic behaviour of a real vagetated water body by means of sophisticated equipments and techniques typically employed in flume laboratory experimental analysis dealing with 3D turbulent and mean flow fields characterizing vegetated flows. In doing that, we considered in our analyses the real-scale reed beds' distributions across the wetted perimeters of the instrumented cross sections.

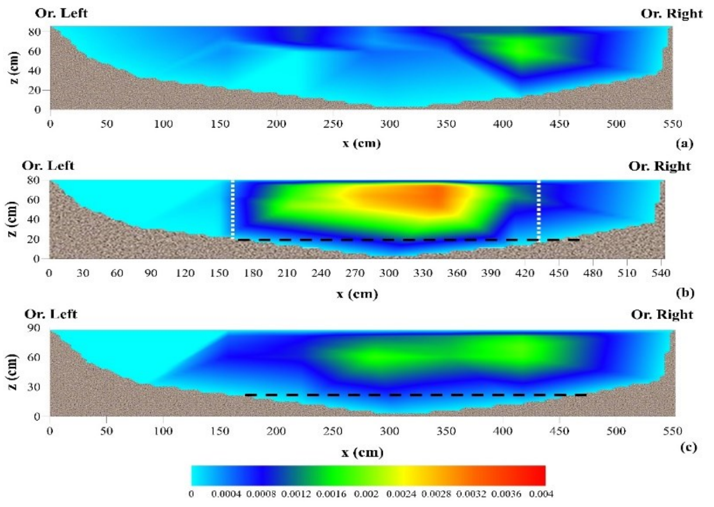


Field-scale hydrodynamic and vegetational measurements

Water flow velocity



Turbulent Kinetic Energy



Experimental tests and Computational Fluid Dynamics (CFD) simulations

3D water flow fields' measurements were performed in a real vegetated draiange channel by means of an acoustic Doppler velocimeter (ADV) for experimentally retrieving the real-scale flow velocity and turbulent kinetic energy cross sectional distributions These measured parameteres were then employed for validating further CFD simaultions.

It can be observed that Scenario 2, corresponding to a central vegetation cut of 3 m and two 1 m wide side riparian vegetation buffers, flow velocity and turbulent fields can guarantee a statisfactory balance between hydraulic safety and high-level water quality on the channel.