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Influence of Stream Order on Compositional and Structural Riparian Biodiversity in south-western Kruger National Park

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Abstract

Riparian zones harbour different species pools from the surrounding landscape and are thus important to biodiversity conservation. However, riparian zones are highly variable. Network characteristics, morphology, flow-sediment interactions, biophysical connectivity and biological characteristics all vary along the length of a river. It could therefore be expected that the biodiversity characteristics of different riparian zones may also be variable. To investigate this, this study quantified compositional and structural diversity in 1st, 2nd, 4th, 5th, and 7th stream order rivers in south-western Kruger National Park (KNP). A suite of measures, chosen to encompass the variety, balance, and disparity properties of diversity, was used to quantify woody vegetation and bird compositional and structural diversity within each stream order.

Woody plant species richness and species diversity was highest in the 7th order river and similar in the 1st through 5th order rivers. Likewise the woody vegetation community composition of the 7th order river was distinct from those in the other stream order rivers. Bird species diversity was similar in all five stream orders considered. Bird community composition of the 7th order river was distinct from the bird community composition of the 4th and 5th order rivers, which in turn was distinct from the bird community composition of the 2nd and 1st order rivers. Woody vegetation height, canopy width and diameter diversity tended to be highest in the 4th and 5th order rivers, while number of stem (NoS) diversity was generally highest in the 1st order rivers and decreased along the stream order sequence to the 7th order river. Bird body mass diversity was highest in the middle of the stream order sequence, while bird wing length/body

length (WL/BL) and leg length diversity was similar along the entire stream order sequence. Overall, a variety of patterns of change in biodiversity along the stream order sequence were observed

The lack of a consistent pattern along the stream order sequence among the different elements of compositional and structural diversity illustrates that no single measure can properly characterise the biodiversity of an area, and thus researchers and managers need to be explicit about which aspect of biodiversity they are aiming to study/conserve. Additionally, the unique combination of biodiversity found in each of the stream orders illustrates that each contributes importantly to overall regional biodiversity, and thus there is need to consider the role of entire drainage networks in the landscape, rather than simply focusing on perennial rivers. Finally, this study illustrates the need to consider the heterogeneous nature of biodiversity itself.