Using ensemble streamflow prediction in the reservoir operation during drought by implicit and explicit stochastic optimization: case study in Shihmen Reservoir

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One of the important goals of water resource management is the establishment of realistic reservoir operating policies for water allocation, especially during periods of drought. In the context of short-term (a few months) water management such as drought, we need to predict the future inflow and allocate current and future water resource to avoid severe economic loss. Because the future flow condition in uncertain, applying the stochastic optimization technique is common in guide reservoir operation. This study is trying to use the ensemble streamflow prediction (ESP) in reservoir operation during drought. We develop reservoir operation model based on two stochastic optimization frameworks, the explicit stochastic optimization (ESO) or implicit stochastic optimization (ISO). Because the forecast is updated time by time, the rolling process is adapted, the decision process is "rolled over" every periods and extended into the future. This study use Shihmen Reservoir as a case study. The ensemble streamflow prediction is produced and provided by National Science and Technology Center for Disaster Reduction (NCDR). Not only expect to provide an appropriate framework in integrating streamflow forecast a reservoir operation during drought, we also aim to compare the ISO and ESO to identify their advantages and disadvantages. As a result, the streamflow forecast can directly contribute, rather than just be kept in mind, in the reservoir operation during drought period.