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Testing the utility of marine habitat classifications as biodiversity surrogates

Natasha Karenyi^{1,2,3}, Kerry Sink², Ronel Nel⁴

¹University of Cape Town, South Africa. ²South African National Biodiversity Institute, South Africa.
³Nelson Mandela University, South Africa. ⁴Department of Zoology, Nelson Mandela University, South Africa

Abstract

Habitat classifications define habitat types that act as surrogates for biodiversity patterns. These classifications may be derived from actual data or expert opinion and may include environmental variables and/or biological variables. The aims of this study were firstly to determine the validity of a data-derived seascape and an expert-derived habitat classification on the west coast of South Africa; secondly to compare the performance of these classifications to each other and against a classification that was based on both biological and abiotic data (biotopes); and lastly to determine the best classification. The Canonical Analysis of Principal Coordinates (CAP), a constrained ordination, was utilised to determine whether the macro-infaunal assemblage of each sample was consistent with the assigned habitat in each classification. The fit of each habitat classification with the macro-infaunal data was measured as allocation success. Both the seascapes and expert-derived habitats had high allocation success, however, the expert-derived habitat classification (93-94 %) performed marginally better than the seascape classification (89-92 %). These two classifications also performed well compared to the biotope classification (98 %). This study indicated that there is a trade-off between capacity requirements and cost, and the performance of habitat classification systems as surrogates of biodiversity patterns. For unconsolidated sediments on the South African west coast, the seascape and expert-based habitat classifications were good surrogates most likely due to the inclusion of the most important environmental variables and the comprehensive understanding of the ecosystem processes in the region. Whether this extends to other ecosystems should be tested. It is recommended to start with seascapes and progress through expert opinion to biological data-driven habitat classifications as data availability increases to continually improve the utility of habitats as surrogates for biodiversity.

Keywords

ecosystem classification, surrogates, seascape, biotope