Mediterranean Marine Science

Vol 8, No 2 (2007)

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doi: 10.12681/mms.150

To cite this article:

NICOLAIDOU, A. (2007). Lack of temporal variability in the benthos of a coastal brackish water lagoon in Greece. *Mediterranean Marine Science*, *8*(2), 5–18. https://doi.org/10.12681/mms.150

Mediterranean Marine Science
Volume 8/2, 2007, 05-17

Lack of temporal variability in the benthos of a coastal brackish water lagoon in Greece

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Abstract

The benthic fauna was studied in the small, brackish water Mazoma Lagoon in the Amvrakikos bay. Benthic samples were collected at 10 stations at bimonthly intervals over a period of a year. Temperature, salinity, dissolved oxygen and sediment organic carbon were also measured at the same time. The environmental parameters showed the expected seasonal variability but the benthic community, the structure of which was only related to plant biomass, did not. This lack of seasonality is attributed to the continuous reproduction of some abundant species and to species interactions.

Keywords: Lagoons; benthos; Amvrakikos Gulf; Ionian Sea; Greece; Seasonal variations.

Introduction

Coastal brackish water lagoons are fragile, ecologically important ecosystems. Due to both their limited communication with the sea and their shallowness, the environmental conditions in the lagoons undergo marked seasonal fluctuations. Furthermore, they are organically enriched areas as a result of riverine inputs and the recycling of materials within the system. Increased eutrophication, accentuated in some cases by anthropogenic impact, often leads to oxygen depletion, known as ‘dystrophic crisis’, with detrimental effects on the lagoon fauna. Temporal variations associated with such phenomena have been described extensively in the literature (e.g. TAGLIAPIETRA *et al.,* 1998; KOUTSOUBAS *et al.,* 2000; MISTRI *et al.,* 2000, 2001; LARDICCI *et al.,* 2001). However, if pollution prevention measures are to be taken, smaller changes need to be detected and distinguished from the natural variability of the system.

Temporal variations in undisturbed lagoons have been much less studied (GRAVINA *et al.* 1989; BACHELET *et al.,* 2000; NICOLAIDOU *et al.,* 2006). NICOLAIDOU *et al.* 2006, who examined the yearly variability of the soft bottom fauna in two brackish water lagoons in three consecutive summers found a shift in the benthic community, particularly in the most enclosed areas, but no significant change in the ecological indices such as numbers of species, numbers of individuals and diversity. They suggested that changes were not only due to environmental conditions but also to species interactions and the intrinsic characteristics of the most abundant species.

The present paper examines the temporal variations in the benthos of a small lagoon in the Amvrakikos Gulf, focusing on aspects that may be responsible for difficulties in detecting changes in the zoobenthos.

Material and Methods

The Mazoma Lagoon is a small, shallow, brackish water lagoon in the Amvrakikos Bay (Fig.1), which has formed in the delta of the River Louros. It has a surface area of approximately 3km^2 and communicates with the Amvrakikos Bay in the east, with two openings approximately 30m wide. The bottom is muddy and in the eastern part of the lagoon, which is influenced by the marine environment, it is covered by the angiosperm *Zostera noltii* mixed with the green alga *Chaetomorpha* sp., while in the innermost areas the bottom is mostly bare.

Ten stations were set, marked with permanently fixed posts. Their depth did not exceed 0.5 m except at station 10 in a channel, where it reached 1.5 m. At each station five replicate benthic samples were collected with a ponnar grab sampling 0.05 m^2 of the bottom, at approximately bimonthly intervals for a year. The samples were sieved through a 1mm mesh sieve, stained with rose bengal and preserved with 4% formalin in seawater. The marine plants in each sample were kept separate-

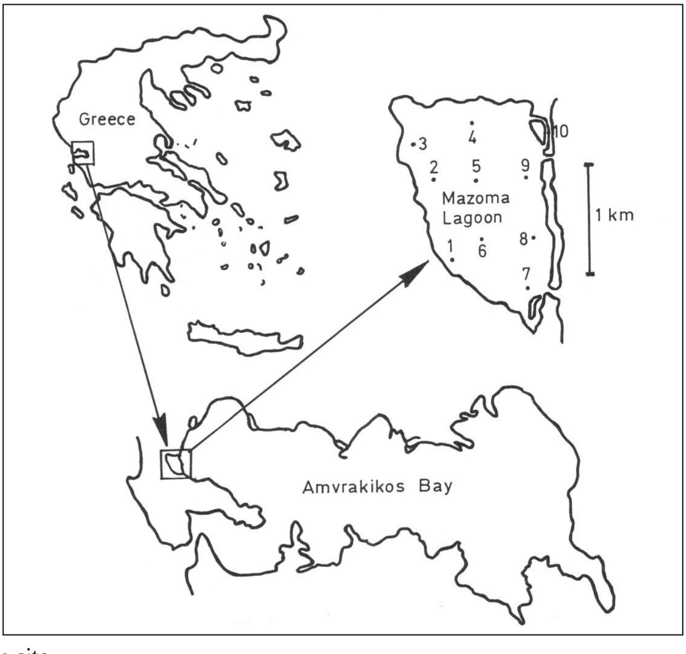


Fig. 1: Sampling site.

ly, dried in an oven at 60° C and weighed to provide an estimate of the vegetation.

Together with the benthic samples a small amount of sediment was collected for analysis of organic carbon (GAUDETTE *et al.,* 1974). Water temperature and salinity were measured with a Yellow Spring Inc probe, while dissolved oxygen was estimated according to PARSONS *et al.* (1984).

Environmental data were analysed by Principal Components Analysis (PCA) after standardisation. Species data were first transformed by y=log(x+1) and then the Bray-Curtis dissimilarity index was calculated. Based on the dissimilarity matrix unconstrained (Multidimensional scaling, MDS) and constrained (Canonical Analysis of Principal Coordinates, CAP) ordination methods were applied (ANDERSON & WILLIS, 2003) using the programmes PRIMER and PERMANOVA+ (ANDERSON & GORLEY, 2007).

Results

The temperature changed seasonally, as expected for a temperate climate, and ranged from 8° C in the winter to 26° C in the summer, while the salinity ranged from 14 psu in January to 36 psu in September. The organic carbon in the sediment ranged from 1.75% to 5.9%, irrespective of season. The mean plant biomass was higher at station 8 where it ranged from 88.9 g/m^2 to 330 g/m^2, followed by the other eastern stations 7 and 9 (272.7 g/m^2 and 151.9 g/m^2 respectively). The lowest plant biomass was found at the innermost stations 3 and 2 (8.6 g/m^2 and 9 g/m^2 respectively) and at the channel (10.5 g/m^2). The PCA of environmental parameters (Fig. 2) showed a clear season-

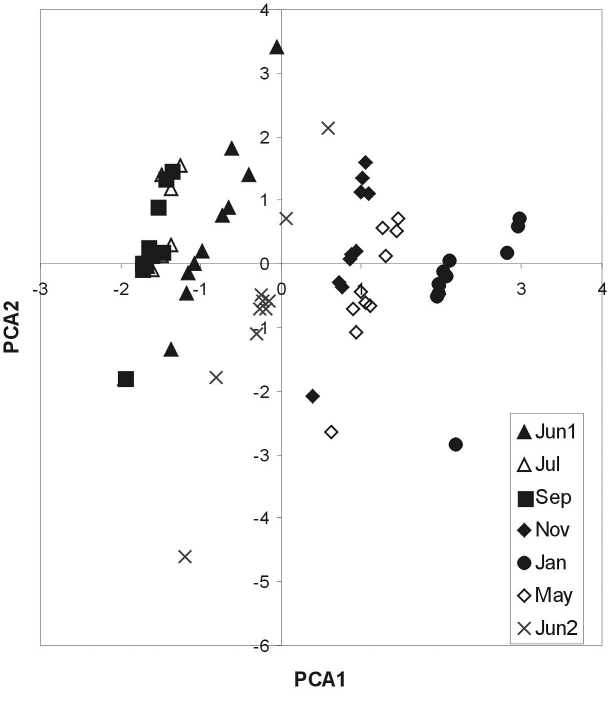


Fig. 2: PCA of environmental parameters.

al trend, with the summer months at lower scores of Axis 1 and the winter at higher. The scores of stations on this axis correlated significantly with salinity (R=-0.906) and temperature (R=-0.866), while those on Axis 2 correlated with algal biomass (R=0.726).

The benthic fauna was typical of brackish water lagoons. A total of 107 species or higher taxa (Annex 1) were collected. The most ubiquitous species was *Abra segmentum* (maximum density 1960 indiv./m^2) which was only missing from one station at one time (98.6% occurrence), followed by *Hediste diversicolor* (max. dens. 3569 indiv./m^2) with 91.4% occurrence and *Mytilaster minimus* (max. dens. 5569 indiv./m^2) with 90%occurrence. Another set of species occurred steadily at some stations only, namely *Naineris laevigata* (max. dens. 1844 indiv./m^2) at stations 7, 8 and 9 and chironomid larvae (max. dens. 3235 indiv./m^2) at stations 7, 8, 9 and 10. Other common, abundant species were the amphipods *Gammarus insensibilis* and *Dexamine spinosa* and the isopods *Idotea balthica* and *Sphaeroma ghigii.* Finally, mention should be made of the erratic occurrence of the amphipod *Erichthonius brasiliensis:* it appeared only at two stations in September with important densities (840 and 350 indiv./m^2) and at smaller densities (25 and 50 indiv./m^2) in November, before it disappeared again. The overall distribution of species in the lagoon suggests a partitioning of the stations between related taxa, or taxa of the same functional group. For example, as seen in Figure 3a, *Hediste diversicolor* has its highest abundance at stations where *Platynereis dumerilii* has its lowest. The same applies to the amphipods *Gammarus insensibilis* and *Dexamine spinosa* (Fig. 3b).

Following the population structure of

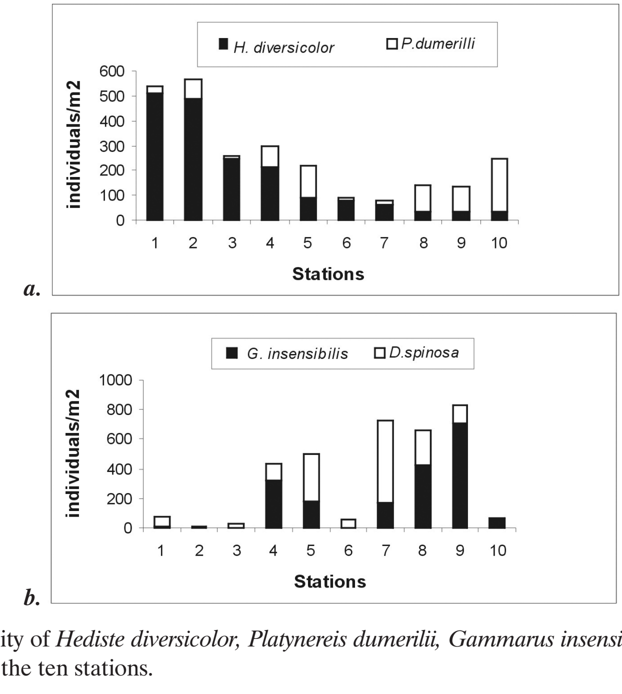


Fig. 3: Mean density of *Hediste diversicolor, Platynereis dumerilii, Gammarus insensibilis* and *Dexamine spinosa* at each of the ten stations.

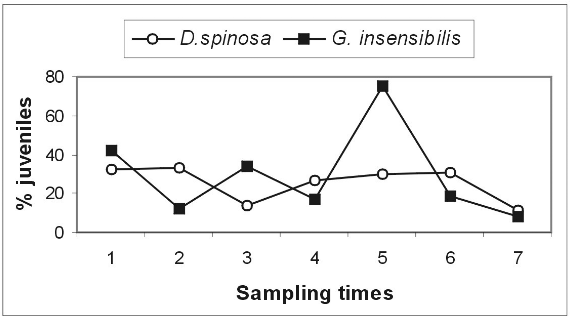
the most abundant species, with time it was observed that although for most species one major settlement occurred, less extensive recruitment took place at different times of the year. Figure 4 shows the percentage of juvenile amphipods and isopods at each sampling time. They never dropped below 12% for *D. spinosa,* 8% for *G. insensibilis* and 14 % for *I. balthica.* The same is indicated by the size frequency distributions of *Mytilaster minimus* and *Naineris laevigata* in Figure 5.

Both the numbers of species and individuals varied greatly between stations and time. (Fig. 6). There was a tendency for higher numbers of species and individuals to occur in July and lower numbers of species in November, however, no statistically significant differences were found. The diversity was generally low, ranging between 1.30 and 2.846; it did not show any pattern at all.

Lack of seasonality in the community structure was also reflected in the unconstrained MDS plot of Figure 7. Only the vegetated stations, irrespective of time, tend to appear on the right-hand side of the diagram. Indeed, as indicated by the vectors of the environmental variables, algal biomass is related to the distribution on the horizontal axis. The high value of stress of the analysis, however, should be noted. The unconstrained CAP analysis (Fig. 8) showed that differences exist only between the first two months of the study, when the major recruitment of most species took place.

Discussion

The benthic fauna of the Mazoma Lagoon is typical of Mediterranean brackish water lagoons (NICOLAIDOU *et al.,* 2005; MISTRI *et al.,* 2000, 2001; PONTI *et*



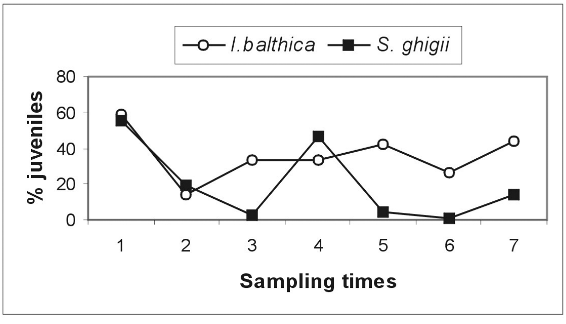


Fig. 4: Percentage of juveniles of four crustacea at the times of sampling.

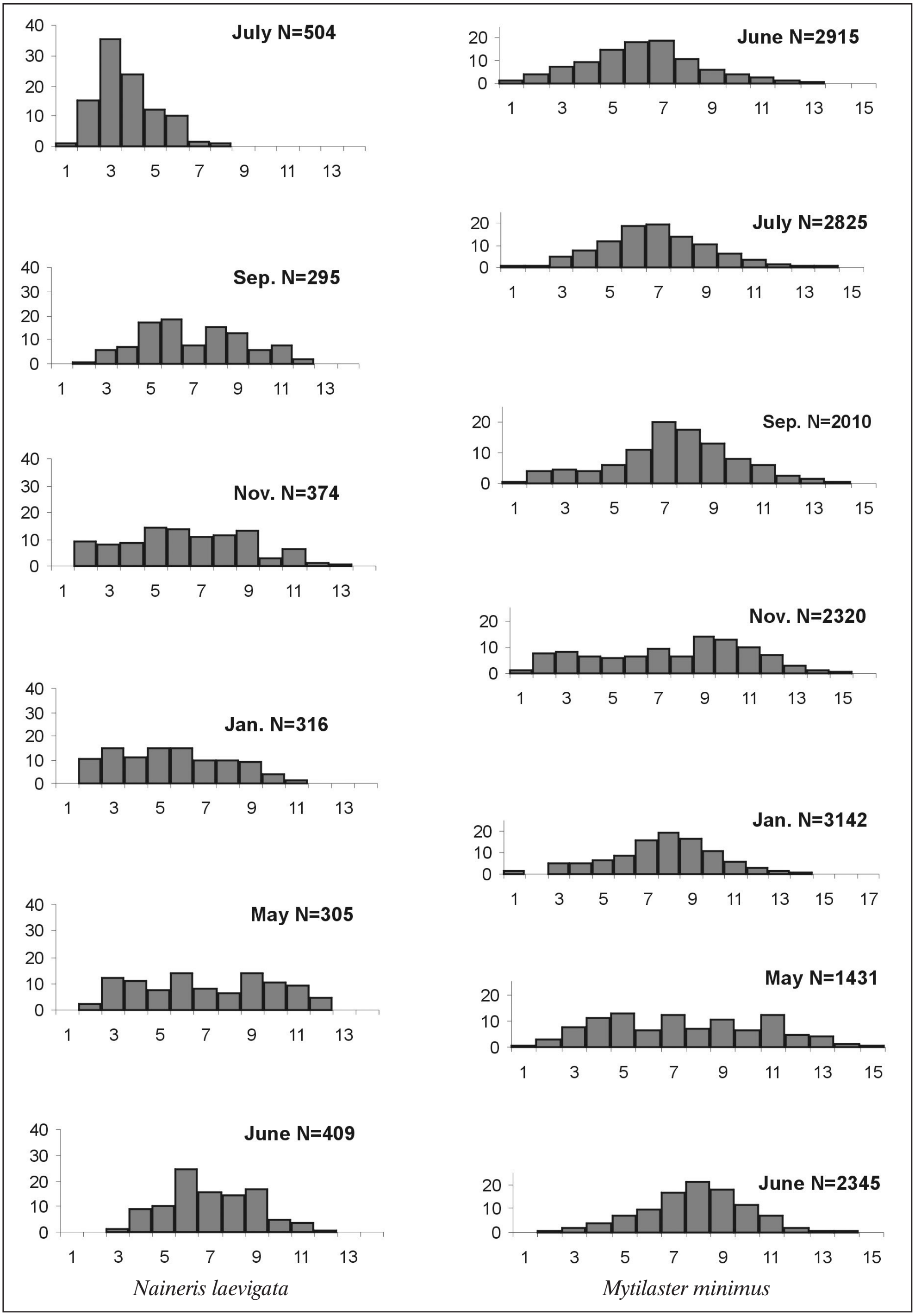


Fig. 5: Size frequency histogrammes of *Naineris laevigata* and *Mytilaster minimus.*

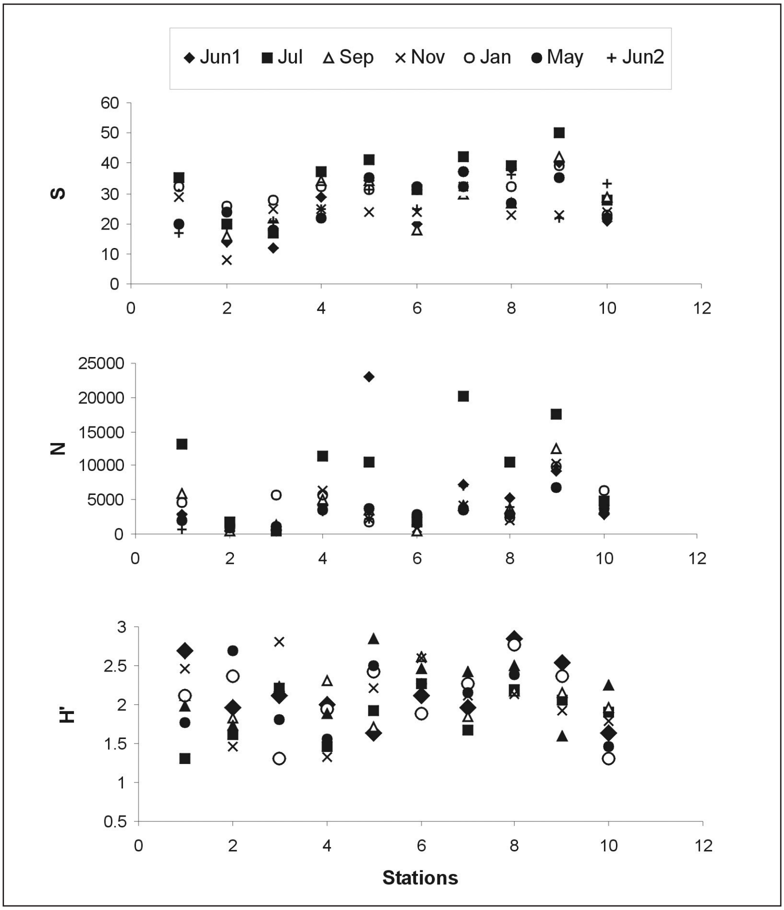


Fig. 6: Number of species (S), number of individuals (N) and diversity (H') at all stations and times.

al., 2007). The main factor which influences the structure of the benthic community is the presence of vegetation. The importance of angiosperms in increasing both the available surface area and the spatial heterogeneity, as well as providing protection in lagoons, is well documented, as for example recently by GAMITO (2006) and PONTI *et al.* (2007).

Despite the seasonal variation of environmental parameters expected for temperate climates, temporal changes were not evident in the benthic community. This lack of seasonality may be attributed to some biological characteristics of the species and to physical features of the lagoons.

Many of the abundant species in the Mazoma Lagoon, such as *Dexamine spinosa, Gammarus insensibilis, Idotea balthica, Mytilaster minimus* and *Naineris laevigata* showed continuous recruitment. Reproduction throughout the largest part of the year has been observed in several species inhabiting lagoons. For example, DIVIACCO & RELINI (1981) indicated the presence of ovigerous females of *Microdeutopus gryllotalpa* all year long in

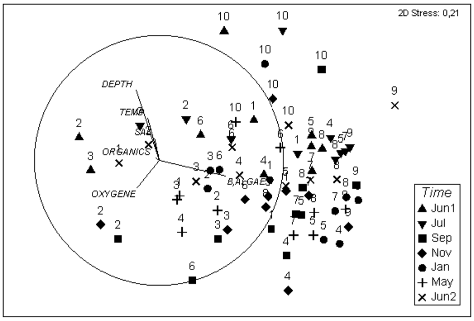


Fig: 7: MDS based on Bray-Curtis dissimilarity on log transformed abundance data.

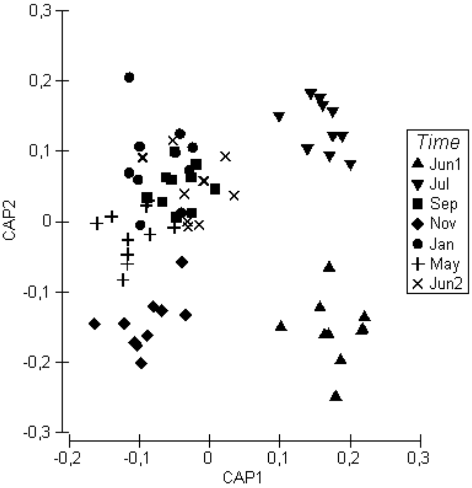


Fig. 8: CAP based on Bray-Curtis dissimilarity on log transformed abundance data. 82.86% of points were correctly allocated with m=19, p=0.001, $\delta 1^2$ =0.917.

the Italian Orbetello Lagoon. A population of the same species in the Bay of Cadiz in Spain, was found by DRAKE & ARIAS (1995) to be multivoltine with overlapping cohorts and a possible maximum of five generations per year. Continuous reproductive activity of *Gammarus aequicauda* was observed in lagoons in the Evros Delta (KEVREKIDIS & KOUKOURAS, 1989) and of *Corophium orientale* in the Paloukia Lagoon (KEVREKIDIS *et al.,* 2000). In the Evros Delta prolonged recruitment of *Abra segmentum* was also observed (KEVREKIDIS & KOUKOURAS, 1992).

The number of generations in a year may be an intrinsic characteristic of the species but it may also be modified by external parameters. DRAKE & ARIAS (1995) suggested that it may be related to the latitude, fewer generations occurring in northern latitudes with colder climates. However, time and duration of reproduction may vary even in the same area under different climatic conditions. BARTELS-HARDEGE & ZEECK (1990), for example, found that *Hediste diversicolor* had a longer reproductive period after an unusually warm winter. Whether the continuous reproduction of the species found in the Mazoma Lagoon is a reaction to the changeable conditions of their environment or to the continuous supply of food in the organically enriched lagoonal ecosystem needs further investigation. In either case, continuous settlement is expected to preclude any seasonal variation of the fauna.

In the Mazoma Lagoon, there were some indications of resource partitioning, that is of space, between the two nereid species and between the amphipods *Gammarus insensibilis* and *Dexamine spinosa.* It is a phenomenon common in amphipods (KOLDING & FENCHEL, 1979; SKADSHEIM, 1984), and it has also been mentioned for two polychaetes in a lagoon in the northern Adriatic (MISTRI *et al.,* 2002). According to MISTRI *et al.* (2001) there is high functional redundancy in lagoonal habitats. While studying northern Adriatic lagoons they found a degree of species compensation among certain guilds, a response likely to occur where there are many species per functional group. Which species prevails may be related to the environmental conditions at the time of larval settlement.

Stochastic recruitment is not uncommon in shallow lagoons (BORSA & MILLET, 1992; MILLET & GUELORGET, 1994). Due to the weak amplitude of lunar tides in the Mediterranean, wind induced water movements assume an important role in the circulation of water and larval input and dispersion. This adds to the unpredictability of the community characteristics of the lagoons and may affect the degree of confinement - or time required to renew the marine elements of a lagoon, according to GUELORGET & PERTHUISOT (1992). These authors stressed the importance of confinement in the distribution of species within a lagoon and REIZOPOULOU & NICOLAIDOU (2004) and NICOLAIDOU *et al.* (2005) found a strong negative correlation of confinement with species numbers and diversity in Greek lagoons.

The benthic study in the Mazoma Lagoon demonstrated the lack of seasonality in the coastal lagoons and put forward possible explanations. There may be more reasons underlying the irregular changes occurring in lagoons such as the patchy distribution of species (NICOLAIDOU *et al.,* 2006) and possible selective predation by fish and crabs which have not been considered in the present investigation. Whatever the causes, assessing and monitoring ecological quality in lagoons based on the zoobenthos should take into consideration the erratic changes that take place naturally. As suggested by REIZOPOULOU & NICOLAIDOU (2007) it may be more reliable to use size distributions, based either on weight or linear measurements (BASSET *et al.,* 2006) rather than the community characteristics of the benthos.

Acknowledgements

I would like to thank the Fisheries Officer and the Fishermen's Cooperative of Preveza for their assistance in the field. Thanks are also due to my MSc students for their contribution at various phases of the project and to Dr I. Akoumianaki for constructive discussions.

References

ANDERSON, N.J. & GORLEY, R.N., 2007. PERMANOVA+ for PRIMER: Guide to software and statistical methods -PRIMER-e: Plymouth, UK.

ANDERSON, N.J. & WILLIS, T.J., 2003. Canonical analysis of principal coordinates: a useful method of constrained ordination for ecology. *Ecology* 84: 511-525.

BASSET, A., SABETTA, L., FONNESU, A., MOUILLOT, D., DO CHI T.,VIAROLI, P., GIORDANI, G., REIZOPOULOU, S., ABBIATI, M. & CARRADA, G.C., 2006. Typology in Mediterranean transitional waters: new challenges and perspectives. Aquatic Conservation: *Marine and Freshwater Ecosystems* 16: 441-455.

BORSA, P. & MILLET, B., 1992. Recruitment of the clam *Ruditapes decussatus* in the lagoon of Thau, Mediterranean. *Estuarine coastal and Shelf Science* 35: 289-300

BACHELET, G., De MONTAUDOUIN, X., AUBY, I. & LABOURG, P., 2000. Seasonal changes in macrophyte and macrozoobenthos assemblages in three coastal lagoons under varying degrees of eutrophication. *ICES Jour-*

nal of Marine Science 57: 1495-1506.

BARTELS-HARDEGE, H.D. & ZEECK, E., 1990. Reproductive behaviour of *Nereis diversicolor* (Anelida:Polychaeta). *Marine Biology* 106: 409-412.

DIVIACCO, G. & RELINI, G., 1981. Gli Anfipodi della laguna di Orbetello. *Quaderni di Laboratorio della Tecnologia di Pesca* 3: 283-291.

DRAKE, P. & ARIAS, A.M., 1995.Distribution and production of *Microdeutopus gryllotalpa* (Amphipoda:Aoridae) in a shallow coastal lagoon in the Bay of Cadiz, Spain. *Journal of Crustacean Biology* 15: 454-465.

GAMITO, S., 2006. Benthic ecology of semi-natural coastal lagoons, in the Ria Formosa (Southern Portugal), exposed to different water renewal regimes. *Hydrobiologia* 555: 75-87.

GAUDETTE, H.E., FLIGHT, W.R., TONER, L. & FOLGER, D.W., 1974. An inexpensive titration method for the determination of organic carbon in recent sediments. *Journal of Sedimentary Petrology* 44: 249-253.

GRAVINA, M.F., ARDIZZONE, G.D., SCALETTA, F. & CHIMENZ, C., 1989. Descriptive analysis and classification of benthic communities in some Mediterranean coastal lagoons (Central Italy). P.S.Z.N.I: *Marine Ecology* 10:141-166.

GUELORGET, O. & PERTHUISOT, J.P., 1992. Paralic ecosystems. Biological organisation and functioning. *Vie Milieu* 42: 215-251.

KEVREKIDIS, T., BOUBONARI, TH. & GOUTNER, V., 2000. Possible factors modifying the dynamics of a population of *Corophium orientale* (Crustacea: Amphipoda) in the Palukia Lagoon (Evros Delta, N Aegean Sea): preliminary note. *Israel Journal of Zoology.*

KEVREKIDIS, TH. & KOUKOURAS, A., 1988/89. Life cycle and reproduction of *Gammarus aequicauda* (Crustacea:Amphipoda) in the Evros Delta (NE Greece). *Israel Journal of Zoology* 35: 137-149.

KEVREKIDIS, TH. & KOUKOURAS, A., 1992. Population dynamics, growth and productivity of *Abra ovata* (Mollusca, Bivalvia) in the Evros Delta (North Aegean Sea). *International Revue Gesamptes Hydrobiologie* 77:291-301.

KOLDING, S. & FENCHEL, T.M., 1979. Coexistence and life cycle characteristics of five species of the amphipod genus *Gammarus. Oikos* 33: 323-327.

KOUTSOUBAS, D., DOUNAS, C., ARVANITIDIS, C., KORNILIOS, S., PETIHAKIS, G., TRIANTAFYLLOU, G. & ELEFTHERIOU, A., 2000. Macrobenthic community structure and disturbance assessment in the Gialova lagoon, Ionian Sea. *ICES Journal of Marine Science* 57:1472-1480.

LARDICCI, C., COMO, S., CORTI, S. & ROSSI, F., 2001. Recovery of the macrozoobenthic community after severe dystrophic crises in a Mediterranean coastal lagoon (Orbetello, Italy) *Marine Pollution Bulletin* 42: 202-214.

MILLET, B. & GUELORGET, O., 1994. Spatial and seasonal variability in the relationships between benthic communities and physical environment in a lagoon ecosystem. *Marine Ecology Progress Series* 108:161-174.

MISTRI, M., FANO, E.A., GHION, F. & ROSSI, R., 2002. Distribution and community pattern of polychaetes inhabiting Valli Magnavacca (Valli di Comacchio, Northern Adriatic Sea, Italy). PSZN: *Marine Ecology* 23: 31-49.

MISTRI, M., FANO, E.A. & ROSSI, R., 2001. Redundancy of macrobenthos from lagoonal habitats in the Adriatic Sea. *Marine Ecology Progress Series* 215: 289-296.

MISTRI, M., FANO, E.A., ROSSI, G., CASELLI, K. & ROSSI, R., 2000: Variability in macrobenthos communities in the Valli di Comacchio, Northern Italy, a hypereutrophized lagoonal ecosystem. *Estuarine coastal and Shelf Science* 51: 599-611.

MISTRI, M., ROSSI, R. & FANO, E.A., 2001: Structure and secondary production of a soft bottom macrobenthic community in a brackish lagoon (Sacca di Goro, north-eastern Italy) *Estuarine coastal and Shelf Science* 52: 605-616.

NICOLAIDOU, A., PETROU, K., KORMAS, A.K. & REIZOPOULOU, S., 2006. Interannual variability of soft bottom macrofaunal communities in two Ionian Sea lagoons. *Hydrobiologia* 555: 89-98

NICOLAIDOU, A., REIZOPOULOU, S., KOUTSOUBAS, D., ORFANIDIS, S. & KEVREKIDIS, T., 2005. Biological components of Greek lagoonal ecosystems: an overview. *Mediterranean Marine Science* 6: 31-50.

PARSONS, T.R., MAITA, Y. & LALLI, C.M., 1984. A manual of chemical and biological methods for seawater analysis. Pergamon Press, New York.

PONTI M., COLANGELO, M.A. & CECCHERELI, V.U., 2007. Composition, biomass and secondary production of the macrobenthic invertebrate assemblages in a coastal lagoon exploited for extensive aquaculture: Valli Smarlacca (northern Adriatic Sea). *Estuarine Coastal and Shelf Science* 75: 79-89

REIZOPOULOU, S. & NICOLAIDOU, A., 2004. Benthic diversity of coastal brackish-water lagoons in western Greece. Aquatic Conservation: *Marine and Freshwater Ecosystems* 14: S93-S102.

REIZOPOULOU, S. & NICOLAIDOU, A., 2007. Index of size distribution (ISD): a method for quality assessment for coastal lagoons. *Hydrobiologia* 577: 141-149.

SKADSHEIM, A., 1984. Coexistence and reproductive adaptations of amphipods: the role of environmental heterogeneity. *Oikos* 43: 94-103.

TAGLIAPIETRA, D., PAVAN, M. & WAGNER, C., 1998: Macrobenthic community changes related to eutrophication in Pallude della Rosa (Venetian lagoon, Italy). *Estuarine coastal and Shelf Science,* 47: 217-226.

Accepted in 2007

ANNEX 1

LIST OF SPECIES	
Polychaeta	*Phyllodoce macrophthalma* Schmarda, 1861
Anaitides lineata Claparede, 1870	*Phyllodoce* sp.
Capitella capitata (Fabricius, 1780)	*Pilargis verrucosa* Saint-Joseph, 1899
Capitella minima (Langerhans, 1880)	*Pionosyllis lameligera* Saint-Joseph, 1899
Capitellidae sp	*Platynereis dumerilii* Aoudouin & Milne-Edwards, 1834
Exogone hebes (Webster & Benedict 1884)	*Podarke pallida* (Claparede, 1864)
Fabricia sabella (Ehrenberg, 1836)	*Pomatoceros triqueter* (Linnaeus, 1767)
Glycera convoluta Keferstein, 1862	*Prionospio cirrifera* Wiren, 1883
Harmothoe antilopes McIntosh 1876	*Prionospio malmgreni* Claparede, 1870
Harmothoe imbricata Linnaeus 1776	*Prionospio steenstrupi* Malmgren 1867
Harmothoe sp.	*Protoaricia oerstedii* (Claparede, 1864)
Harmothoe spinifera (Ehlers, 1864)	Pseudomalacoceros cantabra (Rioja, 1918)
Hediste diversicolor (O.F.Muller, 1776)	*Pseudomalacoceros tridentata* (Southern, 1914)
Heteromastus filiformis (Claparede, 1864)	Sabellidae
Hydroides dianthus (Verrill, 1873)	*Salvatoria limbata* (Claparede, 1868)
Janua corrugatus (Montagu, 1803)	*Schistomeringos rudolphi* (Delle Chiaje, 1828)
Micronephthys sphaerocirrata (Wesenberg-Lund, 1949)	Serpulidae
Microspio mecznikovianus (Claparede, 1868)	*Spio decoratus* Bobretzky, 1870
Mysta picta (Quatrefages, 1865)	*Spio filicornis* (O.F.Muller, 1766)
Naineris laevigata Grube, 1855	*Spio* sp.
Nephtys hombergi (Savigny, 1820)	*Syllidae* sp.
Nereidae sp.	*Syllides longocirrata* Oersted, 1845
Nereidae sp. juv	*Syllis* sp.
Nereiphylla rubiginosa (Claparede, 1868)	*Tharyx* sp. juv
Nereis rava Ehlers, 1868	*Typosyllis hyalina* Grube, 1863
Paranaitis pusilla (Claparede, 1868)	*Typosyllis prolifera* Krohn, 1852
Pectinaria koreni (Malmgren, 1865)	

Mollusca	*Sphaeroma ghigii* (Arcangeli, 1941)
Abra segmentum (Philippi, 1836)	**Decapoda**
Bivalve sp.	*Athanas nitescens* (Leach 1814)
Cerastoderma glaucum (Poiret, 1789)	**Decapoda**
Cyclope neritea (Linnaeus, 1758)	*Hippolyte leptocerus* (Heller, 1863)
Loripes lacteus (Linnaeus, 1758)	*Hippolyte longirostris* (Czereniavsky, 1869)
Mytilaster minimus (Poli, 1795)	*Hippolyte* sp.
Rissoa membranacea (Adams J., 1800)	Brachyura
Venerupis aurea (Gmelin, 1791)	Larvae Decapoda
Venerupis decussata Philippi 1836	Paguridea
Amphipoda	*Palaemon elegans* Rathke, 1837
Amphipoda sp	*Palaemonetes varians* (Leach, 1814)
Corophium insidiosum Crawford, 1937	*Upogebia pusilla* (Petagna, 1792)
Corophium rotundirostre Stephensen, 1915	**Miscellanea**
Corophium runcicorne Della Valle, 1893	Anthozoa sp1
Corophium sp.	Anthozoa sp2
Cressa mediterranea Ruffo, 1979	*Balanus* sp
Dexamine spiniventris (A. Costa, 1853)	Copepoda
Dexamine spinosa (Montagu, 1813)	Gymnobranchia
Erichthonius brasiliensis (Dana, 1855)	*Iphinoe serrata* (Norman, 1867)
Ericthonius diformis Milne-Edwards, 1830	Larvae Insectae
Gammarus crinicornis Stock 1966	Nematoda
Gammarus insensibilis Stock 1966	Nemertinea
Gammarus sp.	Oligochaeta
Microdeutopus gryllotalpa A. Costa, 1853	*Onchnesoma steenstrupi* Koren & Danielssen, 1875
Microdeutopus stationis Della Valle,1893	Ostracoda
Microdeutopus bifidus Myers, 1977	*Phoronis muelleri* Selys-Lonchamps, 1903
Peltocoxa sp.	*Syngnathus* sp
Isopoda	*Tanais cavolinii* (M. Edwards, 1840)
Idotea balthica (Pallas)	Turbellaria