

## **Pooling drought and flood related financial risk to manage conflict in multi-purpose water systems**

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Worldwide, conflict over shared water resources is exacerbated by population growth, economic development and climate change. In multi-purpose water systems, stakeholders can face higher financial risks as a consequence of increased hydrological uncertainty and recurrent extreme events. In this context, a financial hedging tool able to pool the risks faced by different stakeholders, may be an efficient solution to both foster cooperation and manage the financial losses associated with extreme events. In this work we explore the potential of risk pooling strategies involving index-based insurance solutions, to manage financial risk in a multi-purpose water system prone to both drought and flood risk. The agents' interaction and mutual influence in the selection of their insurance coverage level, is also investigated. Risk pooling can allow for reduced insurance premiums in situations in which the pooled risks are entirely, or mostly, uncorrelated. Pooling flood and drought related risks in the same geographic area represents a novel application. The approach is demonstrated using a case study on Lake Maggiore, a regulated lake whose management is highly controversial due to numerous, and competing, human activities. In particular we focus on the ongoing conflict among the lakeshore population, affected by flood risk, and the downstream farmers' districts, facing drought related losses. Results are promising and indicate that risk pooling may provide a more efficient strategy for financial risk hedging in multi-purpose water systems. Moreover, results suggest that risk pooling may be a means of facilitating greater interaction and cooperation among competing stakeholders, therefore mitigating conflicts.