



European Fire in Nature Conservation Network

Project:: The management of heathlands in northwest Germany (Lüneburger Heide Nature Reserve) by prescribed burning in winter

Tobias Keienburg and Johannes Prüter

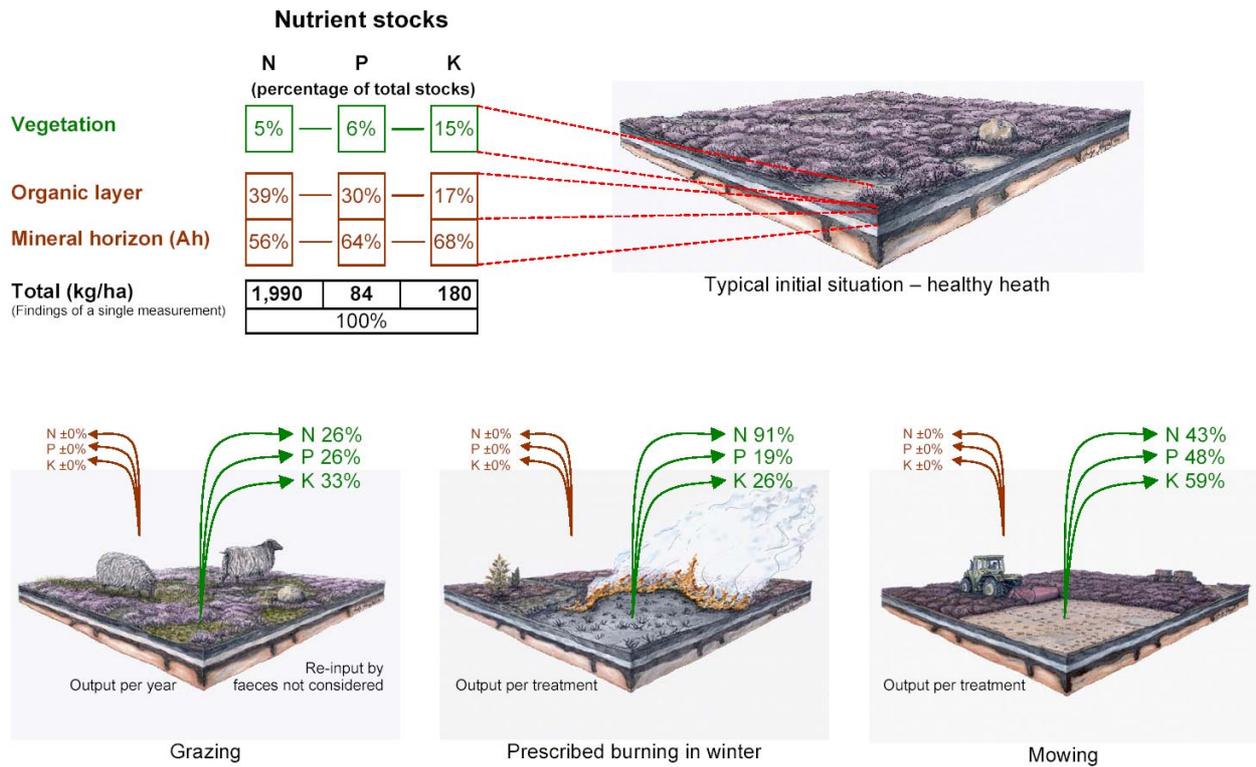
Introduction

The Lüneburger Heide nature reserve is located in northwest Germany, approximately 150 km from the southern North Sea coast in a gradient influenced by Atlantic as well as continental climates. It represents the typical kind of Central European lowland heathlands on sandy Pleistocene sediments extending from Belgium in the west to Jutland in the north and covering the coastal region of the southern and eastern North Sea. The heathlands lying in the Lüneburger Heide nature reserve belong to the largest coherent heathlands of this region, which have developed directly from the historical cultural landscape.

In the conglomeration of diverse habitats of this landscape dominated by older moraines, be it forests, brook valleys, bogs, meadows, pastures or fields, the extant heathlands of about 4,500 ha are, from a supraregional point of view, the most striking ecosystem. In the spacious and open heathlands, with their numerous transition zones to other habitats, a high number of specifically adapted and often endangered animal and plant species can be found.

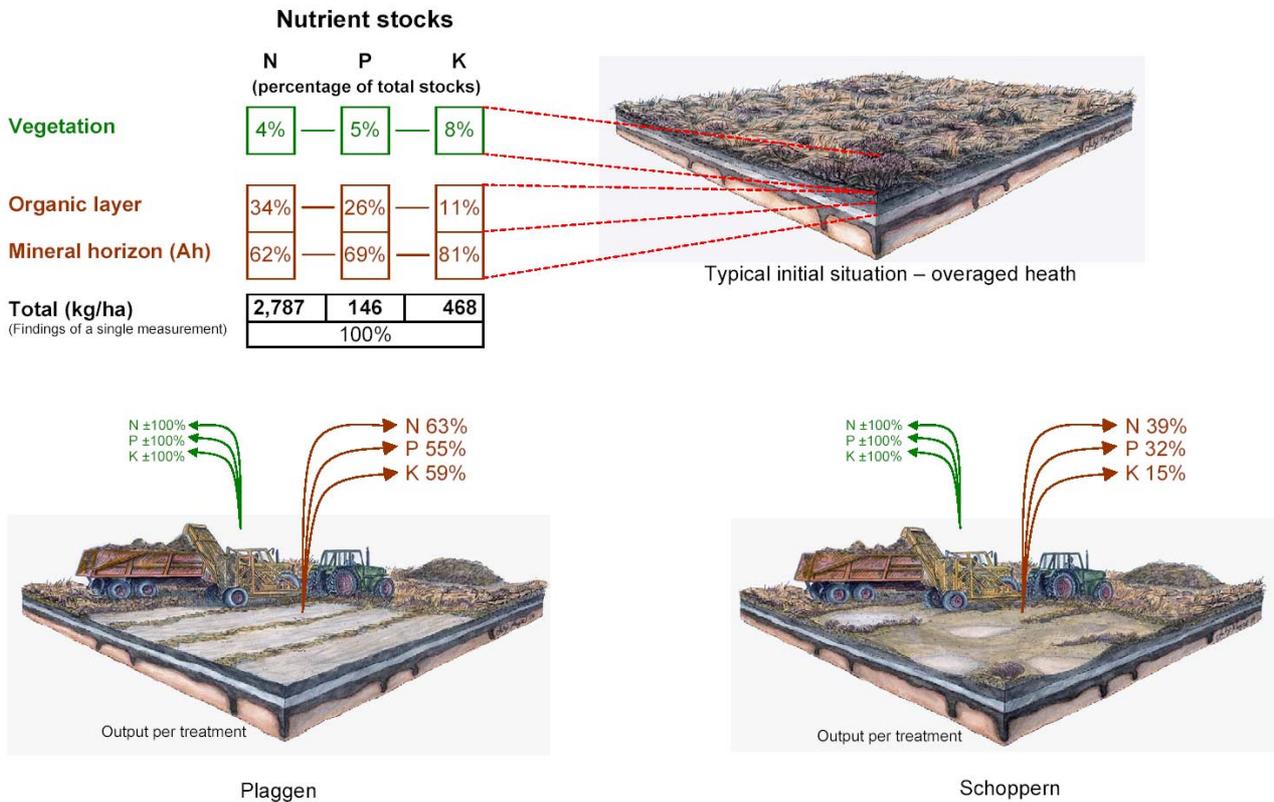
In the Lüneburger Heide nature reserve, heathlands are managed mainly by grazing with Heidschnucken sheep, mechanical management such as mowing or plaggen, and prescribed burning in winter. In their effects, these management practices orient themselves to the historical ways of heathland cultivation (see figure 1, which is an excerpt of the final report of the European project "HEATHGUARD - Safeguarding the Heathlands of Europe").

Figure 1: The impact of management practices on the nutrient stocks of vegetation and soil



Idealized illustration of the impact of grazing, prescribed burning in winter and mowing on the nutrient stocks of vegetation (green colour) and soil (brown colour).

The given figures for nutrient stocks and removal are typical values in a wide range of possible values (without statistical significance), illustrating orders of magnitude.



Idealized illustration of the impact of plaggen and schopperrn on the nutrient stocks of vegetation (green colour) and soil (brown colour).

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Heathland management by prescribed burning in winter

After the use of prescribed burning was prohibited in Germany (under nature conservation and waste disposal laws), the first special exemptions to burn heathlands in a prescribed way within the Lüneburger Heide nature reserve were granted in 1993. The aim was to explore and assess possibilities and risks of re-introducing this traditional cultivation practice dating back to prehistoric times. Having now had ten years' experience of prescribed winter burning, it is clear that it can be a reasonable addition to other management techniques.

Typical areas for prescribed burning are healthy heaths of the same age with small numbers of tree saplings, heaths on slopes, and areas with many stones and not too much grass. But dried up heaths, additionally damaged by the heather beetle, and *Molinia*-rich areas can also be regenerated by prescribed burning if *Molinia* regrowth can be prevented by subsequent grazing.

Good climatic conditions for burning are during cold high pressure after a few dry days, most common in northwest Germany in February. In order to prevent the fire from spreading uncontrollably it should not be too windy. Gentle wind, on the other hand, aids the controlled burning process. Typically, the haw frost thaws in the morning and leaves behind dry heaths with comparatively wet organic soil layers that can be burnt in the afternoon. To prevent the fire spreading, the area to be burnt, which is seldom larger than 1 ha, should be enclosed by a mown strip of about 3 m width in good time. The area to be burnt should not be rectangular, but should fit organically into the landscape. With the help of gas burners and drip torches the fire is initially lit on the leeward side of the area, burning against the wind. This fire normally goes out after few metres and thereby enlarges the strip for fire prevention. Then a fire is lightened on the windward side of the area, burning the heath with support from the wind and going out as soon as it meets the vegetation already burnt. Unintended flames are extinguished with firebeaters (long sticks with fireproof material at their ends), before they can spread to neighbouring areas. The central office of the fire brigade and the neighbouring municipalities are being informed before the burning takes place. Usually, the fire brigade accompanies the practices.

Depending on the intensity of the fire, more or less all that remains in the area are burnt heather stalks. They often start to sprout from the roots and begin to blossom even in the growth period immediately following the fire. Good development of heather from seed banks in the soil can also be observed. As burning in winter only slightly raises temperature in the organic soil layer, animal species hibernating in this layer are virtually unaffected by the fire. Individual insects or spiders, who spend immobile development phases during winter in higher vegetation layers, are immediately affected. But their species' can re-settle the areas from neighbouring heaths if the burnt areas are small enough and healthy heaths are present in the vicinity.

An indirect consequence of the fire can be a significantly changed, warmer micro-climate in the thinned out heath strongly influencing the remaining organic layer for the following months. Moss layers, which have not been immediately affected by the fire, used to dry out due to the more intensive exposure to the sun. Different indirect effects seem to amount to a worsening of the nutrition situation for *Deschampsia* compared to *Calluna* plants. As a whole, the litter is mineralized, resulting in a short-term nutrient transfer from upper to lower soil horizons.

Nonetheless, prescribed burning removes nutrients from the system. Depending on its initial situation, biomass supply on a heath is about 11,200 kg/ha (10-year-old vegetation stock without moss and grass) to 17,200 kg/ha (15-year-old vegetation stock with moss and grass). This biomass is removed by prescribed burning to an extent of 50 (15-year-old stock) to 80 % (10-year-old-stock). With a share of 0.8 to 1.1 % of nitrogen in the biomass, the system loses about 90 kg/ha of nitrogen due to burning.

In order to describe the efficiency of nutrient removal by management practices, the "Theoretical Effective Period" is used. It is defined as the period in which the input of nutrients by deposition is equivalent to the output by a single management treatment (constant deposition rates assumed).

For prescribed burning and nitrogen, the theoretical effective period is about 5 years, indicating that it takes about 5 years for the nitrogen input to compensate the nitrogen output through a single application of the management practice.

As a whole, about 70 ha have undergone prescribed burning since 1993. Therefore, the average annual area of prescribed burning within the nature reserve is about 6.4 ha.

The normally short period of suitable burning weather is a problem. In recent years these periods have lasted about three or four days on an average.

Further information

Detailed information about the impact of prescribed burning and other management practices on heathland ecosystems can be found in the final report of a research project, which was carried out between March 2001 and March 2004 and was supported by the German Federal Ministry for Education and Science (BMBF). Figure 2 shows the cover of this report, which can be purchased from the Alfred Toepfer Academy for Nature Conservation (contact see below).

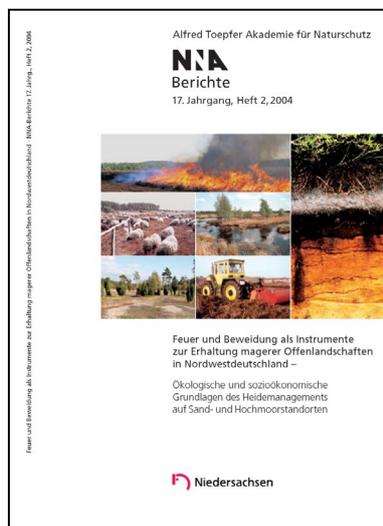


Figure 2: Cover of the final project report

Reference: Keienburg, T. & Prüter, J. (eds., 2004): Feuer und Beweidung als Instrumente zur Erhaltung magerer Offenlandschaften in Nordwestdeutschland – Ökologische und sozioökonomische Grundlagen des Heidemanagements auf Sand- und Hochmoorstandorten. – NNA-Berichte 17. Jg., H. 2. Schneverdingen. 221p. (German text with English summaries).

There are several links to data sources about heathland management and research on a European level, for example:

<http://www.english-nature.org.uk/heathlands>

<http://www.nationaltrust.org.uk/heathlands>

The final reports of a European project called “HEATHGUARD - Safeguarding the Heathlands of Europe” are in press and will be published in winter 2004. This project is part of the European Culture 2000 framework programme and aims to compare four different European heathland regions in Portugal, Scotland, Norway and Germany with respect to their landscape development and current management.

Contact:

Alfred Toepfer Akademie für Naturschutz (NNA)
Dr. Johannes Prüter, Tobias Keienburg
Hof Möhr
D-29640 Schneverdingen
Germany

Tel: 05199-989-27 (Prüter) /-25 (Keienburg)

Fax: 05199-989-46

e-mail: johannes.prueter@nna.niedersachsen.de, tobias.keienburg@nna.niedersachsen.de

Verein Naturschutzpark e.V. (VNP)
Dirk Mertens
Niederhaverbeck
D-29646 Bispingen
Germany

Tel: 05198-987034

Fax: 05198-987039

e-mail: mertens@verein-naturschutzpark.de