Assessing endorheic lake water quality with emphasizing on water physicochemical parameters in the Subang Lake, Selangor, Malaysia

X. L., Chai, H., Rohasliney[*], and I. S., Kamaruddin

UNIVERSIDAD DE GUANAJUATO

GTO Grandeza de México

CONAGUA Comisión Nacional del Agua

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Introduction
The Malaysian lake's status is varied from poor condition to moderate condition status based on the TSI value that ranged from 37.4 to above 47.4 (Shahabudin & Musa, 2018). Lakes and reservoirs worldwide experience the most common problems: eutrophication, sedimentation, and weed infestation, and there are more than 60% of the 90 lakes in Malaysia experience eutrophication (Huang et al., 2015; Sharip & Zakaria, 2008).

Problem statement: Subang Lake is an endorheic lake which sensitive to the environmental changes. The rapid urbanization was sprawling around Subang Lake.

Objectives: To determine the wáter quality of Subang Lake and to categorize the wáter quality of Subang Lake.

Significant of study:
1. Sustaining the freshwater lake ecosystem in a healthy state is crucial to prevent intense pressure.
2. The current, on-going, and emerging problems can be detected earlier.
3. The lake services can be protected as sustaining a freshwater lake starts with understanding the interconnectedness between land and water of the lake.

Methodology

Study Area: Subang Lake is an endorheic lake which located in Petaling district, Selangor, Malaysia. Subang Lake is operated by Pengurusan Air Selangor Sdn. Bhd. Seven sampling points were selected which distribute the entire Subang Lake

Water Physicochemical Parameters collection:
1. In-situ water physicochemical parameters: Dissolved oxygen (DO), pH, temperature, electrical conductivity, and turbidity
2. Laboratory analysis for water physicochemical parameters: ammoniacal-nitrogen, nitrite, nitrate, phosphate, biochemical oxygen demand, and chemical oxygen demand

Data Analysis: Descriptive analysis was conducted to summarize the water physicochemical parameters. Repeated analysis of variance (ANOVA) was conducted to determine significant difference of water physicochemical parameters between sampling points and cluster analysis was conducted to classify the objects into clusters or groups to reveal the essential characteristics based on the similarity.

Results

Table 1. Summary of water physicochemical parameters of Subang Lake

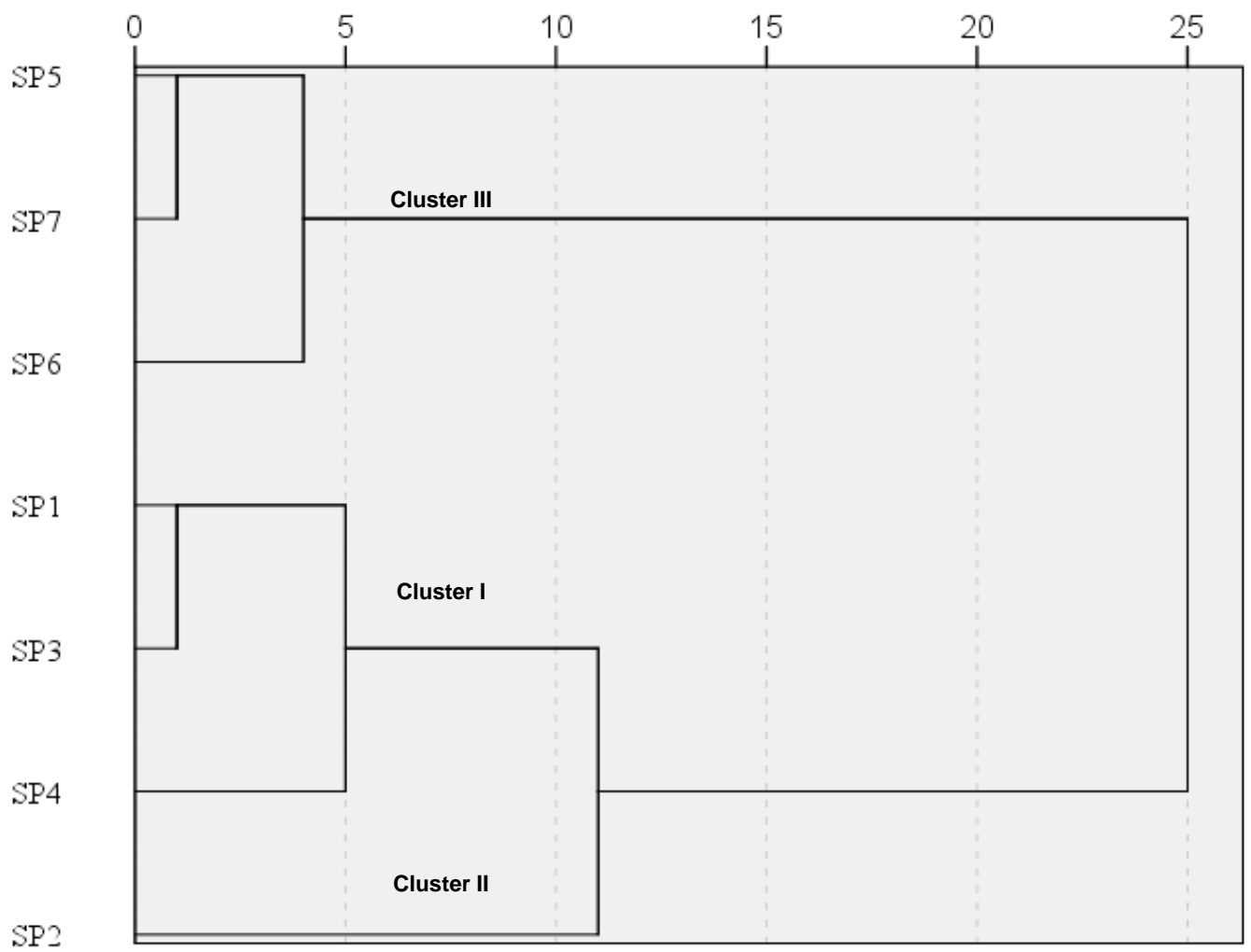| Physico-chemical characteristics	Units	Mean ± SD (Subang Lake)
Temperature	° C	30.7 ± 0.5
Dissolved Oxygen	mg/L	6.74 ± 0.88
pH	-	6.19 ± 0.17
Electrical Conductivity	µS/cm	13.03 ± 0.61
Turbidity	NTU	4.45 ± 0.62
Biochemical Oxygen Demand	mg/L	2.49 ± 1.10
Chemical Oxygen Demand	mg/L	21 ± 4.2
Ammoniacal Nitrogen	mg/L	0.05 ± 0.04
Nitrite	mg/L	0.003 ± 0.002
Nitrate	mg/L	0.3 ± 0.2
Total Phosphorus	mg/L	0.03 ± 0.02

Figure 1. Dendrogram of the seven sampling points using hierarchical cluster analysis based on water physicochemical parameters of Subang Lake, Selangor, Malaysia

Conclusions
The water quality of Subang Lake was generally ranged between good and moderate, with two parameters are near the limit of NLWQS. According to NLWQS, the contaminant limits for particular category A parameters are more stringent than the drinking standard for raw water. Therefore, the water quality of Subang Lake is considered as good water quality and able to support the aquatic ecosystem. Although COD concentration and pH were higher than the standard in category A, COD concentration and pH at Subang Lake are still within the WHO permissible limits (1996). The primary sources of pollutants that affected the water quality in Subang Lake are mainly natural sources such as leaves, woody debris, the decay of dead plants and animals.

Acknowledgments

References

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