

COMPARATIVE STUDY OF AQUATIC INSECTS' COMMUNITIES
FOR WATER QUALITY ASSESSMENT IN SURABAYA PERIOD
OF 2005-2006, KAMPUNG PERANGKAP, TERENGGANU

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COMPARATIVE STUDY OF AQUATIC INSECTS' COMMUNITIES FOR
WATER QUALITY ASSESSMENT IN SUNGAI PERES AND
SUNGAI BUBU, HULU TERENGGANU, TERENGGANU

By

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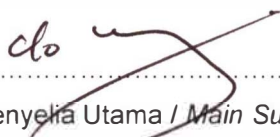


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LIST OF ABBREVIATIONS

ANOVA	-	One-Way Analysis of Variance
ASPT	-	Average Score Per Taxon
BMWP	-	Biological Work Monitoring Party
BOD	-	Biological oxygen demand
C	-	Chironomidae
COD	-	Chemical oxygen demand
DO	-	Dissolved oxygen
EPT	-	Ephemeroptera, Plecoptera, Trichoptera
FBI	-	Family Biotic Index
INWQS	-	Interim National Water Quality Standards
MVSP	-	Multivariate Statistic Package
SPSS	-	Statistical Package for the Sosial Sciences
TDS	-	Total dissolved solids
TSS	-	Total suspended solids
WQI	-	Water Quality Index

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ABSTRACT

The study was done for four months (August-November, 2006) using the biomonitoring approach based on aquatic insects in relation to water physico-chemical parameters to assess, classify and compare the water quality of Sungai Peres and Sungai Bubu. A total of 3409 individuals of aquatic insects representing 42 families from nine orders were collected using disturbance-removal sampling technique. The total number of aquatic individuals did not differ significantly between two streams but showed a higher abundance at the upstreams ($Z = -2.519$, $P = 0.012$) compared to downstreams. The Ephemeroptera, Plecoptera, Trichoptera (EPT) Index and EPT to Chironomidae ratio (EPT:C) showed that the pollution-sensitive EPT were present in high diversity and abundance, especially at the upstreams, while the distribution of resistant Chironomidae was higher at downstreams. Family Biotic Index (FBI), Biological Monitoring Work Party (BMWP) and Average Score Per Taxon (ASPT) showed that the water quality of both streams varied from good to excellent. Heptageniidae, Perlidae and Hydropsychidae were the most abundant in both streams. One individual from Chlorocyphidae, Gerridae, Dryopidae and Hydrochidae was found strictly in Sungai Peres. Meanwhile, in Sungai Bubu, one individual from Ephemeridae, Potamanthidae, Ecnomidae, Calopterygidae, Chlorocyphidae, Chlorogomphidae and Platycnemididae was collected. Correlation analysis indicated an apparent negative influence of the total suspended solids (TSS) on the aquatic insects' communities, in terms of number of orders ($R = -0.417$, $P < 0.004$), families ($R = -0.362$, $P < 0.014$) and individuals ($R = -0.291$, $P < 0.050$) of aquatic insects. The width of streams showed positive correlation to the number of orders ($R = 0.360$, $P < 0.014$), while pH was positively correlated to the number of families ($R = 0.393$, $p < 0.029$) and individuals ($R = 0.509$, $P < 0.003$). The *in situ* measurements of water physico-chemical parameters classified both streams as Class I based on the Interim National Water Quality Standards (INWQS). An on-going monitoring of the water quality of streams should be done by integrating the biological, physical and chemical aspects for appropriate water management.

KAJIAN PERBANDINGAN KOMUNITI SERANGGA AKUATIK UNTUK PENILAIAN KUALITI AIR DI SUNGAI PERES DAN SUNGAI BUBU, HULU TERENGGANU, TERENGGANU

ABSTRAK

Kajian ini telah dijalankan selama empat bulan (Ogos-November, 2006) menggunakan pendekatan pemantauan biologi yang berasaskan serangga akuatik serta parameter fizikal and kimia air untuk menilai, mengklasifikasi dan membanding kualiti air di Sungai Peres and Sungai Bubu. Sejumlah 3409 individu serangga akuatik mewakili 42 famili daripada sembilan order telah dikumpul dengan menggunakan teknik pensampelan “disturbance-removal”. Perbezaan jumlah individu serangga akuatik di antara Sungai Peres and Sungai Bubu adalah tidak ketara namun kelimpahan adalah lebih tinggi di hulu sungai ($Z = -2.519$, $P = 0.012$). Indeks Ephemeroptera, Plecoptera dan Trichoptera (EPT) serta nisbah EPT kepada Chironomidae (EPT:C) menunjukkan bahawa kepelbagaian dan kelimpahan EPT (spesies yang sensitif kepada pencemaran) adalah tinggi, terutamanya di hulu sungai sedangkan taburan Chironomidae (spesies yang lebih bertoleransi terhadap pencemaran) adalah tinggi di hilir sungai. Family Indeks Biotik Famili (Family Biotic Index, FBI), Kumpulan Kerja Pemantauan Biologi (Biological Monitoring Work Party, BMWP) dan Purata Skor Per Taxa (Average Score Per Taxon, ASPT) menunjukkan perubahan kualiti air Sungai Peres and Sungai Bubu dari bersih ke sangat bersih. Kelimpahan Heptageniidae, Perlidae dan Hydropsychidae adalah paling tinggi di semua substesen. Satu individu daripada famili Chlorocyphidae, Gerridae, Dryopidae and Hydrochidae telah dijumpai di Sungai Peres sedangkan satu individu daripada famili Ephemeridae, Potamanthidae, Ecnomidae, Calopterygidae, Chlorocyphidae, Chlorogomphidae dan Platycnemididae dijumpai hanya di Sungai Bubu. Analisis korelasi menunjukkan bahawa jumlah pepejal terampai mempunyai pengaruh negatif ke atas komuniti serangga akuatik dari segi bilangan order ($R = -0.417$, $P < 0.004$), famili ($R = -0.362$, $P < 0.014$) and individu ($R = -0.291$, $P < 0.050$). Lebar sungai menunjukkan korelasi positif terhadap bilangan order ($R = 0.360$, $P < 0.014$) dan pH juga berkorelasi dengan bilangan famili ($R = 0.393$, $P < 0.029$) and individu ($R = 0.509$, $P < 0.003$) secara positif. Pengukuran *in situ* parameter fizikal

and kimia sungai mengkelaskan Sungai Peres dan Sungai Bubu dalam Kelas I berdasarkan Piawai Interim Kualiti Air Kebangsaan (Interim National Water Quality Standards, INWQS). Pemantauan kualiti air sungai yang berterusan harus dijalankan dengan mengintegrasikan aspek-aspek biologi, fizikal dan kimia untuk pengurusan air yang bersesuaian.