The insect crisis we can't ignore

We must start an ambitious and professional global programme to explore and preserve invertebrate biodiversity, says **Axel Hochkirch**.

According to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, which I help to compile, just 394 insect species are classed as extinct. That figure is ludicrously low — it's a good bet that several dozen have disappeared in the past week or so alone.

Nobody knows exactly how many invertebrates are vanishing from the planet, but estimates range from 1 to 100 per day. These alarming numbers don't touch our hearts. It is comparable to noticing the number of deaths in a war without seeing the faces of the fallen. So which species are we losing? Is the extinction rate going up or down? What could the implications be? The answer to each question is just as worrying: we have no idea.

We need to preserve invertebrates, not only because they provide valuable ecosystem services such as pollination, pest control and nutrient cycling, but also because every single species on Earth has a right to exist. Many invertebrate species have amazing life histories and are just as charismatic as larger animals. Unknown to many, for example, many grasshoppers woo mates with elaborate courtship songs and dances. It's beautiful!

Targets to assess and protect species already exist. The IUCN has set a 'barometer of life' goal to assess the conservation status of 45,000 invertebrate species by 2020 (S. N. Stuart *et al. Science* **328,** 177; 2010). And more broadly, the parties to the Convention on Biological Diversity have agreed to try to halt biodiversity loss by 2020; progress will be discussed at a meeting next month.

Neither will happen if invertebrate conservation continues to rely on volunteers to assess the status of most insects. This is a serious issue and it demands serious, professional attention.

Governments, science funders and environmental agencies need to invest in one (or, better, several) large centre for invertebrate conservation that employs many proper entomologists to describe species, study their distribution, ecology and threats, and assess their conservation status. A major objective would be liaising with people on the ground to encourage and guide action, build capacity and raise awareness of the global and national importance of invertebrates.

Such a centre would probably cost about €10 million (US$11 million) to €15 million to establish, and €20 million per year to support. This is comparable to the budgets of similar institutions working at the science–policy interface, such as Germany's Potsdam Institute for Climate Impact Research (which has a yearly budget of about €22 million). Conservation of global biodiversity should be worth such amounts, and is necessary to allow countries to reach their global conservation targets.

Nations are willing to invest in conservation: witness the launch in 2014 of a €20-million tiger-conservation project supported by the German state-owned bank KfW. Although the status of the tiger is still of concern, strong efforts in conservation will probably help to preserve it. Yet many tiger beetles may go extinct unnoticed.

Conservationists also need to explore and mobilize support from companies that depend on invertebrates as sources of pollination and chemical compounds, and even as inspiration for brands and logos.

Invertebrate extinctions go unnoticed because the number of experts who work on most insect groups is extremely low: it has even reached zero in many regions and for some insect groups. So although the extinction risk of about 18,000 invertebrate species has so far been assessed for the IUCN Red List, nearly one-third are classified as 'data deficient'. Many invertebrate species have not been documented since their original description, and we have no idea whether they still exist.

These large knowledge gaps are worrisome because we can only preserve what we know. Humanity spends a lot of money searching for life in space, but we have not described even one-tenth of the species on Earth.

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It is often argued that the lack of invertebrate conservation is caused by invertebrates' low profile compared with charismatic large vertebrates, but this is only part of the truth. Many park managers, rangers and naturalists are very interested in invertebrates, but lack the knowledge and resources to investigate and protect them.

Experience shows that conservation action for invertebrates often starts as soon as information on their identity and threats becomes available. The publication of field guides in central and northern Europe since the 1980s has led to rapid data accumulation, with subsequent publication of national red lists and the establishment of conservation projects. We need to spread these steps to the species-rich tropical, subtropical and Mediterranean regions. Conservation action to protect invertebrates shows rapid results, due to the species' short generations and small geographical ranges.

One reason for the apparently low number of documented invertebrate extinctions is that scientists are reluctant to declare them. Non-existence cannot be proved, and a few species thought to be extinct have been rediscovered. Prematurely declaring a species extinct may end all conservation efforts and lead to the 'Romeo error', whereby we give up on a species that actually still exists. That is a concern for invertebrates, but there is another Romeo error: some partings are not sweet, just sorrow. We should remember that. ■

Axel Hochkirch *is chair of the IUCN SSC Invertebrate Conservation Subcommittee and co-chair of the IUCN SSC Grasshopper Specialist Group. He works at Trier University in Germany.*
e-mail: hochkirch@uni-trier.de