

# Microcrustacean Community Structure Varies with Trophic Status and Environmental Variables in Tropical Shallow Lakes in Malaysia

Table 1. Morphometric characteristics of Sembrong, Putrajaya and Subang lakes.

Characteristics	Sembrong lake	Putrajaya lake	Subang lake
Surface area, ha	850	400	66.4
Water capacity, $\times 10^6$ m <sup>3</sup>	18	24	3.5
max depth, m	7.2	13	15
Mean depth, m	5.1	6.6	9.1
Age of lakes, years	32	19	66
Catchment area, km <sup>2</sup>	130	50.9	10.2
Catchment activity	Agricultural	Residential	Forestry
Purpose	Flood mitigation & water supply	Recreational activities	Water supply

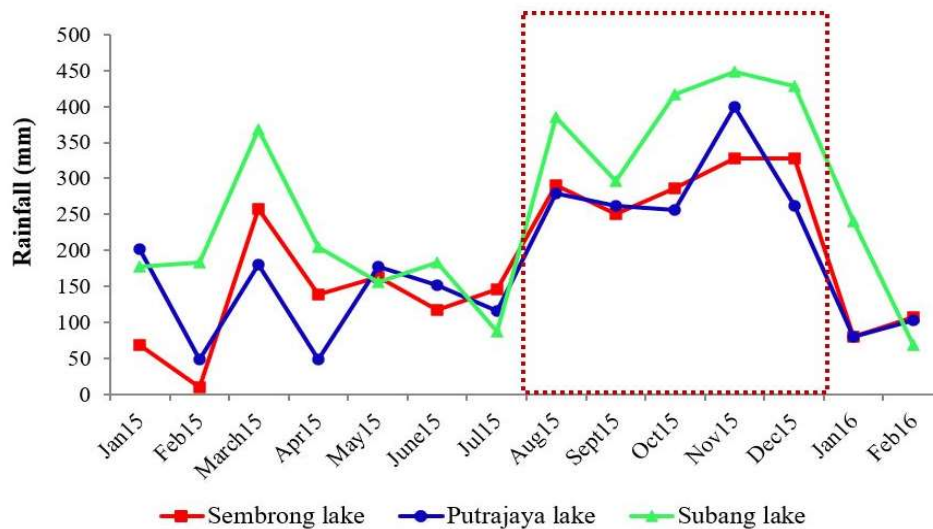


Figure S1. Monthly total rainfall in Sembrong, Putrajaya and Subang lakes from January 2015 to February 2016. Rectangular box (with dashed lines) indicates the wet season which occurred between August to December 2015.

**Table 2.** Mean densities (ind. L<sup>-1</sup>) and percentages (%) of A) total microcrustacean, B) total adult microcrustaceans and C) total developmental stages of microcrustaceans in different lakes.

<b>A</b>	<b>Sembrong lake</b>		<b>Putrajaya lake</b>		<b>Subang lake</b>	
	<b>Mean density</b>	<b>%</b>	<b>Mean density</b>	<b>%</b>	<b>Mean density</b>	<b>%</b>
Adult	141.2 ± 37.8	48.0	73.2 ± 16.1	57.4	6.5 ± 2.55	22.7
Developmental stages	153.4 ± 37.3	52.0	54.4 ± 10.3	42.6	22.1 ± 4.3	77.3
Total	294.6 ± 6.1	100	127.6 ± 9.4	100	28.6 ± 7.8	100

\* Density and percentage of total microcrustacean

<b>B</b>	<b>Stage</b>	<b>Sembrong lake</b>		<b>Putrajaya lake</b>		<b>Subang lake</b>	
		<b>Mean density</b>	<b>%</b>	<b>Mean density</b>	<b>%</b>	<b>Mean density</b>	<b>%</b>
Cladocerans	Adult	108.4 ± 17.3	76.8	52.7 ± 5.5	72.0	0.7 ± 0.1	10.8
Copepods	Adult	32.8 ± 3.3	23.2	20.5 ± 2.6	28.0	5.8 ± 0.8	89.2
	Total	141.2 ± 37.8	100	73.2 ± 16.1	100	6.5 ± 2.55	100

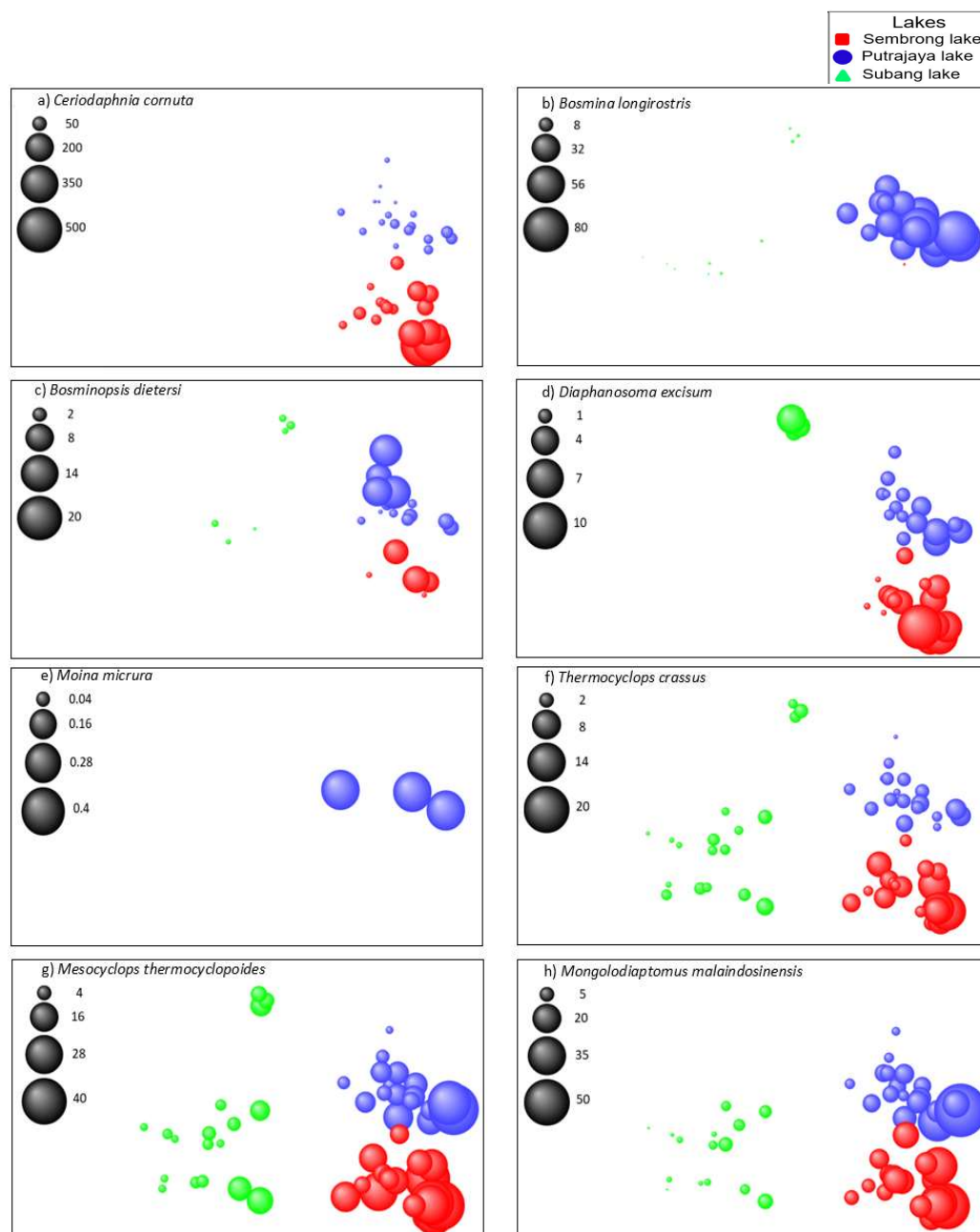
\* Density and percentage of total adult microcrustaceans

<b>C</b>	<b>Stages</b>	<b>Sembrong lake</b>		<b>Putrajaya lake</b>		<b>Subang lake</b>	
		<b>Mean density</b>	<b>%</b>	<b>Mean density</b>	<b>%</b>	<b>Mean density</b>	<b>%</b>
Cladocerans	Juvenile	8.8 ± 1.1	5.7	3.8 ± 0.5	7.0	0.0 ± 0.0	0.0
Copepods	Copepodite	19.0 ± 2.2	12.4	12.4 ± 1.7	22.8	7.1 ± 2.9	32.1
	Nauplius	125.6 ± 13.3	81.9	38.2 ± 6.3	70.2	15.0 ± 2.9	67.9
	Total	153.4 ± 37.3	100	54.4 ± 10.3	100	22.1 ± 4.3	100

\* Density and percentage of total developmental stages of microcrustaceans

**Table S3.** Mean adult densities (ind. L<sup>-1</sup>) and percentages (%) of microcrustacean species in hypereutrophic Sembrong, meso-eutrophic Putrajaya and acidic-mesotrophic Subang lakes.

Family	Species	Sembrong lake		Putrajaya lake		Subang lake	
		Mean density	%	Mean density	%	Mean density	%
(Cladoceran)							
Bosminidae	<i>Bosmina longirostris</i>	0.0 ± 0.0	0.0	34.3 ± 5.2	46.9	0.1 ± 0.0	1.6
	<i>Bosminopsis dietersi</i>	1.0 ± 0.6	0.7	2.7 ± 0.9	3.7	0.1 ± 0.1	2.0
Chydoridae	<i>Anthalona harti</i>	0.0 ± 0.0	0.0	0.1 ± 0.0	0.0	0.0 ± 0.0	0.0
Daphniidae	<i>Ceriodaphnia cornuta</i>	104.6 ± 29.3	74.0	14.2 ± 2.4	19.4	0.0 ± 0.0	0.0
Moinidae	<i>Moina micrura</i>	0.0 ± 0.0	0.0	0.1 ± 0.0	0.1	0.0 ± 0.0	0.0
Sididae	<i>Diaphanosoma excisum</i>	2.8 ± 0.6	2.0	1.3 ± 0.3	1.8	0.5 ± 0.3	6.9
	Sub total	108.4 ± 17.3	76.7	52.7 ± 5.5	71.9	0.7 ± 0.1	10.5
(Copepods)							
Cyclopidae	<i>Mesocyclops thermocyclopoides</i>	15.6 ± 2.5	11.1	9.4 ± 2.3	12.8	3.6 ± 0.7	55.6
	<i>Thermocyclops crassus</i>	4.5 ± 0.8	3.2	1.7 ± 0.3	2.4	1.1 ± 0.2	16.3
Diaptomidae	<i>Mongolodiaptomus malaindosinensis</i>	12.7 ± 2.1	9.0	9.4 ± 2.7	12.8	1.1 ± 0.3	17.6
	Sub total	32.8 ± 3.3	23.3	20.5 ± 2.6	28.0	5.8 ± 0.8	89.5
	Grand total	141.2 ± 37.8	100	73.2 ± 16.1	100	6.5 ± 2.5	100
	Total number of family	5		7		4	
	Total number of species	7		9		6	
	Shannon-Wiener diversity index (H') (Mean & Range)	0.9 ± 0.0 0.7–1.1		1.3 ± 0.0 1.2–1.4		0.6 ± 0.1 0.3–0.8	



**Figure S2.** Non-metric multidimensional scaling (nMDS) of major microcrustacean species distribution in different lakes. The size of the ball denotes the density in ind. L<sup>-1</sup>.

**Table S4.** Summary of physical and chemical parameters that explain the microcrustacean community in the study area, showing spearman rank correlation ( $\rho$ ) obtained by BIO-ENV analysis.

<b>Global Rho (<math>\rho</math>) = 0.506; <math>p</math> = 0.1%</b>		
<b>No.</b>	<b>Correlation</b>	<b>Selections</b>
<b>Variables</b>	<b>(<math>\rho</math>)</b>	
1	0.326	Chlorophyll <i>a</i>
2	0.459	Chlorophyll <i>a</i> , transparency
3	0.506	Chlorophyll <i>a</i> , transparency, total phosphorus
4	0.454	Chlorophyll <i>a</i> , transparency, turbidity, total phosphorus
5	0.421	Chlorophyll <i>a</i> , total phosphorus, transparency, turbidity, total nitrogen