



SPATIAL AUTOCORRELATION OF BENTHIC MACROINVERTEBRATES IN RESERVOIRS ACROSS DIFFERENT SCALES IN THE SEMIARID REGION

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Understanding how aquatic communities are spatially structured is a long-standing goal in ecology and has become increasingly relevant in the context of climate change and growing hydrological instability. Community structuring results from the joint action of environmental filters and the spatial configuration of the landscape, whose effects may vary in intensity and even remain undetectable depending on the scale of analysis. Here, we evaluated the spatial autocorrelation (SAC) of benthic macroinvertebrates in reservoirs and along a cascade system in the Brazilian semiarid region. The eight reservoirs sampled in this study are located within the Paraíba and Mamanguape River basins. Among them, four receive water from the São Francisco River transposition and are arranged in cascade. Macroinvertebrates and environmental variables were collected across 15 sampling sites within each reservoir between 2021 and 2024. We analyzed SAC in macroinvertebrate community composition both within reservoirs and across the cascade using Mantel tests, based on geographic coordinates (latitude/longitude), community dissimilarity calculated with Bray–Curtis distance, and environmental variables using Euclidean distance. We recorded 64,064 organisms distributed across 74 taxa. Neither macroinvertebrates nor environmental variables showed SAC within reservoirs, but both exhibited significant SAC at the broader spatial scale of the cascade. SAC at the cascade scale indicates spatial dependence associated with connectivity and distance-decay in similarity. In contrast, the absence of spatial and environmental relationships at the local scale suggests weak community structuring, possibly related to environmental homogeneity or the predominance of stochastic processes. These findings show that community structuring in semiarid reservoirs emerges primarily at broader spatial scales, whereas patterns at local



scales tend to be less predictable, reinforcing the importance of incorporating spatial scale into ecological studies and management strategies for these systems.

Palavras-chave: *cascade; connectivity; Stochastic processes; environmental variables*