



Influence of natural and anthropogenic disturbances on benthic communities in four lagoons of the Po delta system: focus on free-living nematodes and foraminifera

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Benthic communities inhabiting river lagoons are subjected to both natural fluctuations (e.g. flood and lean-season alternation, tides, daily variations of temperature and irradiance due to the shallow depth) and anthropogenic disturbances (e.g. organic enrichment and loads of contaminants due to urban and industrial discharges). Among them, meiofauna were investigated in May 2016 in four coastal lagoons of the Po River system: Scardovari and Caleri, characterized by more marine features; Canarin and Vallona-Marinetta, more directly affected by the Po River freshwater. Within meiofauna, the study was focused on two assemblages known for being sensitive to environmental disturbance: free-living nematodes and foraminifera.

Focusing on nematodes, an intra-lagoonal variability was observed in terms of more diverse and structured assemblages at the stations nearby the channels that connect the lagoons with the sea than at the innermost sites, especially in Scardovari. Nevertheless, different genera dominated the four lagoons: *Sabatieria* (Canarin), *Daptonema* (Caleri), *Terschellingia* (Vallona-Marinetta) and *Theristus* (Scardovari). Such difference suggests, to some extent, the presence of different environmental factors (e.g. grain-size, organic matter and the composition of microalgal community) that may variably influence nematodes, favoring some genera instead of others. Although in Canarin the highest concentrations of total PAHs, Hg and Pb were obtained (in any case under their ERL values, i.e. the thresholds below which their toxic effects are scarcely observed), nematodes did not show to be negatively affected by these contaminants, since the assemblage did not result less structured and biodiverse than those observed in Caleri and Vallona-Marinetta. On the other hand, nematofauna seemed to be sensitive to the hypoxic events that affect the inner area of Scardovari. The assemblage, composed of only 5-6 genera, was clearly less biodiverse at the internal stations of this lagoon, while at least 12 genera were observed at all the other sites. Furthermore, the nematodes showed the lowest trophic diversity due to the dominance of non-selective deposit feeders that mostly belonged to the c-p2 group, i.e. nematodes considered colonizers, indicating the presence of an assemblage characterized by opportunistic organisms able to tolerate disturbance events.

Focusing on foraminifera, the assemblage seemed to be affected by slightly higher contamination levels of Canarin. However, this response was mainly evidenced in terms of lower abundances rather than different taxonomic composition. The assemblage resulted, in fact, dominated by species typical of transitional systems, i.e. *Ammonia beccarii* and *Haynesina germanica*, at all stations. Furthermore, even in Canarin only a few specimens with deformed shells were observed, suggesting a modest effect of heavy metals on foraminifera.

Both free-living nematodes and foraminifera showed to respond to the environmental disturbances that may affect the four lagoons with the former more sensitive to the hypoxic events and the latter to the contamination in the sediments.