

STUDY OF THE STRUCTURE OF MEGABENTHIC COMMUNITIES IN THE GULF OF GABES

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Abstract

In Tunisia, the gulf of Gabes is the main fishing ground for more than 300 benthic trawlers targeting various species of high commercial interest (shrimp, molluscs...). The aim of this work is to study of the spatial variability of the diversity and structure of the megabenthic communities of the gulf of Gabes. Samples were collected with a 2m beam trawl of 4mm mesh size. All the species captured were identified to the species level. 134 species were identified. Biomass (B), species richness (S) and abundance (A) were calculated. ABC Method was used to characterize the benthic megafauna communities. Granulometric analysis revealed the presence of four types of substrates. Furthermore we have identified 6 megabenthic assemblages. The Abundance-biomass comparison lead to determine the level of perturbation in the gulf of Gabes.

Keywords: *Gulf of Gabes, Biodiversity, Biomass*

The Gulf of Gabes is the main fishing ground in Tunisia, where benthic trawling is a very common activity due to the presence of sandy muddy ground (Hattab et al., 2013). This activity results in several physical effects on seabed and benthic communities, such as changes in benthic communities and the destruction of sea beds (Blanchard et al., 2004). Effects of fishing disturbance on community structure and diversity are then not only likely to depend on the intensity and frequency of fishing, but also on the initial condition of the habitat (Jennings et al., 2002). Benthic communities' assemblages are sensitive to such perturbations. Benthic megafauna are probably the most vulnerable and directly impacted by fishing gears (Blanchard et al., 2004), thus we can consider them as an efficient biological tool to assess the impact of fishing activity on biotope. The aim of this work is to study the diversity and structure of the megabenthic communities of the gulf of Gabes. For that, a stratified sampling that considers the substrate typology and depths (10-100m) was held in May and September 2015. Samples were collected with a 2m beam trawl of 4mm mesh size. The abundance-biomass comparison (ABC method, Warwick 1986) was adopted to detect disturbances (physical, natural, biological, chemical) in benthic communities (Le Loc'h, 2004). Benthic assemblages are therefore classified as: non-disturbed moderately disturbed and strongly disturbed (Blanchard et al., 2004). The comparison of the different parameters used, specific richness, the abundance and the biomass, makes it possible to detect the modifications in benthic structures.

We have identified through granulometric analysis, 4 types of substrates (Biogenous fine sands, Heterogeneous sands, Sandy muddy, Muddy). Hierarchical classification (based on specific Abundance) revealed 6 benthic assemblages and the assessment of S, A, B and the dominance index (DP) allowed characterizing these assemblages (Table 1). For the different assemblages, we have noticed that the abundance varies between 38 and 1474±94 (ind. 1000m⁻²) respectively for *Gobius niger* assemblage and *Pinctada radiata* assemblage. The lowest specific richness was observed *Gobius niger* assemblage (4) and the highest for *Pinctada radiata* assemblage (98) (Table 1). The ABC method indicates that the relative biomass curve is above the abundance curve for *Pinctada radiata* assemblage inform about the non-disturbance of the region. The area of this assemblage is dominated by 2 species of large size like *Pinctada radiata* and *Paracentrotus lividus*. For the assemblage of *Astropecten irregularis* the biomass curve is slightly above the curve of abundance, we notice a slight dominance of *Paracentrotus lividus*, *Aporrhais pespelecani* and *Astropecten irregularis*. So the area seems to be slightly disturbed. For the other assemblages, we can conclude that the two curves intersect or are superposed, thus we are in a situation of a slightly disturbed assemblages or in an intermediate situation (Blanchard et al., 2004) (Figure 1). The gulf of Gabes is an important fishing area in Tunisia. Our investigations on megabenthic communities revealed that the northern part is less disturbed than the southern one. Regarding the specific richness, a coastal-offshore gradient was observed except for *Corbula gibba* assemblage.

Tab. 1. Megabenthic communities assemblages in the gulf of Gabes

Assemblage	Type of substrate	Depth (m)	Number of stations	Species richness (S)	Abundance (ind. 1000m ⁻²)	Biomass (standard deviation (g. 1000m ⁻²))
<i>Pinctada radiata</i> <i>Monodonta articulata</i> , <i>Paracentrotus lividus</i> , <i>Halcyonichthys papillosa</i>	Sands covered with seaweed	20	3	98	1474±94	530±221
<i>Gobius niger</i> <i>Pagellus erythrinus</i> , <i>Coraxenus hepatus</i> , <i>Paracentrotus lividus</i>	Sandy muds	23	1	4	38	41
<i>Corbula gibba</i> , <i>Euraster cornuta</i> , <i>Scapha murex</i> , <i>Cytherea</i> , <i>Cytherea angulata</i>	sandy muds	32	4	24	301±227	105±191
<i>Astarte laticosta</i> , <i>Murex brandaris</i> , <i>Fusinus rostratus</i> , <i>Dentalium dentatis</i> , <i>Paracentrotus lividus</i> , <i>Cytherea</i> <i>linguata</i> , <i>Astropecten irregularis</i> , <i>Pteropoda</i> <i>gemmaeformis</i>	Sandy muds	51	2	47	560	327
<i>Murex brandaris</i> , <i>Fusinus rostratus</i> , <i>Fusinus</i> <i>rostratus</i> , <i>Dentalium dentatis</i> , <i>Paracentrotus lividus</i> , <i>Halcyonichthys papillosa</i>	sandy muds	47	3	42	390±243	208±46
<i>Acanthocardia pinnatifida</i> , <i>Aporrhais</i> <i>pespelecani</i> , <i>Paracentrotus lividus</i> , <i>Astropecten irregularis</i>	muds	65	2	20	209	2603

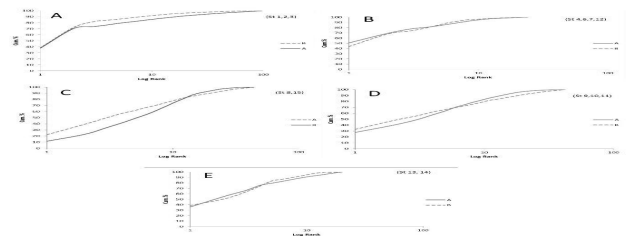


Fig. 1. Abundance- biomass curves of benthic megafauna communities in the gulf of Gabes. A: *Pinctada radiata*, B: *Corbula gibba* C: *Dentalium dentatis*, D: *Paracentrotus lividus*, E: *Astropecten irregularis*.

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