

## Evaluation of the water quality in the Enxoé river: Eutrophization risk ?

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The Enxoé watershed belongs to the list of Portuguese watersheds where was identified a strong growth of cyanobacters with a consequent strong possibility of eutrophization. The Enxoé watershed is located in Beja (Alentejo-Portugal) and is included in the Guadiana river basin. The Enxoé river is a temporary river and Vale de Vargo is an affluent of this river. The aim of this work was the evaluation of the origin of some problems detected in the watershed, namely the eutrophization. Since Enxoé River (ER) and Vale de Vargo (VV) streamlets supply the Enxoé watershed, water samples were collected in both, in triplicate, along the year. The samples were analyzed for the following physico-chemical parameters: pH, electrical conductivity (EC), alcalinity (Alc), cations (Ca, Mg, Na, K, Fe), total soluble solids (TSS), nitrogen forms (NO<sub>3</sub>, NH<sub>4</sub>) organic-N (Norg), total dissolved N (Ntdiss), particulate organic carbon (POC), dissolved organic carbon (DOC), total P and P-PO<sub>4</sub>. The Piper diagram was used for the classification and comparison of the waters as far as concerns the dominant cations and anions. Based on the results, the waters collected in ER and in VV are identical, being characterized as calcium or magnesium bicarbonate waters. The year was divided in three semesters (Jan-Feb-Mar, Apr-May-Jun, and Sept-Oct-Nov) and for each semester was carried out, both for ER and for VV, a Principal Components Analysis (PCA). Using this analysis it was possible to reduce the number of parameters determinant of the behaviour of water quality. PCA evolved 3 PCs with eigenvalues > 1 explaining about 80% total variance. The results obtained in the 1st semester were identical

in both places, with the first PC accounting for a mean value of 40% of the total variance, showed high positive loading (>0,70) on EC, Ca, Mg, Na, and Alc, as well as on Fe, COP and the SST. The second PC (COD and Ntdiss) contributes on average with 15.5% of the total variance. The third PC (K, P, and P-PO<sub>4</sub>) accounts for 13.1% of total variance and shows the presence of P. In the 2nd trimester the PCA performed in ER and VV presented similar results. In both places the first PC accounts for 35.5% and 49.4% respectively of the total variance with high positive loadings between EC, NH<sub>4</sub>, Norg, Ptotal, P-PO<sub>4</sub>, K, Fe, while PC2 accounts for 18.9% and 16.6% of total variance, showed moderate loadings between pH and Ntdiss. In VV the third PC (9.3% of total variance) denotes the presence of NO<sub>3</sub> in the water. In the 3rd trimester once again ER and VV identical results were obtained with loading superiors then 80% for EC, Mg, Na e Cl and for the second PC between Norg and Ntdiss. According to the data obtained along this period, the PCA allowed us to distinguish which quality parameters, in each trimester influenced the water quality in ER and VV. The observed results in both locals are identical. As P concerns, the most important parameter in the eutrophization control, the obtained results showed us that only in the 2nd trimester its influence was significant. This was probably owed to stream flow changes due to precipitation variability.

### Keywords

eutrofization, water quality, phosphorus

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