

Effects of river regulation on aquatic invertebrate community composition: a comparative analysis

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Abstract

Although natural flooding plays a crucial role in shaping the composition of aquatic communities, most rivers around the world have been regulated or dammed for anthropogenic purposes. This affects the biological and chemical composition of these ecosystems. Although studies have demonstrated the negative effects of river regulation on aquatic invertebrate communities globally, there is a scarcity of research in Africa, despite its vulnerability to anthropogenic use. This study aimed to compare aquatic invertebrate communities between the regulated Phongolo River and the unregulated Usuthu River, South Africa and to determine whether the largest lake in the region (Lake Nyamithi), which receives water from both rivers, would show a stronger resemblance to either of the two rivers. Aquatic invertebrate and water samples were collected from 2012 to 2018 over several seasons. The Usuthu River demonstrated a diverse and sensitive aquatic invertebrate community, emphasising its high conservation value. Despite maintaining relatively high aquatic invertebrate diversity, the Phongolo River demonstrated effects of anthropogenic impact, with more resilient taxa to changes in water quality and flow compared to the Usuthu River. Mismanagement and excessive water use may lead to the loss of any remaining sensitive aquatic invertebrate communities in this river. The presence of invasive molluscan species such as *Physella acuta* and *Tarebia granifera* in the Phongolo River and Lake Nyamithi also poses a threat to the aquatic invertebrate community in the system. These invasive species are currently absent from the Usuthu River although other invasive species, such as the Australian redclaw crayfish, are found in both river systems. Lake Nyamithi displayed a unique aquatic invertebrate community, distinct from both rivers and their floodplains. This study provides important baseline information on the Usuthu River's aquatic invertebrates and emphasises the need to maintain adequate water flow in rivers and floodplains to protect biodiversity and sensitive species.

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