

Comparative analyses of biotic indices based on benthic macroinvertebrates for stream water quality assessment at tropical streams

ABSTRACT

Biotic indices application to other countries required testing and adaptations to local environments. However, their testing remains lacking in Malaysia. Therefore, this study analysed the performance of various biotic indices, in their sensitivity, responses, and seasonal stability. Fifteen sampling sites composed of reference and disturbed sites were selected and 14 indices were analysed for their performance. These indices include the Ephemeroptera, Plecoptera, and Trichoptera (EPT), Hilsenhof's Family Biotic Index (FBI), Original Biological Monitoring Work Party (BMWP), Original Average Score Per Taxa (ASPT), Thailand's Biological Monitoring Work Party (BMWP-Thai), Thailand's Average Score Per Taxa (ASPT-Thai), Vietnam's Biological Monitoring Work Party (BMWP-Viet), Vietnam's Average Score Per Taxa (ASPT-Viet), South Africa Score System Version 5 (SASS5), ASPT of South Africa Score System Version 5 (ASPT-SASS5), Stream Invertebrate Grade Number Average Level Version 2 (SIGNAL2), and Singapore's Biotic Index (SingScore), Malaysian Biological Monitoring Work Party (BMWP-My), and Malaysian Family Biotic Index (MFBI). Among the tested biotic indices, the EPT, BMWP-Thai, BMWP-Viet, SASS5, and BMWP-My were sensitive in discriminating the reference from disturbed sites. Most indices had significant linear relationships with phosphates, except the ASPT and ASPT-Thai. Meanwhile, EPT, BMWP-Viet, and BMWP-My were also associated with the habitat scores significantly. While only four biotic indices showed significant differences seasonally, the water quality classification between seasons was highly varied. In conclusion, EPT, BMWP-Viet, and BMWP-My showed better performances in discriminating the reference sites from disturbed sites, while associated with both phosphate and habitat score. As the water quality classification was highly varied seasonally, it is recommended to calculate the biotic indices during the dry season.