



DEPARTMENT OF CIVIL ENGINEERING

Public Lecture of the Environmental Hydraulics Visiting Fellowship

“Eco-Hydraulics: Waves, Currents and Jets in Nature-Based Design”

Prof. Michele Mossa
Polytechnic University of Bari, Italy

Date: April 13, 2026 (Monday)

Time: 5:00 p.m. to 6:00 p.m.

Venue: Tam Wing Fan Innovation Wing Two, G/F, Run Run Shaw Building, HKU

About the Speaker

Michele Mossa is Full Professor of Hydraulics at the Polytechnic University of Bari, Italy, where he has been serving since 1999, and he is also associated with CNR - National Research Council of Italy through research collaboration activities. Prof. Mossa holds a PhD in Hydraulic Engineering for Environment and Land from the Polytechnic of Milan and an MSc (*cum laude*) in Civil Engineering from the Polytechnic University of Bari. His main research interests lie in environmental, maritime, and ecohydraulics, with a strong focus on fluid mechanics, wave-vegetation and jet-wave interactions, environmental flow processes, and Earth system applications, contributing significantly to the understanding of flow-ecosystem coupling and to the development of nature-based solutions. He has played an active leadership role within the International Association for Hydro-Environment Engineering and Research (IAHR), serving as Chair of the IAHR Technical Committee on Ecohydraulics, Chair of the IAHR Education and Professional Development Section, and currently as a co-opted member of the Committee on Education and Professional Development. He is also Associate Editor of the *Journal of Hydraulic Research*, *Journal of Ecohydraulics*, *Environmental Fluid Mechanics*, a member of the Editorial Board of *Scientific Reports* (Nature), and Scientific Director of the Coastal Engineering Laboratory (LIC). He is a Fellow of IAHR and a recipient of the IAHR M. Selim Yalin Lifetime Achievement Award (2025). He has authored 145 journal articles, 93 book chapters, 62 conference papers, 14 scientific monographs/books, 2 edited volumes, and 7 patents. He is listed among the top 2% of scientists worldwide in his field according to the Stanford University ranking. For further information, please visit <https://www.michelemossa.it/>.

Abstract

Nature-based solutions are increasingly integrated into coastal and river engineering, from vegetated shorelines to restored wetlands and eco-engineered channels. While vegetation is widely recognized for reducing wave energy, its influence extends far beyond wave attenuation. It fundamentally alters currents, turbulent mixing, and the spreading of jets and plumes, with important implications for coastal protection, sediment stability, and water quality.

Over the past decade, eco-hydraulics has moved from qualitative descriptions to predictive, physics-based understanding. Research has clarified how vegetated canopies dissipate wave energy, modify flow structure, and reshape turbulence. These changes affect both advective transport and diffusive mixing, controlling how sediments, nutrients, and pollutants are redistributed in natural and engineered environments.

Recent advances include improved modelling of finite-amplitude wave attenuation, better characterization of vegetation drag and canopy geometry, and new insights into how jets spread and dilute when interacting with vegetated currents. Scaling relationships now link plant properties to measurable hydrodynamic effects, providing guidance for numerical modelling and engineering design.

By connecting hydrodynamic mechanisms to practical decision-making, this lecture shows that eco-hydraulics is not only an ecological perspective, but a necessary component of resilient coastal design and effective environmental management.

FREE ADMISSION - ALL ARE WELCOME

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