

CONSIDERATIONS ON THE RELATIONSHIP BETWEEN CONFINEMENT,
COMMUNITY STRUCTURE AND TROPHIC PATTERNS IN MEDITERRA-
NEAN COASTAL LAGOONS.

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Résumé. - *La théorie récente du "domaine parhalique" a été vérifiée en utilisant des données récoltées dans cinq lagunes littorales tyrrhéniennes.*

The theory of the "parhalic domain" proposed by Guelorget and Perthuisot (1983) provides a new tool for the understanding of lagunar ecosystems as it frames them within an unifying scheme disconnected from the traditional classification of the "Venice System". Although an appealing one, particularly when it deals with the biological criteria on which the classification is based, the model by Guelorget and Perthuisot is still a hypothesis that must be tested before it is generalized within the broad spectrum of ecological situations offered by the Mediterranean lagoons. It is in fact evident - albeit a sufficient documentation has to be produced yet - that within a system apparently omogeneous in terms of floristic and faunistic composition, a number of different patterns can be recognized.

The present work represents an attempt to test the above hypothesis in the light of a data base set up for the study of the coastal lagoons of the Pontine region. This data base consists of a series of monthly samples, including flora, fauna, and physico-chemical variables collected in the lagoons of Fogliano, Monaci, Caprolace, Fondi and Lungi.

Of the available data only the following have been considered: 1- salinity, dissolved oxygen, ammonia, total phosphorus, phytoplankton cells number and chlorophyll a, under the hypothesis that they represent useful indicators of the levels and mechanisms involved in production; 2- sixty nine zoobenthic taxa, with particular reference to Mollusks, Crustaceans and Polychaetes.

From the time series a set of samples was extracted to represent the seasonal cycle. The data have been analyzed both by Factorial Analysis of Correspondence (FAC) and Canonical Correlation Analysis (CCA). This latter has been utilized to test the type and strenght of dependence of the biological phase from the physico-chemical one.

The results are shown in Fig.1, which represents a conceptualization of the typologies revealed by the ordination. In the plane defined by the first two factors of FAC, the F1 opposes the

observation points of the Fondi lagoon to all the others. F2 ordi-
 nates at the opposite poles Lungo and Caprolace, the remaining
 lagoons being in intermediate position. All lagoons do not show
 any significant time drift, both in qualitative and quantitative
 terms of the community. This configuration reflects the existen-
 ce of two almost orthogonal cenoclines. The first one can be in-
 terpreted as a canocline induced by an inverse gradient of sali-
 nity proceeding from Caprolace to Fondi. The ordination of the
 species points shows that this gradient affects the community,
 producing a sorting upon thalassoid species and, to a lesser ex-
 tent, upon those of the "near parhalic". The
 second axis defines a gradient which, alto-
 ugh in the substantial homogeneity of the
 parhalic fauna, identifies two opposed poles
 represented by Fondi and Caprolace.

The CCA (Fig.2 a,b) shows that in the spa-
 ce defined by the linear combinations sum-
 marizing the trophic indices (U_1, U_2) and tho-
 se of the community structure (V_1), respecti-
 vely, the observations are ordered along an
 axis almost duplicating the second axis of
 FAC (see the opposition of Caprolace and Lun-
 go). In the equation that defines this axis,
 the coefficients of the trophic indices (P_t ,
 NH_4 and phytoplankton cells number, in parti-
 cular) have values greater than that of sali-
 nity by two orders of magnitude. This brings

into further evidence the substantial lack of dependence on sa-
 linity of the structure of benthic communities, at least within
 defined limits of this parameter. To this configuration contri-
 butes the morphology of the basins which, as in the case of Lun-
 go and Fondi, produces euxinic conditions. Between these two la-
 goons, however, there is a remarkable difference both in terms of
 salinity and of the indices of potential productivity. As the
 confinement levels are essentially the same, this could be explai-
 ned by different boundary conditions, namely quality and quan-
 tity of runoff inputs.

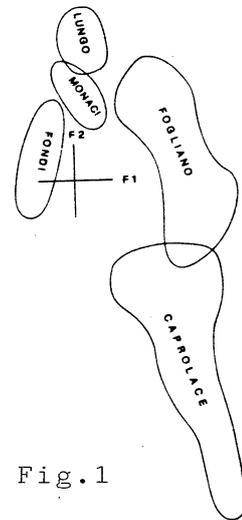


Fig.1

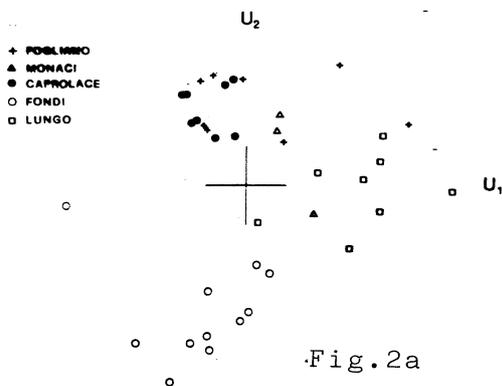


Fig.2a

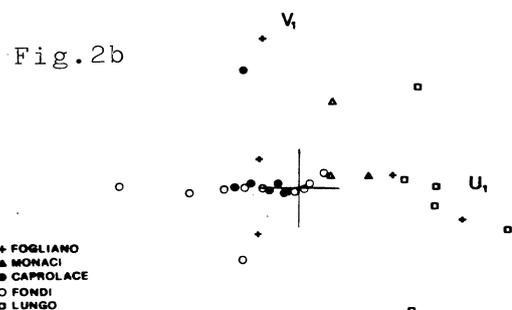


Fig.2b

Our results, while confirming the view of Guelorget and Perthuisot, introduce the idea that, within a defined range of confinement, same aspects of the community structure undergo evident rearrangements, depending on the level of forcing functions - such as, for instance, the nutrients - ending up in a reorganization of the food webs.

References

GUELORGET O., J-P. PERTHUISOT, 1983 - Le domaine paralique. Expressions géologiques, biologiques et économiques du confinement. Trav. Laboratoire de Géologie, 16. Presses Ecole Norm. Sup.

