

Hydrobiologia

Responses of aquatic communities to physical and chemical parameters in agriculturally impacted coastal river systems

C. R. Petersen^{1,2}, N. Z. Jovanovic^{1,2}, M. C. Grenfell², P. J. Oberholster^{1,3}, P. Cheng¹

1. CSIR, Natural Resources and the Environment, Stellenbosch, South Africa

2. Department of Earth Science, Institute for Water Studies, University of the Western Cape, Bellville, South Africa

3. Department of Earth Sciences, University of the Western Cape, Bellville, South Africa

Abstract

The assessment of ecological integrity of river systems is multidisciplinary and necessary for effective river management. The objectives of this study were (i) to characterize the spatial and temporal distribution of macroinvertebrate and algae community assemblages; (ii) to determine the environmental variables that affect assemblage distributions; and (iii) to determine the suitability of the selected bioindicators in relation to environmental conditions. Two agriculturally influenced coastal rivers, in the southern Cape Province, South Africa, provided case studies. Wet and dry season's results indicated that minimally impacted sites were associated with pollution-sensitive macroinvertebrate and algal taxa with increased habitat scores. These sites were dominated by diatoms and macroinvertebrates indicative of low electrical conductivity (12–16 mS m(sub)-1), pH (4–5), and alkalinity (0.5–2.1 mg l(sub)-1). A positive correlation between nitrogen and phosphorus and river flow regime occurred at agriculturally impacted sites and algal taxa changes were driven by nutrient enrichment. Macroinvertebrates were indicative of habitat integrity and river condition while diatoms were indicative of pH and electrical conductivity. The benthic filamentous algae were indicative of increased nutrients and alkalinity. Results suggest that the full consortium of algae and macroinvertebrates be used as bioindicators for ecological integrity assessments in short, coastal rivers, which have application to rivers generally.