ADVANCED DECISION SUPPORT MODELING WITH URGWOM AND THE ET TOOLBOX

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Abstract

The Albuquerque Area Office is significantly impacted by the natural hydrologic cycle in a desert climate, enhanced by the recent drought, exotic invasive phreatophytes and the re-configuration of the natural environment by man-made adjustments to the hydraulic regime, when water management must consider not only contractual demand, but also in-stream flow requirements and potentially, TMDL considerations. The upper/middle Rio Grande loses approximately 2/3 of the surface water flow to evapo-transpiration (ET) on annual average.

Upon release from Cochiti Dam, the last control structure above downstream flow target gages, surface flow in the Rio Grande is subjected to multiple diversions satisfying contractual demand, losses to shallow groundwater, monsoonal gains and ET losses, and surface and groundwater return flow. None of these surface water budget factors varies more than ET, which during the irrigation season varies on an hourly basis, and may vary day to day by an order of magnitude. In a river system operationally impacted by 5- to 7-days of travel time between releases and target gages, with significant and highly variable gains and losses, multiple complex models are required to successfully satisfy all demands and requirements. Over-release depletes upper reservoirs unnecessarily, fills lower reservoirs with higher evaporation rates and risks late season shortages. Under-release risks inadequate supply for contractual demand, missed flow targets and Biological Opinion / court decree jeopardy. The ET Toolbox decision support system (http://www.usbr.gov/pmts/rivers/awards/), in conjunction with the Upper Rio Grande Water Operations Model (URGWOM - http://www.spa.usace.army.mil/URGWOM/), offers near real-time ET data to support URGWOM simulation capability. These data and the simulation capability assist in managing the natural surface water depletion variability of the plant community and the atmosphere on the river system, to effectively meet contractual and natural demands, while conserving upstream storage.

Without the ET Toolbox providing the URGWOM model with daily ET depletion data, the URGWOM model representation of the physical system would lack any basis for the significant and highly variable effects of ET on daily water operations. The URGWOM and ET Toolbox models, along with the use of the Modflow model discussed in another presentation, exemplify the trend of conjunctive use of multiple models for advanced computer assisted decision support.