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How seasonal forecast can improve the water planning in multipurpose reservoirs: ROAT climate service, a reservoir operation assessment tool

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The management of multipurpose reservoirs has to deal with the competitive needs of water for human consumption, for irrigation, for hydroelectric exploitation, for flood regulation, and for environmental flow requirements. This question has special importance in a Mediterranean environment where water is a limiting resource, and decisions have a large media and social impact. In this context, water-systems managers have to take decisions that will condition the operation and availability of water for the following months. Currently they have to rely on spreadsheets where different past data-based scenarios (last year, driest year, wettest year) are compared to the current situation on a monthly basis, as a simple forecast approach.

In the framework of the H2020 project CLARA (Climate forecast enabled knowledge services), the climate service ROAT (Reservoir Operation Assessment Tool) was conceived to support reservoir management through seasonal forecast information to foresee the water availability for the supply of the water demands. The climate service was developed in a co-generation process in which data purveyors, services providers and end-users are involved. The chosen study area was Béznar-Rules reservoirs system in the Guadalfeo River Basin (southern Spain). This system is a good example of a multi-purpose reservoir in a region where water is a limiting resource and the management decisions have to be very accurate. Besides, the presence of snow makes seasonal forecast of precipitation and temperature critical for the evolution of the water reserves throughout the year.

ROAT is conceived as an on-line application aimed at the use of real-time meteorological data and hydrological modelling of the river basin and the seasonal forecast of precipitation, temperature and reservoir inflow for the operational assessment of multi-objective reservoirs. The climate service supports the decision-making process of water managers by anticipating the actual risk of drought based on forecast, optimizing the timing of water allocation taking into account the future availability of water and gaining a global view of the current hydrological state of the watershed.

The service is addressed to water authorities and reservoir managers. Users of the reservoir itself, such as agricultural cooperatives, farmers and hydropower companies can be also potential users.

It will allow managers to make operation decisions knowing that they will have at their disposal the most up-to-date hydrological knowledge combining measurements and modeling, together with the most forward-looking seasonal forecast that already exist at European level, but also all this adapted to their real operating needs.

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