Benthic Nematode Assemblages as Indicators of Spatial Heterogeneity in Early Natural Recovery of *Zostera noltii* Seagrass Beds

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ABSTRACT

Seagrass beds have higher biomass, abundance, diversity and productivity of benthic organisms. They are typically considered as ecosystem engineers playing an important role in the structuring of the benthic assemblages. Seagrass meadows are declining around the world at an unprecedented rate, suggesting a global crisis with important consequences, including changes in the diversity, biomass, abundance of stress tolerant or sensitive benthic species, and the trophic or functional structure of the associated benthic communities.

During 2008, *Zostera noltii* seagrass beds of the Mira estuary (SW coast of Portugal) suffered a total collapse for as yet unknown reasons. During 2009, symptoms of early recovery were observed. The availability of an extensive pre-collapse dataset and the sequence of sudden collapse followed by early and gradual recovery create a rarenatural experiment on recovery and resilience of benthic communities in seagrass ecosystems.

The principal goal of this study is to assess the evolution and resilience of the benthic nematode assemblages during the natural recovery of the seagrass beds through a comparison of the former and present data, to assessing the recovery and resilience.

The horizontal macroscale (km) and small-scale variability are evaluated. We hypothesize that the new environmental conditions of the early recovery, with sparsely distributed and small-sized seagrass patches, will increase the spatial heterogeneity of nematode communities and significantly affect community diversity, both taxonomic and functional.

The sampling design was as follows: Samples were collected in four "occasions", (June, September, Dezember 2010 and February 2011), at randomly chosen "stations" located with a distance of 30 m, at two "sites" at 2 km distance. In order to test the hypothesis that the composition of nematode assemblages changes spatially and seasonally, a two–way PERMANOVA analysis was performed based on matrix biodiversity indices including the Shannon-Wiener index, the Maturity Index (MI) and the Index of Trophic Diversity, before and after the collapse of *Zostera noltii* seagrass beds.

Mean nematode densities varied between 2 and 4735 ind. 10 cm^{-2}, and 89 species were identified. The PCO ordination based on abundance and composition of nematode genera clearly reflected the discrimination of the two sites, and