

Description for the General Public

Wet meadows host an extremely high diversity of plants and animals (especially invertebrates), thus constituting one of the most precious habitats in Europe. The overgrowth of meadow vegetation due to the abandonment of traditional ways of grassland management is currently regarded as the main threat to meadows, and hence the conservation programmes try to halt it through prescribed regular mowing. In addition, it has been recently noted that wet meadows in Europe are also negatively affected by global climate change.

However, both threats may be expected to have opposing impacts on wet meadows. Climate change brings the increase in local temperatures and drier conditions. In contrast, meadow overgrowth presumably results in higher vegetation, which allows less sunlight to the ground, and consequently it leads to cooler and more humid microhabitat conditions near the ground, where a great majority of meadow organisms live. If the above prediction is confirmed in our project, then it will indicate that the effects of climate change and meadow overgrowth can counterbalance each other to some extent, and conservation programmes should be focused on finding an optimal balance between them.

Within the project we are going to analyse the influence of mowing frequency and climate, reflected indirectly by geographic location and directly by mean annual temperature for a given locality, on long-term changes in the communities of wet meadow organisms, including endangered butterflies (indicator species, the presence of which implies high richness of other species), ants (keystone species, which affect the co-occurrence of various other organisms), and plants. In the analyses we will use among others climatic data, measurements of soil temperature and humidity, and continuous monitoring records from over 250 wet meadows in several regions of Europe, linking its south, which is most affected by climate change, and central part, where the climatic conditions are favourable at present, but they may deteriorate in future.

We expect to provide evidence that (1) the negative impact of climate change on the long-term changes in the focal communities is stronger in Southern Europe, where the climatic conditions are a serious constraint; (2) both highly frequent mowing and its complete absence bring negative consequences, while moderate mowing frequency is usually beneficial; and most importantly (3) there is a strong interaction between the effects of climate and mowing frequency, which indicates that the optimal mowing frequency should be lower in warmer climate. Subsequently, we will assess the relationship between climate on the one hand and mowing frequency on the other and microclimatic conditions (temperature and humidity) of the upper soil layer, which will allow to develop simplified rules for planning the optimal mowing frequency in relation to geographic location or mean annual temperature, both at present as well as in future with ongoing climate change.

Such rules will be extremely helpful in making conservation plans for wet meadow species listed in the Annexes of the EU Habitats Directive as well as management plans for nature conservation areas, e.g. national parks, nature reserves and Natura 2000 sites, which is an urging obligation for the EU member states. Poland has a particular responsibility in this field, since many of its conservation areas include wet meadows. The optimisation of mowing frequency would make it possible to preserve typical communities of wet meadow organisms at the sites they currently inhabit, despite the warming climate. Such a strategy should be viewed as 'buying time' before the global efforts, which so far have failed to halt the ongoing climate change, become successful in this respect in future. Moreover, it is worth noting that the optimisation of mowing frequency will bring substantial economic benefits, because the recommended frequency in most cases will be considerably lower than the frequency regarded as optimal at present, i.e. without considering the influence of climate change.