



Vulnerability of boreal zone for increased nitrogen loading due to climate change

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The observed rapid warming of the boreal zone that has been observed in Finland (0.14 °C by decade) is expected to continue (<http://www.ipcc.ch/report/ar5/wg1/>). Also precipitation is assumed to increase in future. These changes may increase nitrogen (N) loading from terrestrial environments to water bodies by accelerating soil organic matter decay and by increasing runoff. Nitrogen is limiting nutrient in the Baltic Sea but also in some lakes, so increased loading may increase eutrophication. Further, high nitrate levels in drinking water may cause methaemoglobin anemia for humans, and nitrate is also connected to increased risk of diabetes and cancer. Thus EU has set upper limits to nitrate concentration in drinking water. MONIMET (LIFE12 ENV/FI/000409) is a project about Climate Change Indicators and Vulnerability of Boreal Zone. We simulated N loading from two boreal catchments to the receiving waters by the dynamic, catchment scale model INCA in different climate change and land use change scenarios. We calculated land use specific N loading values for these two well monitored catchments that belong to the LTER (The Long Term Ecological Research) monitoring network. We upscaled the results to the larger river basin, combining them with the information on drinking water supply to assess the vulnerability. Specific emphasis was paid on nitrate concentrations in soil water and groundwater. In general, land use change has higher influence on N loading than increase in precipitation and temperature alone. Peak runoff will shift from snow melting peak in April to late autumn and winter. Growing season will become longer allowing more efficient vegetation uptake of nutrients. Small groundwater aquifers and private wells in the middle of agricultural fields will be in the risk of increased N concentrations, if agricultural N loading increases due to changes in agricultural patterns and land use change.