Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title: **Former land use impacts on the capacity of forest soils to retain N-inputs**

Project ID: 280

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Throughfall N has previously been established as a strong predictor of N leaching from European forests in the Level II database. Organic soil C:N ratios and B horizon pH have also been identified as factors that can improve N leaching estimates from throughfall N inputs. We have recently collated a database from published literature on nitrate leaching from 65 European coniferous and broadleaf forests and observed that land use history can affect the relationship between throughfall N and N leaching. Land use history was the most significant factor affecting the mineral topsoil C:N ratios. The effect of former land use on the retention of N inputs in forest soils has not been tested on the Level II dataset, to our knowledge.

Our dataset was limited by low sample number for some former land use histories including secondary rotations. Analysis of the Level II dataset will increase the representation of some former land uses and improve the robustness of the conclusions. It may also identify a factor affecting N leaching estimates previously missed in analyses of the Level II dataset. Our main objective is to further develop the evidence base on the effect of land use history on the relationship between N-deposition and nitrate leaching fluxes.

We hypothesised that the effect of former land use on the capacity of forest soils to retain N inputs is affected by the availability of other nutrients in the soil, especially P, K and Mg content. The dataset we have collated does not, however, have information on the availability of other nutrients in the soil. Our second objective is therefore to use the Level II dataset to test the hypothesis that the impact of former land use on the capacity of forest soils to retain N-inputs is related to the nutrient availability associated with former land management practices.

In our dataset, we also observed that mineral topsoil C:N ratios and organic soil pH was significantly different in sites 500-750 m away from agricultural land compared to those closer to agricultural land. This evidences edge effects on soil chemistry over a greater spatial scale than previously observed. The sample size of forests situated beyond 750 m from agricultural land was however small. Analysis of the ICP dataset may increase the representation of sites further away from agricultural land and determine over what spatial scale surrounding agricultural land use affects forest soil chemistry. Our final objective is therefore to test the effect of proximity to agricultural land on the capacity of forest soils to retain N-inputs, and the associated effects on organic layer pH and mineral topsoil C:N ratios.

This research will have implications for guiding site selection for future afforestation schemes to deliver benefits to water quality, especially in areas still subject to elevated deposition. We intend to publish this work in a peer reviewed scientific journal.