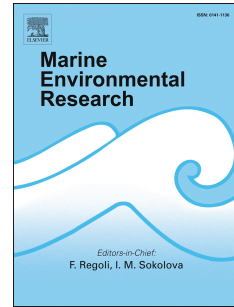


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Long-term variability of macrobenthic community in a shallow coastal lagoon (Valli di Comacchio, northern Adriatic): Is community resistant to climate changes?

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1 **Long-term variability of macrobenthic community in a shallow coastal lagoon (Valli**  
2 **di Comacchio, northern Adriatic): is community resistant to climate changes?**

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7  
8 **Abstract**

9 A time series data of macrobenthic invertebrates of Valli di Comacchio lagoon (northern Adriatic)  
10 from 1996 to 2015, was analyzed using Biological Traits Analysis, structural indices, AMBI and M-  
11 AMBI indices, with a twofold aim to: firstly, test the resilience of the system, and, secondly, test  
12 the influence of climate changes, in terms of temperature and precipitation pattern, on  
13 macrobenthic dynamics. Along the studied period macrobenthic community showed marked  
14 fluctuations, in terms of richness, diversity, biological traits and ecological groups, which could be  
15 related with environmental instability of the lagoon. At the same time, a general tendency  
16 towards a deterioration of ecological condition of the lagoon was observed, with a general  
17 decrease in species richness, diversity, percentage of sensitive species, and a general increase in  
18 the proportion of the more opportunistic trait modalities, such as deposit feeders, burrowing,  
19 infaunal and short living animals. Increasing yearly temperature explained only a small part of the  
20 variability of macrobenthic community, in terms of biological traits and diversity indices, and this  
21 was likely due to the effect of natural fluctuations of environmental parameters and  
22 anthropogenic disturbance. Nevertheless, all metrics used are consistent in identifying the  
23 response of benthic community to a severe disturbance, likely related with the summer heatwave  
24 in 2003. Less marked signs of disturbance were observed also in relations to the thermal anomaly  
25 of 2012. Biological Traits Analysis combined with more classical structural and ecological indices,  
26 proved to be efficient in identifying temporal changes of the community. Our results suggest that  
27 the expected increase in frequency, magnitude and duration of heatwaves could pose serious  
28 threat to the resilience capacity of lagoonal macrobenthic community.

29

30 Keyword: Lagoons, Benthic community, Biological Traits, Heatwave, Adriatic Sea

31

32 **1. Introduction**

33 Lagoons and estuaries are ecosystems characterized by extremely high biodiversity and high rates  
34 of primary productivity. They are transitional areas between land and sea, characterized by a high  
35 rate of dynamic changes in the natural environment, but also subjected to degradation due to

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