



Modelling hydrological systems under change: sociohydrology and sustainable development

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Understanding the behaviours of hydrological systems under a changing environment is a challenging research question, in view of the potentially limited representativity of historical information and the several interrogatives from society about the future of water resources. Indeed, parameter values and model structures identified from past observations might be of limited value to simulate the impact of environmental changes, in view of the presence of non-stationarity. However, historical information and the assumption of stationarity still are key tools to predict the future dynamics of ecological and hydrological processes. In fact, non-stationarity is a deterministic change of the statistics of the involved processes. Therefore, understanding the behaviours of changing systems requires the identification of an analytical relationship explaining non-stationarity, namely, how the above statistics will change along time. Once the latter information is acquired, to incorporate it within a stationary model is a relatively straightforward development, thus readily building a non-stationary framework for the interpretation of change. In summary, to model change one first of all needs to understand and quantify change. If such understanding was missing there would be no change.

Under this latter view, the key research question related to hydrological change is how to infer the future statistics of hydrological processes. A key tool to this end is the principle of sustainability which allows one to identify constraints on future behaviours based on water availability. Indeed, water is going to play a principal, integrating and regulating role for the future scene, through its link with societal development (including agriculture and energy production) and ecological systems. To analytically decipher such a role is a fundamental requirement and a first step to understand changing hydrological processes.

This talk will inspect in detail the above research questions, therefore outlining some assumptions and constraints to support development of non-stationary models for change analysis.