



Water quality influence the phytoplankton and bacteria abundance: a comparison between shallow freshwater and saltwater ponds

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ABSTRACT

Study for understanding the role of various water quality parameters on phytoplankton and bacteria density in shallow freshwater and saltwater ponds is lacking. Therefore, the present study was conducted to understand the difference in the influence of various water quality parameters on phytoplankton and bacteria density in freshwater and saltwater ponds. A series of water quality parameters, phytoplankton biomass [as indexed by chlorophyll-a (Chl-a)], the density of bacteria and trophic state (as indexed by TRIX index) were determined monthly in two freshwaters and two saltwater ponds located in Kuantan, Pahang, Malaysia. Apart from pond type and temporal effects, multivariate ordinations were performed using two different datasets: water quality, and phytoplankton and bacteria. Water temperature, salinity, and the concentration of total suspended solids (TSS) and ammonia was significantly ($p < 0.05$) higher in June–July than in August. This trend was not observed in the TRIX index and nitrite concentration, which were higher in August than in June–July. The Chl-a concentration differed significantly ($p < 0.05$) between ponds, with higher mean values in ponds with freshwater than in ponds with saltwater. The density of bacteria was consistent ($p > 0.05$) throughout the study period in both freshwater and saltwater ponds. All ponds under study are oligotrophic. In all ponds, the water quality dataset explained the overall variation in phytoplankton and bacteria abundance quite well. Phytoplankton biomass in freshwater ponds is greatly related to phosphate and slightly related to ammonia and water depth. In saltwater ponds, nitrogenous nutrients (nitrate and ammonia) were strong predictors of phytoplankton biomass and stronger than salinity, TSS and pH. Turbidity was the strongest predictor of bacteria density in freshwater and saltwater ponds. It had strong negative influences on bacteria density in freshwater ponds whereas, it had strong negative influences on bacteria density in saltwater ponds. The results of this study support and emphasize the importance of developing appropriate programs for the monitoring and conservation of various freshwater and saltwater ponds.

Keywords: Plankton biomass, Bacteria density, Index, Conservation, Monitoring

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