Use of zooplankton indicators for integrated ecosystem assessment

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Zooplankton are drifters and often associated with different water masses in the pelagic ocean environment. Their distribution, species composition, life traits, morphology, behavior, and physical conditions in general can reflect features of physical, chemical and biological environment of the ocean. While zooplankton indicators have been widely used to investigate population dynamics and the related environmental processes including climate change, it appears that recently zooplankton indicator have been used to assessing the status pelagic ecosystem and providing an ecosystem approach for fisheries management in several large marine ecosystems around the world. However, the use of zooplankton indicators for ecosystem assessment is often hampered by the lack of quantitative relationship between the selected indicators and the desired target conditions, the interactions among different indicators, and limited observations over time and space, which in turn lead to significant uncertainties. We examine a risk evaluation framework which applies fuzzy logic inference system and fundamental process analysis to overcome the identified issues. One of the main advantage of the proposed framework is that it allows approximate reasoning based on qualitative descriptors, e.g., categorical variables, and yet make ambiguous decisions. Fuzzy logic inference has been applied to accommodate the inherent uncertainties of environmental risk assessment in various fields and it could be a useful framework to incorporate zooplankton indicators for integrated ecosystem assessment.

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