

Longitudinal distribution of the functional feeding groups (FFGs) of aquatic macroinvertebrates and ecosystem integrity of Tokwe River, Zimbabwe

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Abstract

Knowledge of functional feeding groups (FFGs) is key in understanding energy flow and matter transfer in lotic systems. The River Continuum Concept (RCC) model attempts to capture this flow by looking at the distribution of FFGs. The FFGs approach is informative because it allows assessment of the degree to which invertebrates in streams are dependent upon particular nutritional resource/s. We assessed the ecosystem integrity of Tokwe River, Zimbabwe, and whether it conforms to the RCC by analyzing macroinvertebrates from three zones along the river. A total of 2 172 specimens belonging to five feeding groups (FFGs) were collected. Filters were the dominant group in all zones with proportions of 37.7%, 53.1%, and 53.2% in the upstream, inundated and downstream zones, respectively. Predators (33.9% upstream) and collector-gatherers (25.9% inundated, 32.9% downstream) were second in frequency. Shredders were the least represented in all zones (< 3.1%). The highest proportion of filters (53.1%) and shredders (3.1%) occurred in inundated zones. Predator population was generally but insignificantly correlated to prey ($p > 0.05$). Scrapper's contribution was significantly lower in the inundated than in other environments ($p < 0.05$). All zones were strongly heterotrophic, non-performing and overburdened with predators although channel stability was high, hence high proportion of filters. The study showed that the distribution of FFG was not in conformity to the RCC but had tenants of Hierarchical Patch Distribution model which was modified by elements of the Flood Pulse model, and that ecosystem integrity and health are highly compromised by anthropogenic activities.