



Socio-hydrological modeling to guide communities towards environmentally sustainable behaviour: Case study of Alcantara River Basin System (Italy).

Iolanda Borzi (1,3), Murugesu Sivapalan (2), Alberto Viglione (3), and Brunella Bonaccorso (1)

(1) University of Messina, Italy (iborzi@unime.it), (2) University of Illinois, Urbana-Champaign, USA, (3) Vienna University of Technology, Austria

As pressure on limited freshwater resources has increased in response to population and economic growth, the need to improve our understanding of the interactions between water resources systems and different water uses and to properly analyze these interactions by modeling tools, has grown as well. In many regions of the world, populations' way of thinking on water consumption is oriented in a non-sustainable way, contributing to degradation of the environment and to the detriment of the water resources they depend on. This is also the case of the Alcantara River Basin System (Sicily, Italy), which supplies water to Messina City and many other cities along the northeastern coast of Sicily island, as well as to the agricultural districts and industrial areas. The ability of the river basin to meet water demand has in the past been impacted by natural (climatic) and human-induced (infrastructural) shocks, causing significant distress to people and the economy.

In this work, we present a simple, stylized socio-hydrological model of the Alcantara River Basin System able to simulate the complex dynamics and feedbacks that might arise from natural and human-induced shocks to the system. The aim of the work is to use the socio-hydrological model as a "screening tool" to frame water resource issues in a broad way and provide guidance to the community to change their behavior towards more sustainable water resource management, including the resilience to withstand future shocks to the system.

The results of this study, coming from scenario analyses at different time scales joined to sensitivity analyses of the socio-hydrological parameters of the model, show how the community's way of thinking on environmental issues and water resource management, their capacity to remember water crisis and, in particular their way of reacting to shocks, can affect the system in ways that can produce paradoxical results. For example, a rapid decision-making strategy (e.g., programmed in advance in anticipation of a water crisis) could be satisfying in a short term, but can also be counter-productive when viewed over the long term. Results also show that a do-nothing decision during a water crisis could highly damage the environment.