



# Editorial

## A bleak future for the creatures that make the world go around

### Dave Goulson

It is no secret that wildlife is in decline, at both a national and a global level. In the UK, well-monitored groups such as butterflies and birds have been decreasing in numbers since detailed recording began, in the 1970s, and probably for long before that. Every year there are, on average, fewer than there were the year before, with declines most marked in farmland species. For example, UK farmland-bird numbers have fallen by 51% since 1970, according to the British Trust for Ornithology. Some species have been particularly hard hit: Spotted Flycatchers are down 89% since 1967, and Turtle Doves by 93% since 1994. It is great to see that a small number of species, such as the Red Kite and the Common Buzzard, have increased considerably over the same period, but the broad trend is downwards. A 2015 study by Exeter University estimated that the total

population of birds in 25 European countries fell by 421 million between 1980 and 2009.

Unfortunately, we have no population data for the majority of species, most of which are invertebrates: insects, spiders, and so on. Aside from the exemplary Butterfly Monitoring Scheme and a smaller recording scheme for moths, we have no good long-term data on population trends of UK or European insects. For most groups, such as hoverflies, dragonflies, lacewings or wasps, we simply have no idea how their populations have changed in recent years. This is worrying, for these creatures make the world go around; they are at the base of the food chain for many birds and mammals, they pollinate, control pests, recycle dung and dead leaves, and they do much more. As the biologist E. O. Wilson once said: 'If all mankind were to disappear, the

world would regenerate back to the rich state of equilibrium that existed ten thousand years ago. If insects were to vanish, the environment would collapse into chaos.' We really ought to find out how these creatures are faring.

An alarming new study from Germany suggests that things are not well in the insect world. Amateur entomologists from the Krefeld Entomological Society have been quietly trapping insects on nature reserves across Germany for the last 27 years, using Malaise traps, tent-like contraptions that catch flying insects. In an impressive effort for unpaid enthusiasts, they sampled 88 sites on a total of 15,249 trapping days between 1989 and 2014, catching a grand total of 50.8kg of insects. They have yet to make much progress with counting or identifying the vast numbers involved, but the patterns in biomass

caught per day are striking. Towards the beginning of the study, the traps were catching about 9g of insects per day. By 2014, the most caught at any site was about 2g per day, with an average of about 1g. Overall, the data show that the biomass of flying insects in German nature reserves has fallen by 80% in 25 years.

We do not know for sure whether similar declines have occurred elsewhere. Land use in Germany is broadly very similar to that in the UK and France, for example, so we might expect similar patterns here. The rapid decline of birds that specialise in eating aerial insects, such as the Spotted Flycatcher, swallows and swifts, across much of Europe and North America suggests that the pattern may be widespread. It may be anecdotal, but many of us remember a time when car windscreens became rapidly obscured by splatted insect corpses when driving in summer, something that simply does not happen today. This may be partly because cars are more streamlined than they were, but there are still plenty of boxy 4x4s on the road, and their screens are just as clean. It seems likely that

we are, indeed, living through a period of massive declines in insect abundance.

I am involved with other scientists in analysing and trying to explain the German data, and they are puzzling. The nature reserves on which the traps were placed have not changed much over time. Most of the land surrounding the reserves is agricultural, and this has not changed much since 1989, either. Variation in the weather accounts for some patterns in the data but does not account for the major decline. Clearly, something dramatic has been happening, but it is not obvious what it is.

One possibility is that massive habitat loss that occurred earlier in the 20th century as farming became industrial has left an 'extinction debt', such that populations of insects living on small nature reserves are not viable in the long term, and so are disappearing one by one. A second relates to the introduction of systemic insecticides such as neonicotinoids in the mid-1990s. These chemicals are persistent, are highly toxic to all insects, and appear to be frequent

contaminants of soils, streams, wild flowers and hedgerow plants in arable areas. They have been implicated in declines of bees, and also of butterflies, aquatic insects and insect-eating birds. They may be contaminating the nature reserves, or perhaps they simply render the surrounding farmland inhospitable to insect life so that any flying insect which wanders off the reserve is likely to die (in scientific jargon, the farmland acts as a 'population sink').

Whatever the causes of this decline, if it continues there will be precious little insect life left in a decade or two from now. As Wilson predicts, 'the environment will collapse into chaos'; wild flowers will set no seed, birds and bats will starve, dung will not be recycled, and pests will run amok. Arguing over the causes while doing nothing is not an option; unless we take urgent action, the future for wildlife and for ourselves may be bleak indeed.

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A Malaise trap. Bob Gibbons

