

Evaluation of recent hydro-climatic changes in four tributaries of the Niger River Basin (West Africa)

Badou DF
Kapangaziwiri E
Diekkrüger B
Hounkpè J
Afouda A

ABSTRACT:

West Africa experienced severe drought during the 1970s and 1980s, posing a threat to water resources. A wetter climate more recently suggests recovery from the drought. The Mann-Kendall trend and Theil-Sen's slope estimator were applied to detect probable trends in weather elements in four sub-basins of the Niger River Basin between 1970 and 2010. The cross-entropy method was used to detect breakpoints in rainfall and runoff, Spearman's rank test for correlation between the two, and cross-correlation analysis for possible lags. Results showed an overall increase in rainfall and runoff and a decrease in sunshine duration. Spearman's coefficients suggest significant (5%) moderate to strong rainfall–runoff correlation for three sub-basins. A significant lower runoff was observed around 1979, with a rainfall break around 1992, indicating possible cessation of the drought. Temperatures increased significantly, at 0.02–0.05°C year⁻¹, with a negative wind speed trend for most stations. Half of the stations exhibited an increase in potential evapotranspiration.