AQUATIC INSECT COMMUNITIES IN DIFFERENT TYPES OF LAND USE IN AND AROUND THE STREAMS OF KINABALU PARK, SABAH, MALAYSIA

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ABSTRACT

The objective of this study was to evaluate effects of land use on aquatic insect communities on streams in and around Kinabalu Park. Six sampling stations located in forest area, housing area and agricultural area were selected. Aquatic insects were sampled with Surber net from June 2012 to January 2013. Total abundance, taxa richness, diversity indices and biotic indices were calculated. Difference between sampling stations and sampling occasions were tested with Kruskal-Wallis Test. Aquatic insect composition and distribution was analyzed with cluster analysis. In addition, multiple linear regression was used to relate the aquatic insect abundance and richness against environmental variables. Aquatic insect collection in this study yielded 11694 individuals, nine orders, 50 families and 71 genera. Ephemeroptera was the most abundant order (26.16%) while *Stenelmis* spp. (10%) was the most abundant taxa. Kruskal-Wallis test showed significant differences ($p < 0.05$) between sampling stations for abundance, richness, Simpson's diversity, Shannon's diversity, EPT index, and BMWP index. No significant difference shown between sampling occasions. Cluster analyses resulted in two groups: first group consisted of Housing Area Station 2 (H2) and Agricultural Area Station (A1); second group formed by Forest Area Station 2 (A2) and both Forest Area Stations (F1 and F2). Based on the water parameters, most of the stations were classified as Class I. Assessment based on biotic indices showed most stations were not impacted, except for H1 stations with low EPT taxa (seven families) and the absent of order Plecoptera. Regression results showed that water temperature, current velocity, stream width and depth were the most influential variables on aquatic insect abundance and richness.
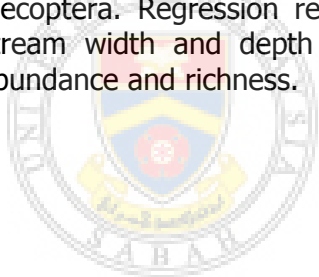
ABSTRAK

KOMUNITI SERANGGA AQUATIK DI PELBAGAI JENIS PENGGUNAAN TANAH DALAM DAN SEKITAR SUNGAI TAMAN KINABALU, SABAH, MALAYSIA

Objektif kajian ini adalah untuk menilai kesan penggunaan tanah terhadap komuniti serangga akuatik di sungai Taman Negara Kinabalu. Sebanyak enam stesen yang merangkumi kawasan hutan, kawasan perumahan, dan kawasan pertanian telah dipilih. Jaring Surber digunakan untuk persampelan serangga akuatik di antara Jun 2012 sehingga Januari 2013. Kelimpahan, kekayaan taksa, indeks kepelbagaian, indeks biotik telah dikira. Perbezaan antara stesen persampelan dan tempoh persampelan diuji dengan ujian Kruskal-Wallis. Komposisi dan taburan serangga akuatik dianalisis dengan menggunakan analisis kluster. Analisis regresi linear berganda digunakan untuk menghubungkaitkan kelimpahan dan kekayaan serangga akuatik terhadap pembolehubah persekitaran. Kajian ini menghasilkan 11694 individu, sembilan order, 50 famili dan 71 genera serangga akuatik. Ephemeroptera merekodkan kelimpahan order yang paling tinggi (26.16%) manakala Stenelmis spp. kelimpahan genera yang tertinggi (10%). Ujian Kruskal-Wallis menunjukkan perbezaan yang signifikan ($p<0.05$) di antara stesen persampelan untuk kelimpahan, kekayaan, indeks kekayaan Simpson, indeks kekayaan Shannon, indeks EPT, dan indeks BMWP. Tiada perbezaan yang signifikan di antara tempoh persampelan. Keputusan analisis kluster menghasilkan dua kumpulan: kumpulan pertama merangkumi stesen kawasan perumahan 2 (H2) dan stesen kawasan pertanian 1 (A1); kumpulan kedua dibentuk dari Stesen Kawasan Perumahan 2 (A2) dan kedua-dua Stesen Kawasan Hutan (F1 dan F2). Berdasarkan parameter air, semua stesen diklasifikasikan kepada Kelas I. Penilaian berdasarkan indeks biotik menunjukkan kebanyakan stesen tidak terjejas, kecuali stesen H1 mencatatkan taksa EPT (tujuh famili) yang rendah dan ketidakhadiran order Plecoptera. Keputusan analisis regresi menunjukkan suhu air, kelajuan arus, kelebaran sungai dan kedalaman sungai adalah pembolehubah yang paling mempengaruhi kelimpahan dan kekayaan serangga akuatik.