BIODIVERSITY OF HARDBOTTOM COMMUNITIES GROWN ON ARTIFICIAL SUBSTRATA IN THE SARONIKOS GULF (AEGEAN SEA) - A PILOT STUDY

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Abstract

In this pilot study, we monitored for the first time the biodiversity of hardbottom communities grown on artificial substrata in two shallow water habitats of the Saronikos Gulf, Greece. Here we report preliminary results from the analysis of assemblages that established at a disturbed and an undisturbed study site as well as a list of macrofouler species. This research was performed within the framework of the German-Greek collaboration for the advancement of knowledge exchange among young scientists (IKYDA, 2006).

Keywords : Aegean Sea, Monitoring, Biodiversity, Artificial Reefs, Fouling.

Intertidal and shallow water subtidal coastal ecosystems are more impacted by human activities than any other marine habitat. Therefore, they can be a useful tool to measure human-induced changes in the marine environment [1]. One promising approach to detect and quantify these changes is to compare the composition and stability of hardbottom communities from impacted and non-impacted areas. The aim of this pilot study was to describe and analyse the structure of assemblages grown on artificial substrata that were deployed at a disturbed and an undisturbed site in the Saronikos Gulf.

Study sites

Settlement panels were exposed to natural fouling at two study sites in the Saronikos Gulf: Agios Kosmas (AGK) and Mavro Lithari (ML) (Figure 1). The Inner Saronikos Gulf is one of the most heavily polluted regions of the Greek coast, mainly due to domestic and industrial effluents [2]. Mavro Lithari lies in the Outer Saronikos Gulf far from these effluents, while Agios Kosmas is located only a few kilometres SE of Piraeus Port and has lately been heavily disturbed by the construction of the Sailing Center for the Olympic Games 2004 [3].

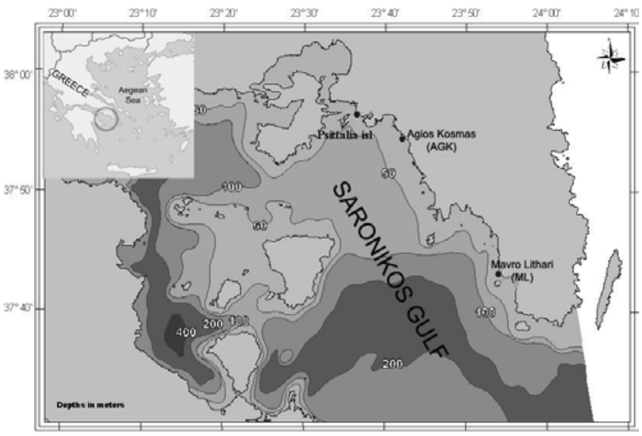

Fig. 1. Study sites in the Saronikos Gulf: Agios Kosmas (AGK) and Mavro Lithari (ML).

Methods

At each study site 6 PVC carrier rings (each with 10 PVC settlement panels, 15 x 15 cm in size) were deployed in March 2006. The communities that established on these 60 settlement panels were sampled randomly every two to four weeks. All macrofouler species larger than 1 mm were identified and their abundances were estimated as percent cover.

In order to compare community structure between study sites, species number (N), the Shannon index (H', loge), and Evenness (J') were calculated for each sampling event. We tested for differences in mean community parameters with the t-test. Additionally, significant differences in community composition between sites were identified using Analysis of Similarity (ANOSIM) conducted on the base of the abundance data.

Results and Discussion

Until the 10^{th} week the assemblages at both sites consisted only of biofilms. Macroufoulers were then observed from the 12^{th} monitoring week on. A total of 29 macrofouling species were identified until the 26^{th} week (Table 1). Hydrozoa and the red alga *Polysiphonia sp.* were the first settlers and became dominant taxa in ML, while in AGK Serpulidae settled first and dominated the communities up to the 20^{th} week.

Tab. 1. Species monitored on artificial settlement panels.

Common to both sites		Mavro Lithari	Agios Kosmas
Schizoporella sp.	*Cladophora sp.*	Hydrozoa	*Colpomenia sinuosa.*
Miriapora	*Laurencia sp.*	Serpulidae sp. B	*Ectocarpus sp.*
Dictyota dichotoma	*Champia parvula*	Bivalve sp. A	Bivalve sp 2
Ceramium sp.	*Wrangelia penicillata*	*Sycon sp.,*	*Leuconia sp.*
Chondria sp.	*Acetabularia acetabulum*	*Mytilus sp.,*	*Acanthophora nayadiformis*
Chaetomorpha sp.	*Balanus (amphitrite)*	Gastropoda	
Polysiphonia sp.	Serpulidae sp. A	*Diplosoma listerianium*	
Jania sp.	Corallinales	*Botryllis (schlosseri)*	

Between sampling sites we found a significant difference ($p < 0.05$) in species number (N) and Shannon index (H', loge) for each sampling event, while the communities differed in their evenness (J', $p < 0.001$) from the 6^{th} month on. Significant differences in the composition of hardbottom communities from the two study sites were also observed for all sampling events ($R \geq 0.77$, $p \leq 0.001$).

Since communities from the impacted site were always less diverse than the assemblages from the non-impacted habitat, we assume that the composition and structure of the hardbottom communities reflect the ecological conditions at the two study sites. Differences between assemblages from Agios Kosmas and Mavro Lithari should therefore not only be due to different colonizer pools. This assumption will be tested in the future course of this study in order to establish hardbottom communities grown on artificial substrata as a tool in the ecological monitoring of Mediterranean coastal waters.

References

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