



Eutrophication of ancient Lake Ohrid: Global warming amplifies detrimental effects of increased nutrient inputs

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ABSTRACT: Lake Ohrid in southeastern Europe is one of the few ancient, long-lived lakes of the world, and contains more than 200 endemic species. On the basis of integrated monitoring of internal and external nutrient fluxes, a progressing eutrophication was detected (~3.5-fold increase in phosphorus (P) concentration in the lake over the past century). The lake is fortunately still oligotrophic, with high concentrations of dissolved oxygen (DO) in the deep water that are requisite for the unique endemic bottom fauna. Hypolimnetic DO is not only very sensitive to changes in anthropogenic P load [via mineralization of organic material] but also to global warming via decrease of vertical mixing and less frequent complete deep convection. Moreover, these two human effects amplify each other. To keep DO from falling below currently observed minimal levels [given the predicted atmospheric warming of $0.04^{\circ}\text{C yr}^{-1}$] the P load must be decreased by 50% in coming decades. However, even with such a reduction in P load, anoxia is still expected toward the end of the century if the rate of warming follows predictions.

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