

The importance of direct groundwater input for a lake carbon budget

Karólína Einarisdóttir

Carbon gases in the atmosphere have been increasing for the last century, causing enhanced greenhouse effects that are resulting in global climate change. The main reason for this increase can be attributed to human activity such as burning of fossil fuel and land use changes. Ever since this increase of carbon gases was detected, great focus was put on the global carbon cycle with the objective of modeling it. The global carbon cycle is however complex as the carbon is stored in very different forms and exchanges between atmosphere, biosphere, geosphere and hydrosphere and is therefore not easy to model. Today, however, we have rather a good idea of how the cycle works and how much is stored and exchanged between the spheres.

Freshwater systems are one of the Earth's ecosystems that play an important role in the global carbon cycle. Most of the carbon found in lakes originates from organic remains of plants and animals of the terrestrial surroundings that are flushed into the lakes via run-off water. When the carbon enters the lakes it undergoes microbial and physiochemical processes that change its form; resulting on one hand in carbon gases that are emitted to the atmosphere and on the other hand in particles that are buried in the sediment. More than half of this terrestrial derived carbon therefore is lost from the system before it enters the ocean.

Most studies that have been focusing on carbon budgets of lakes have only taken into account the carbon that enters the lakes via streams, neglecting the carbon that is coming into the lakes via direct groundwater seepage. In this master thesis I tried to answer how important groundwater input of carbon can be for a carbon budget of a small boreal lake. I compared carbon-load from direct groundwater flow and inlet streams into Lake Gäddtjärn in Mid-Sweden and found out that direct groundwater input of carbon could be a very important source for a lake carbon budget.