

Bioenergy crops could be as bad for biodiversity as climate change

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Hedgehog. Credit: Professor Stephen Willis, Durham University

A large scale expansion in bioenergy crop production could be just as detrimental to biodiversity as climate change itself, according to new research.

The study, which involved expertise from Durham University's Department of Biosciences, investigated the potential impacts of future [climate](#) and land-use change on vertebrate [biodiversity](#) across the planet.

The authors argue there is an urgent need to carefully consider biodiversity when expanding [bioenergy](#) cropland, for example growing oil palm, maize and rapeseed.

Familiar species that would be predicted to decline substantially across their global range as a consequence of an expansion in bioenergy cropland combined with [climate change](#) include the hedgehog (44% potential loss), red squirrel (46% potential loss) and common starling (15% potential

loss), say the researchers.

Globally, palm oil production is already known to be having a detrimental impact on orang-utan populations.

The study, which is published in the *Proceedings of the National Academy of Sciences* today, was led by the Senckenberg Biodiversity and Climate Research Centre and the Technical University of Munich, Germany, in collaboration with Durham University.

Speaking about the research findings, Professor Stephen Willis, Durham University Department of Biosciences, said: "We found that the combination of climate change and large-scale expansion of bioenergy crops would together threaten about 36% of the habitats of all global vertebrate species, including many that are already the subject of significant conservation work.

"While bioenergy is clearly an important tool for [climate change mitigation](#), the potential impacts on biodiversity must not be ignored.



Common starling. Credit: Christian Hof

"A strong reliance on bioenergy to combat climate change could result in outcomes for biodiversity that are little better than would occur if we didn't implement bioenergy strategies, despite the consequent climate change implications.

"Instead, we should be thinking about how to swiftly and significantly reduce energy consumption if biodiversity is to be protected."

In order to meet the Paris Agreement aims to keep the rise in [global temperatures](#) below two degrees Celsius above pre-industrial levels, many climate mitigation scenarios rely on increased bioenergy use, requiring large-scale production of crops such as corn, rape and oil palm.

As part of their study the team compared two scenarios. The first would result in global warming of approximately 1.5 degrees Celsius by the year 2100 and relies on a maximum use of bioenergy. Under the second scenario temperatures rise by approximately three degrees Celsius by the year 2100, with a very low use of bioenergy.

Dr. Christian Hof, who conducted the study at the Senckenberg Biodiversity and Climate Research Centre and is now based at the Technical University of Munich, said: "In order to limit climate change in this way, we would need to cultivate bioenergy crops on approximately 4.3 % of the global land area by 2100—which corresponds to almost one-and-a-half times the area of all EU countries combined.

"This would severely affect the biodiversity currently found in these regions. The reduction of the negative effects of climate change achieved by the maximum use of bioenergy is not enough to offset this loss of biodiversity."

Limiting climate change has been central to discussions at the recent UN Climate Change Conference in Poland.

The impacts of an expansion in bioenergy cropland

are already becoming apparent. In tropical regions, oil-palm plantations are having a detrimental impact on flora and fauna. In temperate areas, the replacement of other crops with maize has negatively affected populations of farmland birds and mammals.

The study is part of the BioScen1point5 project in the programme "Support for an expanded and improved scientific basis for the IPCC special report regarding a global temperature increase by 1.5 °C (SR1.5)," sponsored by the German Federal Ministry of Education and Research.

More information: Christian Hof et al., "Bioenergy cropland expansion may offset positive effects of climate change mitigation for global vertebrate diversity," *PNAS* (2018).

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