



Historical upscaling of the socio-hydrological cycle: Three cases from the Mediterranean Spain

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Understanding the co-evolution between hydrological and socio-economic systems is vital to assess how anthropogenic and natural systems will evolve and interact in the future. Examining past socio-hydrological changes is therefore important to produce knowledge able to develop socio-hydrological models for predicting the future hydrology and society evolution patterns. As noticeable climate changes leading to higher water stress are expected in the Mediterranean Europe, socio-hydrological processes are likely to suffer considerable modifications in the XXI century, driving to potential conflicts as water demand increases while water resources fall.

The goal of this contribution is to identify the hydro-social processes that have caused water conflicts, and how they have been solved in the Mediterranean Spain. The method is based in the analysis of historical documents, available since the Middle Ages. Once historical water conflicts (always well-documented) were located, a socio-hydrological “causal loop” is formulated, determining what caused that conflict, what factors or chain of factors were involved, and how it was addressed. Repeating that process for all the reported water conflicts allow us to gain insight into their driving forces, the socio-hydrological relationships linked to those, and the successful (and unsuccessful) strategies employed to address them.

Three cases were selected from the Mediterranean Spain: the Mijares, the Turia and the Jucar river basins. All of them share similar documental sources (the Royal Archives, courts' archives, municipal archives and farmers' archives), similar climate and similar socio-economic backgrounds. Moreover, all of them are predicted to suffer similar climate change impacts. Irrigation is their major water demand. In these three rivers, during the last millennia, successive waterscapes have been constructed by different societies, in a prolonged process of institutional and environmental up-scaling, from the local level to the basin level, based on collaborative actions through multistakeholder partnerships and agreements. Irrigation development has played a major role in the evolutionary trend of the hydro-social cycle in the three basins, determining water demands and uses, and boosting institutional building. Following the main historical institutional milestones and examining the historical changes in water uses, remarkable differences can be found among the three cases, enhancing the high sensitivity of the hydrological processes with respect to socio-economic factors. Therefore, comparing them is adequate to find out those high-sensitive factors and the way they provoke the differences between the basins.

The casual loop created a basin closure - basin reopening cycle. Basin closures were associated to increasing demands by population growth, irrigation and immigration, causing drought vulnerability. Basin reopenings corresponded to the building of regulation facilities (reservoirs, canals), the availability of new water sources (groundwater, regenerated water), or a change in the management strategies (conjunctive use). During basin closure, users fought during droughts but united to prevent new users' access to water. During reopenings, water use quickly increased, leading to basin closures. User conflicts were solved by user agreement in water sharing or by law requirement, establishing a new management policy. New-user conflicts were solved when the basin reopened again and those potential users gained access to water.