This thesis is based on research in two lakes in northernmost Sweden. The aim is to bring further knowledge about in-lake CO$_2$ production, the variation of CO$_2$ in the surface water and the CO$_2$ gas transfer rates between water and air.

The general net release of CO$_2$ from inland waters contrasts the general net CO$_2$ uptake by the terrestrial biosphere. High latitudes, with a large number of lakes, are predicted to be particularly affected by global climate change. The carbon cycling in northern lakes and their role in the landscape are therefore important to study.