

# Predicting freshwater habitat integrity using land-use surrogates

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## Abstract

Freshwater biodiversity is globally threatened due to human disturbances, but freshwater ecosystems have been accorded less protection than their terrestrial and marine counterparts. Few criteria exist for assessing the habitat integrity of rivers and data used for such assessments are generally of limited geographical coverage. Here, we use a fine-scale dataset describing river integrity in north-western South Africa to explore the extent to which measures of freshwater habitat integrity can be predicted from remotely sensed data, which are readily available in many parts of the world. A spatial statistical model was built using broad land-cover variables to predict the habitat integrity (subdivided into riparian and instream integrity) of rivers. We also explored the importance of the spatial scale. Results showed that riparian and, to a lesser degree, instream habitat integrity of river systems could be predicted with reasonable accuracy. The total area under natural vegetation was the most significant predictor of riparian integrity, which is best predicted by land-use activities at catchment level, rather than more locally. Our GIS-based model thus provides a fine-scale approach to assessing river habitat integrity as a supplement to landscape-level conservation plans for river systems, and represents a significant contribution towards the monitoring component of the River Health Programme (RHP), which reports on the state of rivers in South Africa.

**Keywords:** freshwater habitat integrity, land use, GIS, conservation planning, predictive modelling