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Study Multi-Models to Estimate the Primary Productivity of Sawa Lake

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Abstract

Sawa Lake is a permanent lake, it is located at the eastern edge of the southern desert of Iraq, it takes place about 23 km from the city center of Samawa, southwest of Al-Muthanna Governorate. The primary productivity of Sawa Lake was studied using different models. The study was conducted for one year from November 2020 to October 2021, three sites were selected for sample collection some of the physical and chemical properties of the lake water were measured the biological properties were determined a quantitatively and qualitatively study of phytoplankton, chlorophyll measurement, and the net primary productivity.

The results showed that the air temperature ranged between (9-37.16°C) and the water temperature ranged between (6.33-26°C). The pH values had a narrow range in all seasons and ranged between (7.5-9.3), while the salinity values range from (13.64) to (87.97‰).

Clear fluctuation in the nutrients concentrations were noticed nitrite concentrations ranged between (0.89-19.92) µg/L and nitrate concentrations ranged between (7.65-251.79) µg/L. The phosphate concentrations ranged between (0.10-2.37) µg/L. The results showed that chlorophyll concentrations were between (0.11-9.8) mg/L.

Sixty-eight species of phytoplankton were reported during the study period. The Bacillariophyceae was the dominant class of phytoplankton followed by Cyanophyceae, Chlorophyceae, Pyrrophyceae, and Euglenyceae. *Gomphosphaeria aponina*, *Chroococcus minor kutz*, *phormidium tenue*, *Fragilaria capucina*, *Synedra acus*, *Glenodinium pulvisculus*, *Peridinium cinictum*, *Cymbella helvetica* were the dominant species in all the locations. Monthly and local variations were observed in the total numbers of phytoplankton during the study period. The total number of phytoplankton ranged from (26.45) to (543.34) cells * 10³/L.

The results showed that, the values of the gross and net primary productivity ranged between (0 - 3.75) and (0 - 3.25) mg / m³ / h, respectively. The values of phytoplankton net primary production ranged between (7242.6 - 141.09) mg/m²/ y. Based on the classification of lakes and according to phytoplankton primary productivity, Sawa Lake can be classified an Oligotrophic Lake.

The results of the statistical analyzes showed that there were significant differences in the physical, chemical, biological factors, and primary productivity, and the presence of significant and non-significant negative and positive correlations during the study period at the probability level of P≤0.05, such as a positive correlation between water temperature with nitrite and nitrate

($r = 0.923$; $r = 0.902$) respectively and, negative correlation between salinity and net primary productivity ($r = -0.63$).