STATUS AND TRENDS OF EUROPEAN POLLINATORS

Key Findings from the STEP project

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2.2 The relative importance of broad-scale drivers for the distribution of European pollinators

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Summary of the science

The diversity of pollinators such as wild bees, hoverflies and butterflies contributes tremendously to the pollination of crops and wild plants. Knowledge of the drivers causing observed declines and potential future changes of pollinators is indispensable for target-oriented management, the sustainable provision of pollination services and to secure sufficient production of agricultural goods. Because of this central role, knowledge of the relative impact of different factors on the distribution of pollinator groups at larger scales is important to understand species declines and to assess potential future risks. A major shortcoming here is that the relative importance of different drivers has never been quantified for pollinators at larger spatial scales.

We explored how major drivers of global change such as climate, land cover, agrochemicals and soil conditions affect the European-wide distribution of pollinators. The relationships of these drivers and the geographical distributions of over 1,000 butterfly, bumblebee, hoverfly, and solitary bee species were modelled at a rather coarse spatial resolution of 50 km x 50 km (Figure 1, 2).

Figure 1. Example of an the analysed species, the mining bee *Andrena hattorfiana.* (Photo: Markus Franzén)

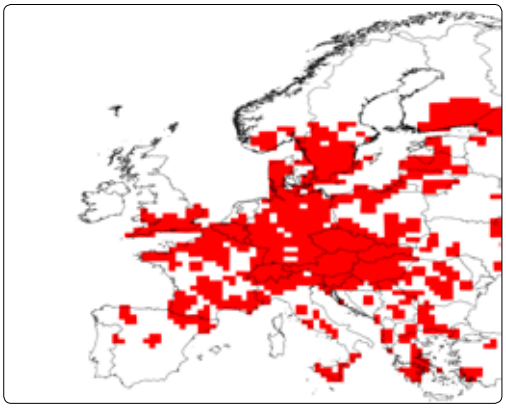

Figure 2. Distribution of the solitary bee *Andrena hattorfiana* in Europe shown as occupied 50 km x 50 km grids in red (Franzén et al.).

Climate is the most important driver of the large-scale occurrence of all investigated groups of pollinators in Europe (Figure 3). Land cover and soil conditions are the second most important drivers, but their relative importance differs among the taxonomic groups reflecting their ecological requirements. Most important, agrochemicals like fertilisers and pesticides have a

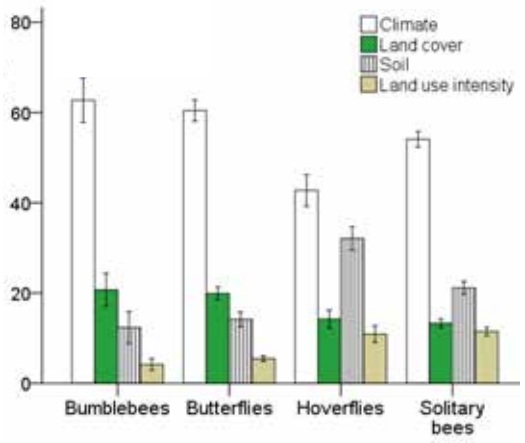

Figure 3. Climatic conditions are the most important drivers for European pollinators. Land cover and soil are the second most important drivers, but their effect size differs among pollinator groups. Also the effects of agrochemicals were considerable at the European scale and were largest for solitary bees and hoverflies. (Franzén et al.)

significantly negative impact on pollinators, even at the European scale. Thus, effects of agrochemicals are not restricted to the local scale, as usually thought, but are already affecting large-scale pollinator occurrence across Europe.

Policy relevance

Land cover changes and accompanying changes in soil conditions are regarded important drivers currently affecting European pollinators, and our results show that across Europe, climatic conditions are the most important overall driver of occurrence and richness of pollinators. The large effects of climatic conditions, in combination with projected future climate changes, indicate a likely shift of importance from land cover to climate change.

However, land cover is still an important determinant of pollinators which highlights the large potential of well-designed land management strategies to mitigate the increasingly negative effects of climate change. Further, agricultural intensity is a serious driver of pollinator occurrence and richness at the European scale, which calls for strong European-wide regulatory schemes. However, since the severity of agricultural practice is highly context-dependent, such regulatory schemes should still provide enough flexibility to take regional differences in the effects of the different drivers into account.

The recent implementation of the EC habitats directive, and the ban or reduction in use of selected pesticides like neonicotinoids in the European Union, could result in large scale changes in landcover and land use intensity, potentially improving the situation for many pollinators across Europe. Further, the Common Agricultural Policy of the European Union could be a powerful instrument to ensure sustainable pollination service provision, if the importance of pollinators and their services are fully recognised and appropriate incentives are in place to implement greening measures targeted at increasing pollinator habitats and limiting harmful impacts of agrochemicals.

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