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**River Networks
as ecological Corridors**

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Ca' Bottacin - Dorsoduro 3911, Calle Crosera
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Room A



Abstract

River basins are a natural laboratory for the integration of hydrological, ecological and geomorphological processes. Moving from morphological and functional analyses of dendritic geometries observed in Nature over a wide range of scales, this Lecture addresses essential processes sustaining human life and societies taking place along dendritic structures (floods, droughts, a fair distribution of water)-- suggesting that indeed they can be predicted. Population migrations and human settlements historically proceeded along river networks to follow water supply routes. Riparian areas, critically important ecosystems positioned along streams and rivers, play crucial roles in their watersheds and in the loss of biodiversity proceeding at unprecedented rates. Waterborne disease like cholera or schistosomiasis thrive in pristine or engineered watercourses especially if water resources developments loom in the background. How does connectivity within a river network affect the emergent spreading of water-borne infections? Does the river basin act as a template for biodiversity? Are there hydrologic and human mobility drivers and controls on the spreading of water-borne disease? Is there a linkage to the purported failure of economic development to bring equality in the wealth of nations? Can we contribute to bridge development thinking, argued to be stacked against Nature as it stands, and environmental thinking? Can we evaluate quantitatively ecosystem services discounting the environment?

Here, I shall draw together several lines of argument to suggest that a coherent ecohydrological framework, rooted in laboratory, field and theoretical work, has contributed substantially to our understanding of a number of fields, from spatial ecology of species, to population dynamics, biological invasions and the spread of endemic or epidemic waterborne disease. My main tenet is that ecological processes occurring in the fluvial landscapes are so constrained by hydrologic controls and by the morphology of the matrix for ecological interactions (notably, the directional dispersal embedded in fluvial and host/pathogen mobility networks) that the spatial and temporal patterns in ecology are indelibly marked by them in a remarkably broad range of applications, some of which are recalled here – a fun and possibly even instructive novel research field.

Bio sketch: [BS+MS University of Padova (IT) summa cum laude (1979); PhD Purdue University (1983)] is the Director of the Laboratory of Ecohydrology at the École Polytechnique Fédérale de Lausanne (EPFL). Among recognitions: Dalton Medal (2005), Prince Abdullaziz International Water Prize (2011), Royal Swedish Academy of Sciences (2006), US National Academy of Engineering (2006), US National Academy of Sciences (2012), Tartufari Prize (2014), Accademia Nazionale dei Lincei (2019). His book titled River networks as ecological networks. Species, populations, pathogens, will be published by Cambridge University Press in January 2020.