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What ecological and functional changes follow the positioning of an artificial barrier? Answers from a 4-years investigation on soft-bottom benthic community

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Abstract

Nowadays, the consequences of shifts in species composition for marine ecosystem functioning due to human pressure are largely unknown. In this study, we assessed the variation of taxonomic and functional diversity (i.e. range of species and their biological traits), and functional identity (i.e. the occurrence of certain traits) in soft-bottom macrofaunal community influenced by the construction of the coastal artificial barrier in north-eastern Sicily (Tyrrhenian Sea). The macrofaunal invertebrates were collected in five transects around the barriers during four years that encompassed the following phases: *ante-operam* (2003), *in-operam* (2004-2005), and *post-operam* (2006). The biological traits analysis was performed considering 10 biological traits, gathered in: life strategies, adult feeding habits, movement methods, and response to anthropogenic stress. The influence of *rip-rap* construction on the macrofaunal community was clearly observed during *in-operam* and *post-operam* phases. Overall, the macrofaunal community displayed a shift in species composition towards the end of the study. In fact, higher values of turnover diversity were noticed in 2006 ($\beta_t=0.80\pm0.145$). However, this variation was not mirrored in the functional diversity index, since no significant differences among years were obtained ($F_{disp}=0.15\pm0.04$). Further, we observed a great variation in occurrences between traits as 'response to anthropogenic stress' and 'colonizer'. In fact, we noticed a dominance of *second colonizer* and *sensitive* invertebrates in 2003, whereas *tolerant* and *pioneer species* occurred in 2006. Our results indicate that during the construction phases the community taxonomic composition changed through species replacements and/or new settlements, yet the ecological functions performed by the anthropogenically-altered community remained the same.

Keywords

soft-bottom macrofauna, Beta-diversity, Functional traits, Artificial barriers