

Mediterranean aquaculture impact on the infralittoral rocky shore: a study case from the Aegean Sea

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The nutrient enrichment from fish cage culture in the Mediterranean has been associated with negative impacts in environmental conditions and surrounding habitats in several occasions. However, these studies have been usually directed to the benthonic habitat in the close vicinity of the fish farms neglecting other sensitive habitats. Thus, for the first time ever, the effect of nutrient loading from multiple fish farm facilities on infralittoral rocky shore macroalgae community using ecological and metabolomics analysis is here evaluated. To achieve this Vourlias Bay, a semi-enclosed bay with intermediate hydrodynamics in the Peloponnese region on the Aegean (Greece) was chosen as the study site. This bay has sea bream aquaculture facilities and there is recorded evidence of nutrient enrichment made by farm discharges in the past. At the site, seasonal sampling was done in two campaigns during June 2017 and March 2018, two sites were chosen in an impact gradient from the fish farm, one close to the aquaculture site and one far from it as a control. In each site a transect of 50m along the shore was done, every 10m the macroalgae was scraped on 40cm² quadrats and all the material collected, along this quadrat photography was performed for digital analysis and macroalgae and associated fauna was collected and frozen in liquid nitrogen for metabolic analysis. As a result, seasonal patterns in composition and structure of both macro-algae and its associated epifauna were found, sea urchin cover, in particular, was higher during the summer than in winter evidencing the effect of temperature on grazing pressure. The metabolomics analysis allowed to describe pathways involved in the tolerance or degradation of key species in relation to nutrient enrichment from fish farm discharges. And the multiparametric analysis relating macroalgae community with the ecological and biogeochemical water quality evidenced the effect of both seasonality and fish farm effluents.

Keywords: macroalgae; aquaculture effect; omics; rocky shore; Mediterranean