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Methodology To Define Drought Management Scenarios Based On Accumulated Future Projections Of Risk

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Drought is a serious threat to many water resources systems in the world. Especially to those in which the equilibrium between resources availability and water uses is very fragile, making that deviation below normality compromises the capacity of the system to cope with all the demands and environmental requirements. Since droughts are not isolated events but instead they develop through time in what could be considered a creeping behavior, it is very difficult to determine when an episode starts and how long will it last. Because this is a major concern for water managers and society in general, scientific research has strived to develop indices that allow evaluating the risk of a drought event occurrence. These indices often have as basis previous and current state variables of the system that combined between them supply decision making responsible with an indication of the risk of being in a situation of drought, normally through the definition of a drought scenario situation. While this way of proceeding has found to be effective in many systems, there are cases in which indicators systems fail to define the appropriate on-going drought scenario early enough to start measures that allowed to minimize the possible impacts. This is the case, for example, of systems with high seasonal precipitation variability. The use of risk assessment models to evaluate future possible states of the system becomes handy in cases like the previous one, although they are not limited to such systems. We present a method to refine the drought scenario definition within a water resources system. To implement this methodology, we use a risk assessment model generalized to water resources systems based in the stochastic generation of multiple possible future streamflows generation and the simulation of the system from a Monte-Carlo approach. We do this assessment every month of the year up to the end of the hydrologic year that normally corresponds with the end of the irrigation campaign and the beginning of next year water allocation negotiation processes. From the evolution of the risk profile of the system along the time we can define more approximately the current drought scenario. We applied the methodology presented to the Orbigo River Basin in Spain with promising results.