

Colonization rates and dispersal as essential parameters in the confinement theory to explain the structure and horizontal zonation of lagoon benthic assemblages

Angel PEREZ-RUZAF A and Concepcion MARCOS-DIEGO

Dpto. de Ecología, Fac. de Biología, Universidad de MURCIA (Spain)

In place of parameters such as salinity, ionic composition, etc., the confinement theory proposes renovation-rates of vital elements in marine water as the main factor to explain the composition and structure of benthic assemblages and the observed gradients in population-density, biomass, specific richness, and diversity, in coastal lagoons (GUELORGET & PERTHUISOT, 1983).

However, this model is not altogether free from difficulties. Data cited in the bibliography, and the results of our work at the Mar Menor lagoon (SE Spain) (PEREZRUZAF A, 1989), show that the distribution of some communities and macrophytic meadows, like those *Caulerpa prolifera*, *Ruppia cirrhosa*, etc., display patch-distributions, related to the nature of the bottom, physical and chemical composition of sediments, minimum temperatures, wave-energy or hydrodynamism, and depth, instead of horizontal gradients. These species can inhabit zones other than those predicted by the model of GUELORGET & PERTHUISOT (1983). Furthermore, some assemblages, of fishes and other vagile macroinvertebrates, do not respond to the predicted gradients, and recent colonizers show temporary gradients in horizontal zonation.

We propose that lagoon zonation and community structure must be considered in terms of a new conceptual model. This includes a multifactorial approach in which lagoon-assemblages composition is related, on the one hand, to reproduction and growth-rates as result of adaptations and energetic costs to physical and chemical factors, and, on the other, to the confinement concept reinterpreted as the capability of open-sea organisms to colonize the paralic environments. In this way, interspecific competition between colonizers and paralic species can be one of the essential factors determining community structure. In resolving equations of competition, population growth-rates also include colonization or effective settlement rates. Thus, disadvantages in competition can be compensated for if immigration rates are high enough, so that competitive equilibrium is permitted. This would explain the higher diversities observed near the channels of communication with the open sea and the different patterns shown by sessile and vagile fauna.

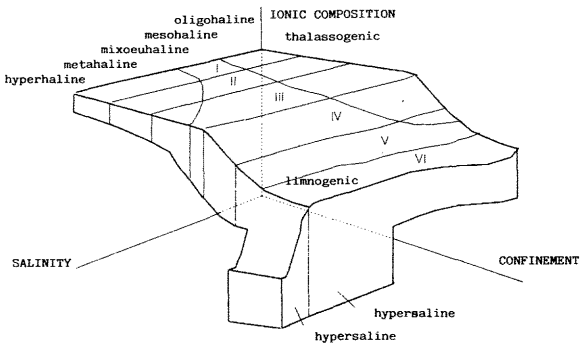


Fig. 1 - Body water and biological zonation classification according to some of the main factors that determine them.

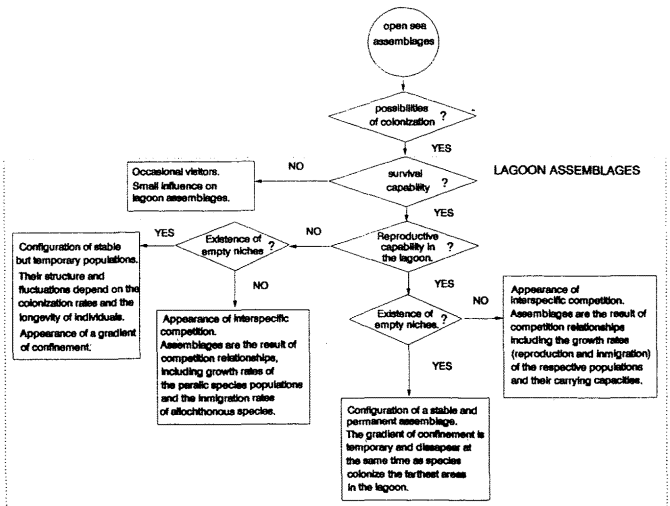


Fig. 2 - Conceptual model to explain the structure of lagoon benthic assemblages.

REFERENCES

GUELORGET O. & PERTHUISOT J.P., 1983.- Le domaine paraliq ue. Expressions géologiques, biologiques et économiques du confinement. *Travaux du laboratoire de géologie*, 16: 1-136.
 PEREZ-RUZAF A A., 1989.- *Estudio ecológico y bionómico de los poblamientos bentónicos del Mar Menor (Murcia, SE de España)*. Tesis Doctoral. Universidad de Murcia: 751 pp.