

The Use of Fire in Nature Conservation?

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THROUGH the removal of mowing and grazing from grass- and moorlands a collection of considerable masses of organic matter accumulates. To prevent the paralleling floristic impoverishment and finally the change to nitrophilic and azidophilic replacement communities, burning is discussed, which, along with plantsociological controls, could be done in intervals of several years.

Some wildlife reserves, which were set up early, have been preserved "to death", since it was not known that the plant communities to be preserved, whether "Hude"-woods, heath, a dry-grass or any other apparent natural looking community, in reality was the result of long and even economic influences of earlier times. But even after it was realized that many if not even superficially most plant communities in our country were formed and caused by man, their preservation wasn't or isn't without problems, since today it is no longer easy to apply those economic influences in the same way, which resulted in the formation and retention of the plant communities to be protected. How would one for example continue the "hude"-management, how could one continue the "Plaggen" and heath farming today, as it was practiced throughout thousands of years? How can one manage dry-grass with silica and lime, since sheep don't graze them any more? It would be more possible to retain a certain grass community, if one—when necessary—use the

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same fertilization as in earlier times as well as the same mowing rhythm.

The determining factor for the protection of all these, even if unconsciously created plant communities caused by man for certain economic uses, today is not so much a question of fertilization, or non-fertilization, in other words, the addition of materials as replacement for the removed ones, but rather the continued removal of the produced plant masses, be it through grazing, plowing, mowing, or through fire. All these interventions were regularly used for the preservation (and rejuvenation of heath, grasslands, both fertilized and unfertilized, of pastures, and with the exception of burning, in "Hude"-woods. When this removal (by taking away or destruction) of the annually produced products no longer takes place, then in all cases, where the annual increase is larger than the breakdown—which is the case in most substitution communities caused by man—an accumulation of an organic mass ensues, be it in or on the upper layer, which forms a loose layer of additional humus on the ground and enables only a certain group of the originally present species further living conditions, until they too disappear slowly or suddenly.

An obvious example for this are the former *Molinieta* areas east of Oker, where today one here and there sparsely finds a *Molinia* clump, one or more plants of *Stachys betonica*, or where few *Iris sibirica* stands have survived. But otherwise the evenly died off hay of former hay meadows, which haven't been mowed for some time, due to the set-in nitrification today is overgrown with an almost pure cover of *Melandrium dioicum* which, however, will also not last indefinitely. In this case a return of the earlier species-rich *Molinia* communities is unthinkable, not even if the organic top layer were removed, regardless of method used. Nor can it be assumed that there are still enough viable seeds of all species of the former *Molinieta* remaining in the soil, or that not foreign pioneer species rapidly invade and cover the exposed soil, that the partly returning species of *Molinieta* lack the sufficient development possibilities. Nevertheless, an attempt could be made on an exposed area, which than would have to be observed as a long term quadrat.

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Among wet meadows *Calthion* meadows rapidly change into stages rich in alder and birch after the termination of mowing, if not opposed by extreme distributional-biological obstacles.

The orderly reverse development to present day normal climax communities (the secondary progressive succession) at the end of human tillage previously which kept it from developing in our latitudes always results in forest, which depending on the location develop into a characteristic community. Some replacement communities take longer, to return to their present day natural climax communities. The paths toward it are not always the same, but individually still insufficiently known.

The forest as climax formation of our vegetation can at first absorb productivity increase in organic mass by the wood increase of its trees, until here also a decay and a cyclic renovation over predestined paths begins. The long asked for Bannwalder (completely protected forests) now finally established by the forestry department will, with thorough studies of its syndynamic, also bring informative knowledge to this question.

Much slower and probably not as simple as in wet meadows of the flat or hill lands this process of reforestation takes place in the *Nardeten* or in the species rich *Tristetten* of the Upper Harz. Since the cessation of mowing, a layer of up to 10, even 15 cm of surface humus has accumulated. Where the Goldhafer meadows aren't fertilized any more, resulting *Meum athamanticum* develops, in which the remaining grasslands die off after prolonged snow cover and leave areas of grey, flattened straw. In most areas there still remain enough species, even if in low numbers that one can recognize as the old (killed?) meadow. But the future is predictable, where with further cessation of any human influence a floristic depauperization and finally a reversal of the last remnants of the original meadow standing on the exposed humus—sporadically *Hypericum maculatum* or also *Polygonum bistorta*—into a monotonous (nitrophilic or azidophilic) replacement community will occur. This process requires an exact observation in chosen long term areas, if possible with simultaneous soil examinations.

One also finds examples for the degeneration of plant communi-

ties among natural vegetation, which produce more organic mass as can be broken down. The *Sphagnion* clumps of the high bogs (Hoch moor) grow, to only mention this example, up to a certain maximal height, only to degenerate and die off then. Later, after another ground water distribution, they are resettled. In which form this takes place is a question about which the last word hasn't been said yet (compare Overbeck, 1963).

One exception among plant communities created by man are those, whose metabolic production is so low, that the organic matter can be broken down within a year without reserves left over. In this category below certain stands of *Gentiano-Koelerietum* of calcium (lime) or (chalk) soil plains, which, although not very efficient, are active enough to break down all organic matter without remnants with the help of the dominant local climate. Nitrification doesn't seem to take place there, so that immigration of nitrophilic species is made impossible (for example, *Altendorfer Berg* by Einbeck).

If one wants to maintain the *Meum-Geranium sylvaticum-Polygonum bistorta* meadows, which due to their splendid colors belong to the provincial highlands, which the Harz area has to offer besides its endless monotonous spruce forests, one has to prevent the accumulation of organic matter on the soil surface. Up to now this was done for centuries by mowing and grazing. But after mowing disappeared for some time (in certain areas since the last war), and after grazing more and more ceased also, the degeneration of those meadow communities cannot be stopped. Their development, according to the common succession scheme into the often mentioned development into forest almost always takes quite awhile. Among 100 surveys of these *Trisetion* meadows one finds perhaps in one of these one seedling of *Sorbus aucuparia* whose development is in no way assured. Thus these meadows remain, be it by adaptive or distribution-biological reasons, unforested for long periods of time. But they unilaterally will change to a number of those species, which can adapt to the surface humus layer, until they too, one day, perhaps after an extreme winter, disappear and then be replaced by an unexciting, monotonous replacement community.

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The local, for example in Clausthal-Zellerfeld or by Andreasberg and in other places practiced improvement of meadow areas with technical and chemical methods (machines and fertilization) may have resulted in a higher net gain coupled with a worksaving economic method, but the former coloration of the colorful mountain meadows has been replaced by the monotonous, overfertilized green of the species-poor tall grass areas, whose continuance (duration) hasn't been proven yet.

No objectives would be raised, when mass production at any price was the only imaginable goal and if concurrently the quality of the fodder (and life expectancy of the cattle) if not increased, at least were maintained.

However, the villages and cities in the Harz are depending increasingly on the tourist economy. They increasingly need the scenery as a point of attraction for the paying guests which today they feed easier than previously the cattle herds. Both however were and are dependent on the presence of the colorful mountainsides. Their forestation (compare for example, Scheer, 1970) destroys the former attraction of the landscape as much as the unplanned, or even planned settlements on the hillsides, which also isn't heightened by ski jumps and other sport attractions¹.

The preservation of the pretty meadow areas remains an important goal of the nature preservation movement, which concerns itself with the recreation aspect. It also remains for the scientific conservationist nature protection, which at times is pushed into the background due to occasional consideration of overimportance of modern day problems.

For the care of such meadow communities the possibility remains, if it was to be done half way satisfactorily, to gather and remove the "hay" from the meadows, where necessary, with "Igel" or "Grubbern" (farm machinery).

But where such a process isn't feasible and the economic treatment of earlier times can't be used any more, only fire remains,

¹ Similar problems occur in the dry meadows (*Mesobromion*) of our Lime (chalk) hills, on old sheep grazing areas of the "Dreischen", and on the last heath remnants in the flat hill lands. In the meadow of low areas things may be different (see above).

whose use initially may appear frightening, but was occasionally used in earlier times by the shepherds themselves. Indeed here too the saying applies: "Beneficial is the fire's might, when man tames and guards it." I would under the given circumstances not hesitate, to burn off, with all necessary precautions, a *Nardetum* or even a *Meo-Trisetetum* enriched with raw humus at the right time of year, which means immediately after the Ausapern (in spring or), as soon as the hay layer was sufficiently dried, but before the plants come up. Of course one shouldn't treat all meadows in this manner at once, but here too undertake individual experiments. The influence of the burning off done every 5–7 years or even less often should be followed from a plant sociological point of view carefully in long term quadrats.

One has to consider, however, that in similar cases, for example along road sides and slope, that too numerous burnings can result in a one sided result of the burned communities, i.e. the *Tanacetum* result of *Artemisietum vulgare* (compare Mahn, 1966; Runge, 1967).

It would be thinkable also, that the immigration of tree seedlings takes place quicker after burning, since the thick hay-layer could no longer hinder the germination and growth of especially light seeds. Rather than birches, which are seldom found fruiting in this area, perhaps alders (*Populus tremula*) could then start, if they produced germinating seeds. Parent trees are present in numbers.

Other wind distributed plants have, with the exception of the pine, little importance, since the soil is properly, as a rule, too poor for *Salix caprea* or *Acer pseudoplatanus*. The most numerous deciduous tree, *Sorbus aucuparia*, will therefore be less widely distributed on a burnt area, since the birds, which have eaten their fruits, choose for the digestion and elimination of the seeds a high site, mostly pine trees, thus properly would shed (drop) no seed on the open area.

The objection, that the burned over area brings an ugly spot into the landscape—even if for only a short while, is no doubt true. But who ever shuns work, has to take other disadvantages into consideration, and these are thanks to the replacement power of the plant layer only of restricted duration. Besides, one finds more fire determined plant communities and biological communities on this earth,

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as we assume in our latitudes. Those plants and animals have adapted to the periodic return of the fire, but also selected through it. This can lead to a change in the species association of areas to be burnt in the future.

But all these questions about the syndynamic consequences of the removal or burning off of the hay masses can't be predicted in advance, but have to be empirically tested through experiments and continuous plantsociological observations.

If this method should falter too, no possibility remains to preserve these meadow communities, as they were in the old way through former mowing and following extensive grazing, if not by cattle at least by sheep. But if this isn't possible, they will disappear and only be preserved in pictures or indexes as a relic from a time in which people realized the value of their work and the fruits of their labor and not blindly accepted the good life.