

Role of Streamflow Seasonality in Influencing Water Quality Variability in the Southeastern US

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Most of the studies on water quality studies have focused on estimation of nutrient loadings and their concentrations at annual time scale with limited consideration to streamflow seasonality. Using the observed concentrations of Total Nitrogen (TN), Total Phosphorous (TP) and Dissolved Oxygen (DO) in 42 stations over the southeastern US, we identify critical seasons for monitoring TN, TP and DO. Mann-Kendall tests showed that there is no trend on these variables. Both rank correlation and partial correlation analyses showed that seasonal streamflow variability predominantly determines the TN, TP and DO variability during the spring and summer seasons. Using streamflow and water temperature as predictors, we employ canonical correlation analyses to predict the concentrations of TN and TP during the spring and summer seasons. Similarly, for predicting DO during the summer season, we employ principal component regression by considering TN, TP, streamflow and water temperature as predictors. Estimates of loadings obtained from the predicted TN and TP concentrations are compared with the estimates obtained from distributed pollutant runoff models (SPARROW). Our future studies will utilize these low-dimensional seasonal water quality models for developing strategies that could suggest appropriate/allowable loadings for point and nonpoint source pollutants based on seasonal streamflow forecasts contingent on climate information.