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Joint use of biological traits, diversity and biotic indices to assess the ecological quality status of a Mediterranean transitional system

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ABSTRACT

In the present study, we tested the effectiveness of biological trait analysis (BTA) as an ecological indicator in support of the assessment of the Ecological Quality Status (E_{QS}) of a Mediterranean transitional system by commonly used macrobenthic assemblage diversity (e.g. H' and Margalef) and biotic (BENTIX, M-AMBI and M-BAMBI) indices. Ten biological traits describing morphological, behavioral and life history characteristics were considered for the analysis of the functional structure of macrobenthos. As a test study, a historical dataset obtained from the Cabras lagoon (Gardinia, Italy) comprising a riverine site, the lagoonal main body, a confined pond, a seaward creek and a marine channel connected to the Gulf of Oristano was analyzed. Our results showed clear spatial changes in macrobenthic density, number of species and diversity indices along the riverine-lagoon-sea gradient, which were well reflected in the E_{QS} values based on M-AMBI and to a lesser extent on M-BAMBI. The abundance-based functional diversity was significantly related to the structure and taxonomic diversity of the benthic community. Similarly, the Community-level Weighted Mean test computed with abundance data, rather than with biomass data, supported major evidence for differences in the ecological conditions of the different study sites. In particular, all riverine, lagoonal and confined stations had poor or bad E_{QS}, indicating unstable and warning conditions in this Mediterranean transitional water body. Overall, the BTA approach appeared to be a very promising method in reporting the expected environmental and biotic variability in the Cabras lagoon system and in supporting the E_{QS} assessment by M-AMBI. We conclude that an in-depth knowledge of the benthic communities in terms of both taxonomic and functional aspects is an indispensable basic tool for understanding the variability of the brackish-water systems and for properly assessing their environmental quality.

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