Dr. Maria Cristina Rulli is full professor in hydrology at the Politecnico di Milano, Department of Civil and Environmental Engineering since 2019. Previously she has been an associate professor (2013-2019), an assistant professor (2006-2012) at the Politecnico di Milano.

She teaches the course on “Water and Food Security” and on “Climate and Global Change in the Age of Sustainable Development within the Environmental Engineering programs, and the course on “Climate and Hydrology” within the Architecture and Urban Planning program at the Politecnico di Milano. She teaches also the course on “Sustainable Water and Food Security” within the Doctoral Program in Environmental and Infrastructure Engineering and High Level Training Program “Honours Programme Engineering for Sustainable Development” (Politecnico di Milano) and the course on “Resource Planning and Management within Sustainable Development: a focus on the Water, Energy, Food and Climate Nexus” open to all the Doctoral Program students at the Politecnico di Milano.

She is author of a more than 80 peer-reviewed papers (Hindex 24) in the fields of hydrology, fluvial geomorphology, hillslope hydrology and stability, global water resources, and assessments of other natural resources under a variety of global change scenarios, such as climate change, deforestation, urbanization, land degradation, population growth, and changes in dietary shifts in dietary preferences, and changes in energy policies. Her most recent research work focuses on the Food-Energy-Water Nexus and environmental sustainability issues with particular emphasis on the emergent phenomenon of Large Scale Land Acquisition (LSLA) and the consequent impacts on water, energy and food security.

In particular, her research has helped to clarify the effects of anthropogenic and natural disturbances such as land use change, climate change, forest fires, and new infrastructures on both the hydrological response and sediment yield of a variety of watersheds at different spatial and temporal scales. Her work has contributed both to experimental (field and lab based research) and numerical investigations focusing on different geographic regions across Europe, Asia, North and South America. She designed a rainfall simulator to generate (artificial) precipitation on large (up to about 100 m ×100 m) and steep (slope up to 35°) plots. This generator is suitable for studies of runoff generation, soil erosion and sediment transport both in the presence and absence of fire-induced disturbance. She developed distributed models of hydrologic response, triggering of shallow landslides, soil and erosion and sediment transport at different spatial scales. She has used these models to evaluate the effects of human activities on the risk of hydrologic disasters.

Recently, she has been investigating the impact of climate change, urbanization, deforestation, land degradation, population growth, changes in food consumption, changes in energy policies on the management of water and other natural resources. Her work has investigated the effect of environmental externalities, interdependencies and teleconnections on natural resource availability. She is analysing water and food security and environmental sustainability issues using the Food-Energy-Water Nexus perspective. In particular, she has focused on the emergent phenomenon of Large Scale Land Acquisition (LSLA) and its implication for water, energy and food security. Her work has defined and quantified the global phenomenon of “water grabbing” and explored its impacts on water governance, rural livelihoods, and the emergence of water conflicts. These original contributions have led to a number of highly influential research articles that have been broadly cited in the scholarly literature, policy documents and the media. For this research she has developed a global hydrologic model that estimates the amount of rainwater consumed by the 26 major crops (>80% cultivated area) around the world and the corresponding irrigation water requirements. She has used his global model to evaluate the phenomenon of global water grabbing, the amount of needed to close the yield gap (i.e., the difference between actual and potential yields) in cultivated regions around the world, and to assess the sustainability of the associated water withdrawals from surface water bodies and aquifers.

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