



HYDROLOGICAL SEASONALITY AS A MODULATOR OF LIMNOLOGICAL VARIABILITY IN SEMI-ARID RESERVOIRS

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The influence of hydrological seasonality on limnological dynamics in reservoirs of the Brazilian semi-arid region remains poorly understood, particularly regarding the consistency of responses across systems. This study evaluated the response of limnological parameters to dry and rainy periods in the Boqueirão and Acauã reservoirs (Paraíba river basin), using time series from 2015 to 2024, including years of prolonged drought (2015–2017). Variability was quantified using the coefficient of variation, multivariate patterns were assessed through Principal Component Analysis (PCA), and differences between periods were tested using the Wilcoxon test. The results revealed high temporal heterogeneity and the absence of a consistent seasonal pattern between reservoirs. In Boqueirão, greater sensitivity to seasonality was observed, with increased variability of total phosphorus (~169%) and orthophosphate (~176%) during the dry period, and higher turbidity (~178%) during the rainy period. In contrast, Acauã showed more homogeneous variability between periods. Despite the variations observed in Boqueirão, no significant differences were found between periods in either reservoir ($p > 0.05$), indicating a low direct seasonal influence. The PCA explained 53.5% of the total variance, showing a clear separation between reservoirs, without the formation of distinct clusters based on hydrological periods, highlighting the stronger influence of spatial differences over seasonal variations. These findings suggest that limnological variability is primarily structured by internal interactions and local and spatial characteristics, while hydrological seasonality acts as a secondary modulator. Therefore, its isolated use as an analytical criterion may lead to limited interpretations. Additionally, the regional drought occurring during the analyzed period and the fact that these reservoirs receive water from the São



Francisco River transposition are additional factors that may influence hydrological dynamics and seasonal patterns. Thus, monitoring and management strategies tailored to each reservoir are required, considering seasonality alongside internal variability and inter-system differences.

Keywords: *Paraíba River; water quality; hydrological variability; dry season; rainy season*

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