Quantification of the impact of historical litter raking on forest soils and runoff generation in Tyrol – concept, sites and methods

Schrott, Roman[1]; Müller, Lukas[1]; Gröber, Maximilian[2]; Markart, Gerhard[4]; Scharr, Kurt[2]; Katzensteiner, Klaus[3]; Meißl, Gertraud[1]; Simon, Alois[3 5]; Geitner, Clemens[1]

[1] University of Innsbruck, Department of Geography
[2] University of Innsbruck, Department of History and European Ethnology
[3] University of Natural Resources and Life Sciences, Vienna, Institute of Forest Ecology
[4] Austrian Forest Research Centre (BFW), Department of Natural Hazards
[5] Department of Forest Planning, Tyrol Forest Administration, Office of the Tyrolean Government

Aims

The aim is the investigation of the influence of historical forest uses on forest ecosystems, forest soils and runoff generation.

Historical background

Until the middle of the 20th century, litter raking was practiced by local farmers in Tyrol. Especially the high proportion of livestock farming led to a corresponding need for bedding. Straw was rare but organic material on forest soils was available in large quantities.
In order to cut roots and ground vegetation, the forest floor was first mown with special scythes. The next step was to collect the organic material with small rakes.
The material obtained consisted primarily of the ground vegetation (grasses, herbs, dwarf shrubs, mosses), the more structurally parts of humus OL and OF and roots.

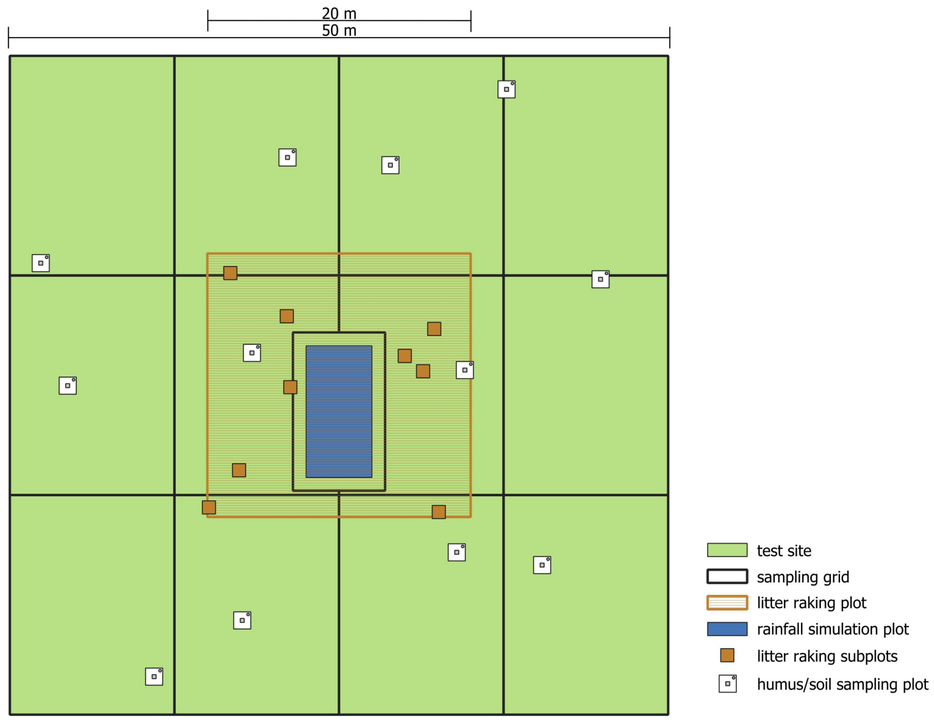
Historical tools for litter raking

Study sites

The four experimental test sites are located in North Tyrol, two in a subalpine spruce forest (Stummerberg), the other two in a low-montane spruce-fir forest (Söll).

Methods

To quantify the amount of carbon and nutrients stored in the ground vegetation, humus and soil, a stratified random sampling with a rectangular grid was applied on a test site of 2500 m². On each of the twelve sampling points organic layers were sampled with a 900 cm² frame separately. The mineral soil was sampled with a soil corer with 7 cm diameter.
Litter raking was executed on an area of 400 m², located in the centre of the test site. To quantify the amount of litter removed during the intervention, nine randomly distributed 1 m² subplots were sampled before litter use. On these subplots the extracted material was weighed in the field and a subsample of the material was taken. To determine the quantity of humus which was left in the subplot after the litter raking, further samples were taken.
A terrestrial laser scanner was used to record the soil surface before and after the intervention. By intersecting the 3D models derived from this, is it possible to get a better estimation of the litter volume removed.
In order to quantify the hydrological conditions, rainfall simulations were carried out on an area of 50 m², using a transportable spray irrigation installation. These tests were executed two times, bevor the litter removal and after. This makes it possible to determine the influence of litter raking on surface runoff generation.



Experimental setup

Rainfall simulation experiment after litter raking

Next steps

The next steps will be the analysis of the samples in the laboratory and the evaluation of the data obtained. In addition, the effects of litter raking on soil and vegetation, as well as their regeneration behavior, will be investigated through further surveys.

About the Project:

HILUC (Hydrological Impact of Historical Land Use and Climate) is an inter- and transdisciplinary research project on flood formation in small Alpine catchments from about 1850 to the present, focusing on the impact of specific land use practices.
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