



Could climate change cancel out the results of water quality control measures at Lake Balaton?

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With an average depth of some 3.5 m, Lake Balaton (LB) is a very shallow large lake. For comparison, Lake Geneva (Leman) has almost the same surface area but its volume is 44 times of that of Lake Balaton. In terms of the dynamic ratio (DR), a measure of shallowness introduced by Hakanson, Lake Balaton is the second shallowest in Europe with DR=7.4, and it is in the top ten in the world among shallow lakes of high environmental and/or economic importance.

Just as the water balance (refer to adjoining article on LB water quantity), water quality is highly vulnerable to external factors, such as nutrient and pollutant loads and changes in the hydro-meteorological conditions.

Anthropogenic eutrophication of Lake Balaton became well recognized in the early 1960's, and serious algae blooms were recorded in the next 3 decades. Serious control measures targeting the radical reduction of phosphorus (and nitrogen) load first helped to avoid further (potentially disastrous) deterioration of water quality, and then resulted in improvement since the middle of the 1990s. However, reduced water levels and the lack of outflow for many of the last 12 years have raised concerns of the effects of climate change on water quality. Experienced changes include slight increase in phytoplankton concentration, mass blooms of filamentous green algae *C. glomerata* in the extremely shallow shoreline areas, increase in salt concentration, spread of introduced/invasive species, etc.

Based on the regional climate predictions conducted at the Austrian Institute of Technology in the framework of the EULAKES project, model simulations on water quality were carried out by using a dynamic tanks-in-series model to predict changes in the level of eutrophication as a result of climate change and measures to prevent the potential deterioration of water quality are suggested.