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The biological integrity of streams and channels draining into the Rwizi River system in Western Uganda

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Abstract
Rwizi River, often called the life-line river, supports over five million people in Western Uganda and is a major contributor of freshwater to Lake Victoria. Surrounded by a large and rapidly growing population, the river has suffered anthropogenic disturbances whose impact on the integrity of the system is a subject of concern. Aquatic macroinvertebrates, used globally to monitor both short- and long-term environmental conditions, were thus used to assess the biological integrity of streams and channels draining into the river system. Macroinvertebrates were sampled for six months in 2017 encompassing the wet and dry seasons using the *kick net* sampling method. The macroinvertebrates were identified morphologically using peer reviewed identification keys and their pollution sensitivity scored using the Tanzanian River Scoring System (TARISS). The Shannon diversity index was computed per site and related to average score per taxon (ASPT). We collected a total of 5442 macroinvertebrates belonging to 54 families dominated by Chironomidae (29.1%). Macroinvertebrate diversity increased with ASPT ($r = 0.57$; $N = 131$; $P = 0.000$). The water quality was generally poor and was not affected by the season ($t = 1.03$; $df = 64$; $P = 0.303$) though sites had different water quality ($F = 11.32$; $df = 20$; $P = 0.000$) attributed the degree of anthropogenic disturbance. We concluded that river Rwizi system is highly degraded and thus recommend restoration of the entire catchment. Aquatic macroinvertebrates are good indicators of long-term conditions but less sensitive to short-term changes. Multiple approaches, biological and chemical, are encouraged during the restoration process.

Keywords: *Bioassessment; ecosystem health; water quality; benthic macroinvertebrates; biomonitoring*

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Introduction

The task of preserving the integrity of freshwater reserves is today's greatest challenge for mankind (Hermoso, *et al.*, 2016). This is majorly due to the anthropogenic related impacts on the quality of freshwater bodies. Access to safe water is a global priority (UNDP, 2015) and is a key point of discussion at several national and international platforms (Fagan, *et al.*, 2015). Water and sanitation services contribute to sustainable development and cater for rapid economic development and social transformation. To ensure the desired water quality, states have invested in constant monitoring as a prerequisite for timely management interventions (Kaaya, Day, & Dallas, 2015).

Rwizi river, a major contributor to the waters of L. Victoria, is an important freshwater reserve and supports a large and rapidly growing population in Western Uganda. It is the major source of water for people in South Western