

Investigation of Improved Operational Streamflow Forecasting in the Rio Grande Basin

Shalamu Abudu and J. Phillip King (advisor)

Civil Engineering, New Mexico State University

Purpose of Study

Streamflow predictor variables used in seasonal water supply forecasting are usually highly inter-correlated. This study uses the partial least squares regression (PLSR) to balance the information in both predictors and response variables by focusing on the covariance between them and reduces the impact of large, but irrelevant, predictor variations. The objectives of this research are to investigate the application of PLSR in improving seasonal streamflow forecasting accuracy and to examine the utilization of Snow Telemetry (SNOTEL) data and composite indices to enhance forecast skills and operational capabilities of forecast equations.

Study Underway

The naturalized April-September streamflow volume at Del Norte gaging station, Rio Grande, Colorado and the March-July net inflow of Elephant Butte Reservoir, Rio Grande, New Mexico will be selected for modeling in this study. The development of PLSR forecasting equations for seasonal streamflow and reservoir net inflow using SNOTEL snow water equivalent, precipitation index, temperature index, and previous flow conditions as input variables will be investigated. The selection of an optimal number of components using the jackknife cross validation scheme and variable selection approach using PLSR will be analyzed in detail. The forecast performance of the proposed PLSR equations will be compared to other models and NRCS official forecasts to evaluate the performance of improved forecasting equations.

Benefits

With the outcome of this study, the proposed forecasting equations are expected to be easily applicable in operational streamflow and net inflow forecasting at the study sites in combination with NRCS official forecasts. The findings of this study may provide an impetus for in improving operational seasonal streamflow forecasting and benefit the efficient water resources management in Rio Grande Basin.



Shalamu Abudu is working on a Ph.D. in water resources engineering at NMSU.