

Science for Environment Policy

Past environmental pressures affect current biodiversity loss

The negative effects of human activity on biodiversity may not be fully realised for several decades, or even a century for some species, new research suggests. Conservation efforts may need to be much increased to prevent declines of wildlife populations as a result of environmental pressures that occurred many years ago, say the study's authors.

Biodiversity in Europe is under threat from diverse pressures including habitat destruction, [land use](#) change and invasive alien species. Conservation efforts are generally focused on responses to immediate pressures that are thought to be driving population declines. However, in addition, delayed effects may occur, such as the extinction of remnant populations which have been persisting only in small fragments of habitat.

In this study, funded under the EU EcoChange Project¹, researchers used national 'red lists' of threatened species from 22 European countries. The species were made up of seven groups: vascular plants (such as flowering plants), bryophytes (such as mosses), mammals, fish, reptiles, dragonflies and grasshoppers. The researchers then assessed how the proportions of threatened species correlated with environmental pressures associated with human activities.

As it is well known that biodiversity losses (and hence red listed species) are closely linked with socioeconomic development, the researchers chose three key indicators of socioeconomic activity. These were: human population density, gross domestic product (GDP) and 'human appropriation of net primary production' (HANPP). This last indicator is a measure of land use intensity based on the proportion of plant biomass consumed by humans.

To assess whether environmental pressures from many years ago are having an effect on wild populations now, the researchers examined whether the proportions of threatened species in each group most closely reflected the patterns in socioeconomic indicators at three different time periods. These were the early 20th century (1900-1910), mid-20th century (1950) and the year 2000.

As expected, increased population density, GDP and HANPP were linked to increased numbers of threatened species. Importantly, however, the results showed that patterns in current proportions of red listed species were best explained, not by current socioeconomic activity, but by activity in the early 20th century.

Examining effects within particular groups of species, the researchers again showed that early 20th century socioeconomic activity best explained changes in proportions of red listed vascular plants, bryophytes, dragonflies and grasshoppers. Among mammals and reptiles, patterns were equally well explained using either early or mid-20th century socioeconomic data. However, numbers of threatened fish species were better explained by the most recent data from the year 2000.

The reason why fish appear more responsive to recent socioeconomic changes is unclear. However, it may be because water pollution, rather than other impacts, such as habitat destruction, is the most common threat to freshwater ecosystems. Furthermore, fish are completely immersed in the medium, water, which carries such damaging pollutants.

The researchers conclude that past human-driven environmental pressures have amounted to an 'extinction debt', whereby the worrying trends seen in red lists today have yet to expose the consequences of current pressures on ecosystems. This implies, they add, that reducing current environmental impacts may not be enough to reduce future biodiversity decline and that conservation efforts will also need to account for past damage. They suggest that it would require 'well beyond current investment' and systemic change to reduce the decline.

17 October 2013
Issue 346

**Subscribe to free
weekly News Alert**

Source: Dullinger, S., Essl, F., Rabitsch, W. *et al.* (2013). Europe's other debt crisis caused by the long legacy of future extinctions.

Proceedings of the National Academy of Sciences. 110 (18):7342-7347. DOI: 10.1073/pnas.1216303110.

Contact:
franz.essl@umweltbund.esamt.at

Read more about:
[Biodiversity](#)

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "[Science for Environment Policy](#)": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. EcoChange was supported by the European Commission under the Sixth Framework Programme. See: www.ecochange-project.eu