



USING AQUATIC MACROPHYTE TO FORECAST EMERGENT PROPERTIES OF A SUBTROPICAL EUTROPHIC RESERVOIR OWING TO CLIMATE CHANGES

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Climate change alters carbon cycling in freshwater ecosystems. To forecast properties arising from such changes in a subtropical eutrophic reservoir (Monjolinho Reservoir: 22° 00'S and 47° 54'W; Brazil), a mathematical model was developed to describe both the growth and decomposition of a free-floating macrophyte (*Pontederia crassipes*). Growth rates (μ) and decomposition rates (k) were modulated by temporal variations in: temperature (air and water), pH, total inorganic nitrogen, and total phosphorus. The incidence area (= carry capacity) was also considered. The model used first-order kinetics and parameters from the literature and experiments. The simulations accounted for the current average monthly air temperature and an IPCC scenario ($T + 2^\circ\text{C}$). After reaching steady state, a 2°C rise will reduce the amount of organic matter in the sediment by 34%. The *E. crassipes* biomass will increase 12.7%, and the net primary production (NPP) will decrease by ca. 33%. The following properties are expected: i) shorter time for the crop to reach carrying capacity; ii) lower NPP rates due to carrying capacity constraints; iii) the stock of living biomass will be larger than the current, and the amount of organic detritus in sediments will be lower. These properties will promote increases in BOD and decreases in euphotic zone depth and dissolved oxygen concentrations; thus, the biota can change. The highest mineralization rates may also promote increases in greenhouse gas emissions; the higher temperatures of subtropical aquatic systems tend to increase emissions due to lower saturation concentrations. The predicted effects are more pronounced with increased eutrophication, when growth and decomposition are usually faster and generate better mineralization conditions. In turn, the NPP tends to be physically limited.

Key-words: *Pontederia crassipes*; net primary production; decomposition; math model.

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