Positive Impacts of a Biomanipulation of the Pont-de-Salars Reservoir(Southwest, France)

Limnology, Phytoplankton Dynamics and Recolonization of Phytoplankton in Relation to Flow Regime and Fish Removal Biomanipulation (whole-lake emptying, 1995) of the Pont-de-Salars Reservoir (Southwest, France) from 1993 to 1996

서울대학교 환경대학원 환경계획연구소
정상옥

I. Introduction and methods

Pont-de-Salars reservoir is the uppermost part of a series of reservoirs in the Aveyron - Tarn complex in southern France. The numerous studies carried out on Lake Pareloup, a downstream reservoir just after Lake Bage, have suggested that the Pont-de-Salars reservoir is the most important for the successful management of the series of reservoirs.

Since its construction in 1952, the reservoir has been completely emptied twice ; in 1972 without monitoring and between August 21 and September 1, 1995. During the second operation, fish (over 30 tons, mainly roach (21 tons) and pikeperch (4 tons)) were taken out and the subsequent refilling with water was carried out without reintroducing the fish.

The aim of this presentation is to show positive impacts of biomanipulation (total removal of fish) associated with certain hydrochemical parameters of the main inflow (temperature and dissolved oxygen data were not available) on the reservoir.

The methods (sampling, analyses, and statistical tests) used are classically known in modern limnology. Thus, they will not be depicted here.

II. Results and discussion

Fish removal biomanipulation in 1995 resulted in a general improvement in the quality of water although the reservoir was deep, large and stratified: a drastic summer decrease in phytoplankton biomass (biomass and chlorophyll *a*) and

abundance, a spectacular early summer increase in water transparency, an increase in hypolimnetic dissolved oxygen, and perhaps an increase in the biomass of large grazers according to other authors, after the biomanipulation.

The Viaur river exerts a major effect on watershed inflows. The seasonality of the alkalinity, conductivity and nitrate nitrogen in the reservoir seemed to follow that of the Viaur inflow. Nitrate nitrogen in reservoirs is the substance which is mostly affected and shows a significant relationship with the inflow, especially in the agricultural watershed. Therefore, it is necessary to improve the water quality of the Pont-de-Salars watershed (not just the reservoir) in order to reach better water quality downstream. Moreover the Pont-de-Salars reservoir has never shown nutrient deficiencies probably due to high nutrient loadings of its inflow and surrounding land use patterns (i.e. agriculture, cattle farming). Thus, in the Pont-de-Salars reservoir, nutrient limitation should not be critical due to high external and internal P and N loadings (highly accumulated at lower depths). It does, however, became important following the flow operations including biomanipulation which always results in a highly disturbed system.