AGU100 ADVANCING EARTH AND SPACE SCIENCE

Water Resources Research

Modeling flow and chemical quality changes in an irrigated stream-aquifer system

Leonard F. Konikow, John D. Bredehoeft

https://doi.org/10.1029/WR010i003p00546

Volume10, Issue3

June 1974

Pages 546-562

Abstract

Salinity increases in groundwater and surface water in the Arkansas River valley of southeastern Colorado are primarily related to irrigation practices. A digital computer model was developed to predict changes in dissolved solid concentration in response to spatially and temporally varying hydrologic stresses. The equations that describe the transient flow of groundwater and the transport and dispersion of dissolved chemical constituents were solved numerically. The model simulated flow as well as changes in water quality for both the stream and the aquifer. Detailed field measurements made for a 1-yr period in an 11-mi reach of the valley between La Junta and the Bent-Otero county line were used to verify and calibrate the model. Measured water levels varied by an average of about 3 ft during the study period, and calculated water table elevations in the aquifer were within 1 ft of the observed values approximately 90% of the time. The specific conductances of water samples from five wells in one well field had a standard deviation of about 10% of the mean. Dissolved solid concentrations calculated by the model were within 10% of the observed values for both the aquifer and the stream approximately 80% of the time.