

Susceptibility of water quality indexes to tidal cycle and its effect on monitoring campaigns

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Abstract

The application of Water Quality Indexes (WQI) is an essential part of the water framework directive. One of the main factors of variability in transitional waters is the tidal effect, but knowledge of its effect on WQI is still scarce. Therefore, the objective of this study is to evaluate such effect on the existing metrics (e.g. Chlorophyll's P90) used in Portugal for biological and environmental parameters. To accomplish this approach, weekly sampling was performed at two sampling points (Alcântara and Barreiro) in the Tagus estuary, during different tidal conditions. Both stations suffer from anthropogenic pressure, Alcântara being the most affected due its location near a commercial harbor and a sewage effluent from the largest wastewater treatment plant in the area. Barreiro is also affected by both anthropogenic pressures, but this station is located further away (200 m) from both pollution sources. Chlorophyll's P90 presented higher values during spring tides, at Alcântara up to 5.87 $\mu\text{g.L}^{-1}$ at low spring tides, while in Barreiro up to 6.78 $\mu\text{g.L}^{-1}$ during high spring tides. For nutrients, P90 is also used, yielding high variability for different tidal conditions. In Alcântara all nutrients had a similar pattern, with highest value at low neap tide and lowest at high spring tide. Barreiro presented lower nutrients P90 than Alcântara. At Barreiro nutrients presented different results from one another, with both low spring tides and low neap tide presenting the highest value for different nutrients. Dissolved oxygen pattern was similar in both sampling points, being P90 higher during neap tide and P10 inversely related with tide high. These results suggest that sampling during neap low tides could better expose anthropogenic pressure, since it is when residence times are higher, and the water column is lower. This can support the definition of better adjusted monitoring plans.