Sediment impact on algal macrobenthic communities : an experimental approach

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The vertical flux of particulate matter from the pelagic to the benthic system is the result of a delicate balance, controlled by biological and physical-chemical factors, between supplies and losses of material in the water column (fig.1). Human activities can alter the sedimentation rate by directly or indirectly increasing the amount of suspended material. Increment of water turbidity has been observed in many coastal areas, with grave consequences for benthic organisms (LUMB, 1990).

Great efforts have been made to assess and quantify vertical transport and spatio-temporal dynamics of particulate matter in many coastal and oceanic areas. Sediment traps have proved to be a suitable and inexpensive instrument to provide information about vertical fluxes, even if possible sources of bias are inherent to this methodology (SMETACEK, 1984).

Adequate knowledge of interactions between sedimentation and benthic communities are lacking so far. Laboratory experiments and field observations have shown that sediment instability, burial and scour may represent a source of stress and disturbance for algal communities, by removing whole organisms or part of them, by preventing settling of spores or recruitment of recently settled algae, by reducing inputs of light and oxygen and substratum availability (DEVINNY & VOLSE, 1978; TAYLOR & LITTLER, 1982). These effects are difficult to quantify and to date only very few field experiments have been performed in subtidal habitats.

We propose an experimental manipulative approach to study the effects of sediment deposition on the structure or rocky bottom subtidal macroalgal communities. The research is being carried out on a 15m-deep rocky bottom at Calafuria (Tyrrhenian Sea), a locality characterized by high levels of turbidity. Previous studies on algal community of the area were carried out by CINELLI (1969).

Preliminary surveys of the experimental area have shown a poorly diversified algal community, dominated by filamentous turfing algae (*Polysiphonia* spp.) and by crustose coralline algae. Both kinds of algae are resistant to sediment burial and scour (KENDRICK, 1991). Our experiment tests the null hypothesis that the structure of the algal community is unaffected by variations in rates of sediment deposition and scour. The experimental units are 12/400 cm2 squares, randomly assigned to 6 treatments and 6 control replicates. Sedimentatioll is reduced in treatment plots by means of transparent Plexiglas roofs, while it is ullmanipulated in controls. The same experimental design is used to study the effect of sedimentation on algal recruitment: the experimental units are 12/400cm2 squares scraped clean from resident organisms. Community dynamics and algal recruitment are surveyed with non-destructive techniques. A pilot study is in progress to test any artifact induced on light penetration and hydrodinamism by roofs. The sedimentation of the area is investigated using cylindrical sediment traps and sanded Plexiglas plates. Hydrodinamism, light penetration and physical-chemical parameters of the water column are also periodically measured.

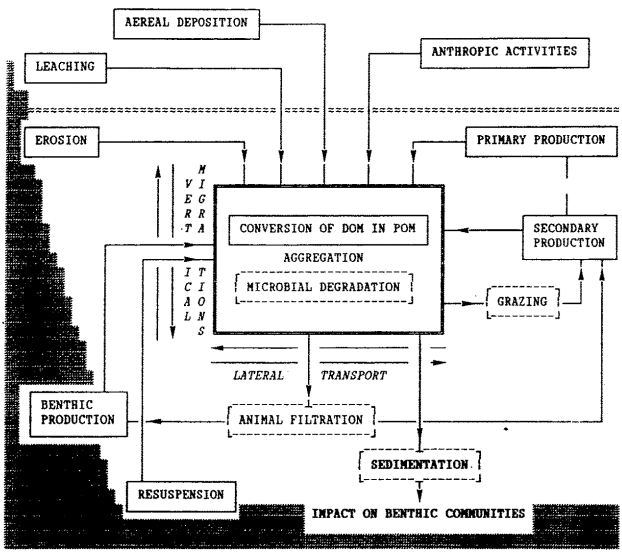

Fig. 1 - Scheme of fluxes of particulate matter in marine ecosystem.
——— processes producing particulate matter
-------- processes removing particulate matter
===== pool of suspended particulate matter

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