E-I3

The Halmyric Environment : a proposal

F.D. POR

Hebrew University, Department of Zoology,
91904 Jerusalem (Israel)

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Along the Mediterranean shores, more than in any other sea, there is a variety of environments with changing salinities, both brackish and hypersaline. Furthermore, the Mediterranean lands present a wide diversity of landlocked saline aquatic environments. Much thought has been given by Mediterranean oceanographers and limnologists to the classification of these aquatic environments, often from different approaches. Marginal to the marine and to the freshwater environments, the environments with changing salinity present an unity of their own, which at least for methodological reasons deserves a separate definition.

It is proposed to reunite these environments under the name **"Halmyric environments"**, using the greek name of a lagoon area of the Black Sea, Halmyris(=Razelm). These environments present a salinity restriction of their biota. The halmyric biota are a stock of very adaptative and genetically variable species ,some of which are represented in both brackish and hypersaline waters. Halmyric waters are characterized by fluctuating salinities, often modified ionic composition, vertical stratification , frequently with oxygen deficiency. The ecosystems are to a large extent based on detritic pathways, either resulting from import or from rich local aquatic plant growth .The planktonic grazing pathway has a limited importance. Soft bottoms are prevalent. Cosmopolitism of the biota, primary or secundary by its origin is frequent.

The halmyric environments are furthermore subject to large scale human impact, both economic and detrimental. The need for an "interdisciplinary" approach to define the main traits of the halmyric environments is therefore an urgent one. The fragmentation according to the oligohaline-hypersaline scale, or according to geomorphological shapes (lagoons, estuaries, limans, lakes, ponds, sebkha's , swamps, salty springs, etc.) is in fact counterproductive.

The Mediterranean area is unique in presenting a long history of halmyric waterbodies of marine dimensions, in the form of both the Messinian and the Sarmatic environments. From the geological perspective their common environmental and biological traits are even more evident.

Halmyrology should be a discipline of its own on equal footing with Oceanography and Limnology.

E-I4

Experimental enrichment of estuarine zones with sewage sludge. Changes in community structure of estuarine tidal creeks

Rafael SARDA' and Ivan VALIELA

Boston University Marine Program, Marine Biological Laboratory, Woods Hole, Ma 02543 (U.S.A.)

Human growing population in coastal regions has increased the contamination of coastal wetlands with sewage wastes. Increased concern about pollution of deltas and estuarine zones shown interest in community structure and succession of estuarine fauna.

The taxa found in this study were very similar to those found elsewhere in similar shallow coastal marine environments exposal to nutrient enrichment. For example in shallow creeks draining into coastal lagoon of the Ebro Delta, similar densities of *Streblospio benedicti, Capitella capitata, Polydora sp.* and several oligochaetes were found. This list of species is quite similar to the obtained from our place of study and suggest that there is a widely distributed cosmopolitan fauna of those environments.

Benthic macrofaunal populations were censused in control plots and in experimental plots in Great Sippewisett Salt Marsh (Massachusetts, USA) in which food resources were enriched by adding 2 dosages of sewage fertilizer during the growing season (highest fertilization, XF= 75 g/m*m wk; high fertilization, HF= 25.2 g/m*m wk), (Valiela et al, 1973). Fertilization began in 1974. Animals in the sediments of tidal creeks bisecting these plots were sampled during 1974, 75, 79, 86, 87 and 88.

No differences in total biomass values in 1974 and 1987 were found, but an important change in species composition was observed between those years, therefore, different species contributed to similar biomass values. Diversity of fauna in all creeks diminished since the beginning of the experiment in 1974.

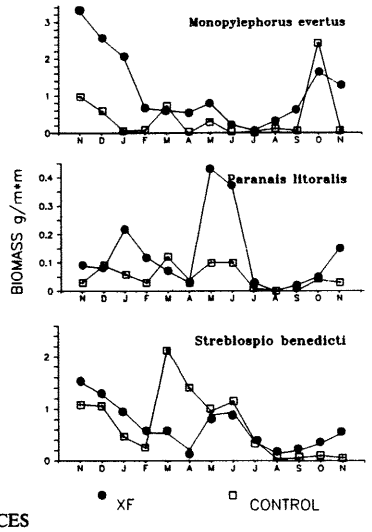
The seasonal pattern was the same in all creeks. Density of macrofauna peaked in early summer, decreased abruptly in July/August and increased again in the fall. Diversity of fauna in all creeks through the years diminished from early spring to late summer and increases again in fall.

A change of species composition took place in the control creeks over the period of study, due to long term changes in bed sediments which are a result of colonization by *Spartina alterniflora*. Some species disappeared, including *Polydora ligni, Amphicteis gunneri, Pygospio elegans, Marenzelleria viridis* and *Leitoscoloplos fragilis* (POL), *Hydrobia totteni* and *Gemma gemma* (MOL) and *Edotea triloba* (CRU). Some species appeared in the late seventies: *Paranais litoralis, Limnodriloides sp.* (OLI), *Manayunkia aestuarina* and *Dinophylus gardineri* (POL). *Streblospio benedicti* (POL) is the most abundant species in the new assemblage.

No large difference in abundance, biomass and species composition between creeks were observed during the first year of experiment (1974). In 1975 biomass increased ten-fold in the highest fertilized creeks due to a suite of opportunistic species that responded to enrichment within 1 year of treatment: *Capitella capitata, P. ligni, A. gunneri, S. benedicti, P. elegans* (POL), *Monopylephorus evertus* (OLI) and *Nematostella vectensis* (CNI). Later on the continued enrichment accelerated an important switch in species composition, when most of those species were displaced by *M. evertus* and *P. litoralis* (OLI).

Enrichment of salt marsh thus results in transient increases in invertebrate biomass, and also fosters growth and colonization by *Spartina alterniflora*. Long term fertilization stabilize faunal composition in those creeks, accelerating the switch observed in control areas, by the dominance of oligochaete species.

Meanwhile the control creeks are actually colonized by a S. benedicti population with a variable fauna associated through the year, the fertilized creeks are based in a mores stable faunal composition based in two oligochaetes populations: *P.litoralis* in spring-summer and *M. evertus* the rest of the year, (fig. 1).



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