Project aims at estimating the rate of N_2O emission from freshwater temperate lakes across trophic gradient as well as at recognizing its temporal changes and environmental conditionings.

Nitrous oxide acts as a greenhouse gas and its contribution to the natural and anthropogenic greenhouse effect is estimated to 4%. Production of N_2O is related to denitrification, one of the major microbial processes of organic matter degradation in O_2-depleted environments. Owing to a close link between N_2O formation and N cycling, it is believed that the amount of N_2O released in lakes is largely determined by trophic conditions and the availability of nitrates. Since the late 18^{th} century the atmospheric N_2O, like other greenhouse gases, has displayed an increasing trend. However, unlike CH_4 and CO_2, N_2O derivatives contribute to degradation of stratospheric ozone. In the context of global environmental change and enhanced anthropopression the understanding of processes behind N_2O production and estimations of its fluxes to the atmosphere seem crucial environmental modelling and management.

Not much is known about N_2O emission from aquatic ecosystems worldwide and the data from Polish lowland lakes are missing altogether. One-year monitoring programme of N_2O was run by the author in 2014/2015 in Lake Licheńskie (Gniezno Lake District) and in seven coastal lakes along the Polish Baltic coast. However, none of these lakes seem representative for lowland lakes owing to strongly hypertrophic conditions and enhanced anthropogenic pressure (Lake Lichenskie receives warm waters from the "Pątnów" power plant). On the other hand, the data from coastal lakes and Lake Lichenskie can be used to extend systematic observations from natural/seminatural lakes to be studied in the current project.

In the project we are investigating 3 channel lakes situated on the Lubuskie Lake District (Lake Trześniowskie) and Poznań Lake District (Lake Łódzko-Dymaczewskie and Lake Dębno). These lakes are relatively deep (12.7 – 58.8 m) and seasonally stratified basins representing different trophic conditions (from meso- to hypertrophic). In the deepest sites of these lakes throughout a year we monitor t, pH, EC, Eh, O_2 diss, concentrations of major ions (HCO_3^-, SO_4^{2-}, N_{tot}, NH_4^+, NO_3^-, P_{tot}, PO_4^{3-}) as well as N_2O and stable N isotope composition of NO_3^- ($\delta^{15}N_{NO3}$). In addition, we are planning incubation experiments to measure denitrification rates in different limnological conditions.

On the basis of our data diffusional emission of N_2O from lakes will be calculated.