



Efficiency of distributed systems of reservoirs related to non uniform spatial distribution of rainfall

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In river basin planning, is often useful to consider reservoirs or floodplains, in which part of flood volumes can be temporarily stored to reduce discharge peak rates and then to protect surroundings from flooding. In urban areas, particularly, is often convenient or sometimes necessary to distribute the storage volumes in a system of separated areas along or near the river network, not only for the existence of urbanistic constraints, but also because characteristic scales, both spatial and temporal, of hydrological processes are smaller than in natural catchments. These distributed system of reservoirs or floodplains seem usually to be less efficient than a unique reservoir of equal volume, due to the progressive lessening and extension of flood waves. However the real efficiency of distributed systems of reservoirs has to be evaluated also considering spatial distribution of the rainfall. Flood waves resulting from such systems, in fact, are relatively similar with different rainfall distribution. Effects in flood control are then less dependent from the accordance of real conditions with reservoir design hypotheses, becoming better when rainfall distribution is particularly unfavorable. In this work a combined hydrologic and hydraulic model is used to evaluate the effects of different hypotheses on rainfall spatial distribution on the efficiency of a system of distributed flood reservoirs. Application to case study is presented and comparison with the case of a unique reservoir is discussed. The choice of a distributed system of reservoirs seems to guarantee a better protection of the river basin, reducing the effects of spatial variability of rainfall and also extending the area in which the flooding risk is reduced.

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