Geophysical Research Abstracts
Vol. 12, EGU2010-4730, 2010
EGU General Assembly 2010

Groundwater – the underestimated component in lake nutrient balances

Joerg Lewandowski and Gunnar Nuetzmann
Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany (lewe@igb-berlin.de)

Eutrophication is one of the most important threats to lakes in temperate climatic zones. It is necessary to determine the relevance of different nutrient sources to conduct effective management measures, to understand in-lake processes and to model future scenarios. A prerequisite for nutrient balances are water balances. Surface inflows from streams, rivers and ditches can be precisely quantified and based on local weather data precipitation and evaporation can be calculated. Quantifications of groundwater infiltration and exfiltration are more difficult. Often they are determined as residual in the water balance equation or estimated based on groundwater flow models. For nutrient balances some additional input paths have to be taken into account, for example, dry deposition, waterfowl, swimmer and anglers. Furthermore, concentration fluctuations of the different inflows have to be considered. The determination of nutrient imports via the groundwater paths is quite complex and often disregarded in nutrient balances or based on dubious assumptions. Nevertheless, groundwater might be an important nutrient source in several lakes. There are three major reasons for neglecting the groundwater path: (1) The groundwater-lake interface is difficult to access, especially in deeper lakes. (2) The size of the interface gives much space for spatial heterogeneity and requires an enormous amount of measurements for reliable determinations. (3) The lake sediment is a reactive interface, i. e., there might be some processing of the nutrients at the immediate groundwater-lake interface. In the present study we suggest a combined approach of localization of major water infiltration zones with distributed temperature sensing, quantification of water infiltration at some locations based on temperature gradients at the groundwater-lake interface and determination of nutrient concentrations with seepage meters at the same locations.