

Identifying critical biodiversity areas through phylogenetic and species diversity

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In a changing world, knowledge to detect alterations in species and genetic diversity and maintaining the diversity needed to cope with change are foundational to sustainable development and climate adaptation. One way of maintaining biodiversity is to identify and secure areas of high diversity. This has traditionally been based solely on species richness (SR), which however fails to integrate the evolutionary history of species. This indicates an urgent need to include genetic measures to better represent biodiversity, yet genetic diversity has been neglected in biodiversity planning and monitoring, especially in marine systems. For example, there are no published, comprehensive phylogenetic trees for any South African marine taxa. Further, such knowledge has never been applied in systematic biodiversity plans for marine habitats. Phylogenetic diversity (PD) is a measure of evolutionary diversity, which in conjunction with SR has been shown to be an effective tool for spatial planning and identifying important areas for maintaining biodiversity and securing ecological and evolutionary infrastructure. This project will result in a) five novel phylogenetic data sets and add to our knowledge of the evolutionary history of South African marine species, b) add a minimum of 150 barcodes, c) provide comprehensive species occurrence and SR data for five taxonomic groups and d) integrate PD and SR into biodiversity assessment and planning in the region. In addition to providing foundational knowledge on SR and PD for monitoring and reporting, this project provides an avenue for exploring and identifying areas that may prove crucial for adapting to future global and climate change, thereby supporting sustainable development and helping secure the South African bio-economy and ecological infrastructure.