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Ecotoxicological risk assessment of tributaries to the Alqueva Reservoir (Southern Portugal)

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ABSTRACT

The Alqueva reservoir constitutes the most important water supply source in Southern Portugal, a Mediterranean region, affected by water scarcity and where agriculture is one of the main activities. The aim of this study was to assess the usefulness of ecotoxicological endpoints to detect chemical alterations in the tributaries to the Alqueva reservoir, that may affect its water quality. Water and sediment samples were collected during 2017 at four tributaries (Zebro, Álamos, Amieira and Lucefécit streams), which were analyzed for: (i) physicochemical support parameters; (ii) hazardous substances (pesticides), and (iii) ecotoxicological endpoints. The results for Zebro and Lucefécit, presented a 5-day biological oxygen demand (BOD₅) (Zebro: 4.0-35.5 mg L⁻¹; Lucefécit: 2.3-7.5 mg L⁻¹), and total phosphorus (Zebro: 0.18-6.23 mg L⁻¹; Lucefécit: 0.02-1.92 mg L⁻¹), concentrations that may compromise the support of life, with regard to nutrient and oxygenation conditions. Concerning pesticides, the concentrations detected were low, being bentazone the compound quantified at highest levels at Lucefécit (1.94 µg L⁻¹). As for the ecotoxicological characterization, samples from Zebro and Lucefécit streams were identified as toxic when using sublethal endpoints (e.g., reproduction, feed inhibition or growth inhibition). In conclusion, the ecotoxicological characterization identified the streams which promoted a higher negative impact in the reservoir, which is essential to delineate specific management actions to improve its ecological status and the balance of the respective ecosystems.

KEYWORDS

Alqueva tributaries, pesticides, ecotoxicological assessment, ecological status