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Evaluating HSPF in an arid, urbanized watershed

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ABSTRACT

The Hydrologic Simulation Program- Fortran (HSPF) is a powerful time-variable hydrologic model that has rarely been applied in arid environments. Here, we assess the performance of HSPF in southern California, testing its ability to predict annual volume, daily average flow, and hourly flow. The model was parameterized with 13 land use categories and physical watershed characteristics. It was calibrated using rainfall and measured flow over a 10-year period in a predominantly undeveloped watershed; and it was validated using flow data from a separate, predominantly urbanized watershed over the same time span. Annual volume predictions correlated well with measured flow in both the calibration ($r = 0.94$) and validation ($r = 0.89$) watersheds. Daily flow predictions correlated well with measured flow following rain events, but predictions were poor during extended dryweather periods. This modeling difficulty during dryweather periods reflects the large influence of, and the poor accounting in the model for, artificially introduced water from human activities such as lawn overwatering or car washing that can be important water sources of contaminants in arid environments. Hourly flow predictions mis-timed peak flows, reflecting spatial and temporal heterogeneity of rainfall within the watershed. Model performance increased considerably when predictions were averaged over longer time periods, reaching an asymptote after an 11-h averaging window.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2001_02AnnualReport/07_ar33-drew.pdf