

N:P ANOMALIES IN A LAND-LOCKED BASIN (MARMARA SEA)

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Systematic measurements in 1991-1994 have led to a better understanding of nutrient cycling in the Sea of Marmara which permits to water exchanges between the salty Mediterranean and brackish Black Sea. The Black Sea inflow to the Marmara surface layer is drastically enriched in nitrate and phosphate, yielding highly variable N:P ratios (5-35) whereas it is $\approx 5-25$ for PON:PP. Interestingly, in the Marmara basin which is subject to external nutrient inputs from the Black Sea and the anthropogenic sources of the basin itself besides the subsurface inputs via mixing, sestons in the thin (25-25m) upper layer possess anomalous N:P ratio and it is usually much less than 16. It was as low as $\approx 5-6$ and ≈ 10 for the "less" and "more" productive seasons, whereas the POC:PP ratio being ≈ 115 for "more" productive periods. This suggests a nitrogen-limited algal production. A weak correlation between the POC and Chl-*a* measurements in the "less" productive seasons indicates a detritus dominated seston distribution in the Marmara surface layer, due to limited inputs of labile nutrients both from external and internal sources during the stratified seasons. Similarly, anomalous $\text{NO}_3:\text{PO}_4$ ratios (8-10) in the oxygen-poor subhalocline waters of the entire basin is principally the result of the sinking of the biogenic POM from the surface with low N:P ratios rather than denitrification. A linear close correlation observed in regression analyses of AOU vs. NO_3 (slope: ≈ 20) and AOU vs. PO_4 (slope: ≈ 178) data sets from the Marmara subhalocline waters also supports the N-deficient rather than P-enriched) particle snow from the surface.

CHANGES IN THE ZOOPLANKTON COMMUNITY IN RELATION TO THE DECREASE IN THE FISH BIOMASS

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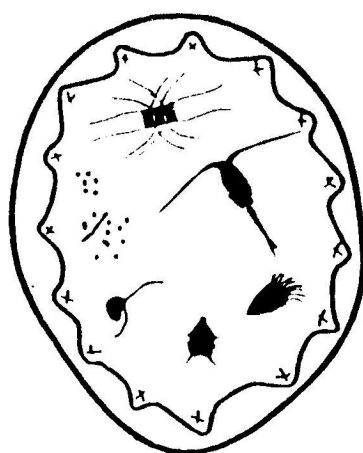
From 1993 to 1996, the effectiveness of biomanipulation as a tool for restoring a small (61 ha) eutrophicated lake ecosystem has been studied in Lake Pohjalampi (North Karelia, Finland). The internal phosphorus load has been reduced by removing cyprinids. Over 200 kg ha^{-1} of fish, mainly roach and bream, have been caught and, thus, approx. 60% of total fish biomass was removed from our study lake during three years. The external nutrient loading in Lake Pohjalampi was low and nearly stable during the study.

The effect of decreasing fish predation on plankton community has been studied. Both the biomass and structure of phytoplankton and zooplankton community as well as the nutrient concentrations (N, P) in the pelagial zone of our lake was observed. Besides the population size of zooplankton, the mean size, egg number and the intensity of cyclomorphosis of *Daphnia* and *Bosmina* was measured.

The decrease in the total fish biomass caused the considerable change in the predation of fish on zooplankton and in the whole plankton community. The number and biomass of large cladocerans such as *Daphnia* species increased but, on the contrary, the numbers of copepods decreased. The mean length of another dominant crustacean species, *Bosmina*, increased during the study period. At the same time N, P or chlorophyll-*a* concentrations or their ratios were unchangeable. During summer in each year, chlorophyll-*a*:P ratio increased, but N:P ratio decreased.

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