Science for Environment Policy

Grassy field margins provide additional biodiversity benefits by connecting habitats

June 2017
Thematic Issue 57
AES schemes: impacts on the agricultural environment

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Habitat fragmentation is a threat to biodiversity, especially in agricultural land where there are also many endangered species. Corridors between habitats are one way to counteract its effects. A study suggests that grassy field margins — established throughout Europe to improve water quality — could act as corridors. The study, which measured the effects of field margins on butterflies, concludes that agricultural schemes should include this corridor function.

Intensive agriculture can have negative effects on landscape, for example, causing habitat fragmentation, whereby large sections of land are divided into smaller, isolated areas. Habitat fragmentation affects the survival and persistence of species, and thus biodiversity, by preventing animals from breeding with each other (and, therefore, also reducing genetic variability) and limiting the ‘rescue effect’, which describes the emigration of individuals to a smaller population, which saves it from extinction.

Increasing the ability of species to move between patches of land has been proposed as a tool to mitigate fragmentation. One way to achieve this is via ‘corridors’: strips of land that connect habitats and species.

This study focused on grassy field margins: linear, grassy strips around 5–10 metres wide that are traditionally set up along watercourses to mitigate run-off from crop fields. Subsidies for grassy field margins have been made available across Europe via the mandatory agricultural and environmental conditions (GAEC) of the first pillar of the Common Agricultural Policy. France chose grassy field margins as a GAEC, but other countries have chosen different options, such as maintaining natural grasslands. Then, grassy field margins became part of the tools of the Water Framework Directive and are now mandatory along watercourses.

The study investigated whether grassy field margins can also act as corridors for species in fragmented landscapes. To do this, the researchers monitored the movement of butterflies, a known method of demonstrating corridor function, in grassy field margins in France. They focused on the Meadow Brown (Maniola jurtina), a butterfly found in a wide range of grassy habitats and particularly in the agricultural landscapes of Western Europe. The study was conducted in Brittany in the north-west of France, in a 13 000-hectare Long Term Ecological Research (LTER) site containing a mixture of crops, hedgerows and small grassland patches. Grassy field margins in the area are on average 10 m wide, 150 m long and planted with Trifolium (clover) and Poaceae (grasses). The researchers monitored butterfly movement in the grassy field margins and adjacent meadows in the summer of 2009.

The results showed that the movements of the butterflies were clearly influenced by the grassy field margins. The movements were similar to those associated with foraging or mate-searching, and unlike dispersal strategies used to move out of habitats. The observed movements suggest the butterflies were not hesitant to enter and move within the margins, and the boundaries imposed meant the butterflies moved towards potential habitat patches.
Of the 74 grassy field margins observed, around half provided a corridor function (e.g. were connected to meadows at both ends). Those that were connected to at least one meadow were of an average length and width (10 m x 150 m), which are well suited to movement between habitat patches and have been shown to increase dispersal rates by 400%. Although the remaining margins could not act as corridors (e.g. because they were isolated), the vast majority (93%) of margins were less than 15 metres from a meadow and thus could act as 'stepping stones' between habitats.

Although grassy field margins have already been shown to mitigate run-off and increase local biodiversity by providing habitat, this study shows that they can also enhance wider biodiversity by acting as corridors.

According to the researchers, these findings have significant implications for management of agricultural landscapes across Europe. Grassy field margins are used as a conservation measure across Europe. Although local implementation varies, these buffer strips can feature as one of the types of Ecological Focus Area, which arable farmers need to implement on their farms, under the ‘greening’ of the first pillar of the CAP.

However, policy could be amended to incorporate these findings, say the researchers. Grassy field margins were originally established to improve water quality but prescriptions for other ecological benefits may not be as effective. For example, current CAP regulation does not require margins to be near meadows, even though this study suggests they could benefit biodiversity in fragmented landscapes.

Due to the global importance of field margins for biodiversity, their wide distribution in Europe, and the amount that is invested in agri-environment schemes, the researchers argue that their corridor function should also be investigated for other species. They also suggest that their effectiveness could be improved, perhaps by adding flowers (which could decrease emigration from corridors) or even reducing habitat quality (which could increase the speed at which butterflies move within the field margins).