

Public engagement theme 2

Does bioenergy cause biodiversity loss?

In summer 2022, as part of the Supergen Bioenergy Hub public engagement strategy, a media literature review was conducted to explore the public debate around biomass energy in the UK. A number of themes were identified in the review.

The following questions and areas of debate arose on the theme of biomass energy and its impact on **biodiversity**. Biodiversity typically refers to the number of different species of life on earth (species richness) and the number of individuals of those species (abundance). This theme is frequently discussed in relation to concerns that demand for bioenergy leads to the harvesting of old-growth forests and the conversion of natural ecosystems to bioenergy plantations. Each question or area of debate is addressed with a short scientific answer or response.

Is demand for bioenergy in the UK leading to old-growth forests being cut down in North America?

There is no scientific evidence to show that recent bioenergy demand has resulted in the loss of natural or old-growth forests in North America. Forests are under threat across the world, although recent demand for bioenergy does not appear to have been a cause for these risks. Forest biomass used for bioenergy - often residues such as sawdust, chippings, and small-diameter trees - is of relatively low commercial value compared to other uses of timber, and is therefore unlikely to be driving forest harvest operations. Additionally, the forest biomass used for bioenergy represents a relatively small proportion of the harvested forest biomass in the North American forests.

Could further demand for bioenergy lead to old-growth forests being cut down?

No scientific scenarios suggest that future bioenergy demand should be met through cutting down old-growth forests to grow bioenergy plantations, which would be expected to operate counter-productively from both a carbon and biodiversity perspective. However, there is a risk to biodiversity if future demand for all forestry products including bioenergy is not governed by sustainability frameworks that protect natural ecosystems. Scenarios which involve very high bioenergy demand would likely increase the risk of negative side-effects.

Could bioenergy lead to biodiversity loss by indirect land-use change?

There is a concern that high bioenergy demand could lead to an expansion in agricultural land at the expense of natural ecosystems: if biomass is grown on land that would otherwise produce food, this may lead to natural ecosystem land being converted elsewhere to grow additional food (indirect land-use change). Agricultural land expansion to meet human consumption has been a leading driver of biodiversity loss, and further expansion poses further risk. There is therefore a need to meet food and biomass demands from land responsibly, without further natural ecosystem conversion, and even returning some land to nature. This will be challenging, although land can be freed-up through productivity and yield improvements, and through dietary shifts away from land-intensive meat and dairy foods. Using land for some bioenergy crops also presents greater opportunities for biodiversity than using land for food (see below).

Can bioenergy support biodiversity in agricultural landscapes?

Dedicated bioenergy crops (fast-growing grasses and trees purpose grown for bioenergy) can support biodiversity in agricultural landscapes, by adding complexity or heterogeneity, providing shelter and new habitats, and requiring fewer inputs such as pesticides compared to food production.

What species are supported by using land for bioenergy?

In the UK there is particularly robust evidence to show that dedicated bioenergy crops support the diversity and abundance of bird species. Insects, plants, and micro-organisms in the soil have all also been found to be supported by dedicated bioenergy crops.

What species are at risk from using land for bioenergy?

The habitat provided by dedicated bioenergy crops are unsuitable for some species, with concerns raised over the impacts on birds on open farmland, especially ground-nesting species in the UK. There is limited evidence on the impact of dedicated bioenergy crops on mammal, reptile, and amphibian biodiversity. With the evidence available on these groups suggesting, at least for mammals, impacts may be related to biomass crop type, with dense fast-growing grasses least favoured, but potential positive impacts of woody crops.

Can bioenergy be scaled-up to avoid biodiversity losses?

Some scientific scenarios expect very high levels of bioenergy will be needed to meet climate targets and it will be challenging to achieve these high levels whilst supporting biodiversity. This will require robust sustainability and governance frameworks, attention to potential indirect land-use changes, and supportive management practices. The effect of bioenergy demand on biodiversity will be context dependent.

What is the public perspective?

The UK Climate Assembly - which involved over 100 citizens deliberating on what policies should be pursued to meet climate change targets - found strong support for protecting biodiversity. There was a concern about the land demand of bioenergy, and that increased bioenergy use would lead to plantations which would harm biodiversity. The UK public appear concerned about the biodiversity impact of both imported and domestically sourced biomass feedstocks.

Does government bioenergy policy protect biodiversity?

The UK government policy requires sustainability criteria are met for imported biomass feedstock, ruling out land conversions from highly biodiverse or old-growth forests and requiring forest management standards to minimize harm to ecosystems. According to the UK government's advisory Committee on Climate Change, meeting future biomass from domestic grown biomass and imports could pose biodiversity risks, although land could be freed up to grow bioenergy crops from dietary shifts away from land-intensive meat and dairy foods.

Summary

The effect on biodiversity of using land for bioenergy is context dependent, with the previous land-use, management practices, and bioenergy crop type, all relevant. Bioenergy is land-intensive and there are biodiversity risks of high bioenergy demand, whilst there are also opportunities to use land for dedicated bioenergy crops and support biodiversity. Under appropriate sustainability frameworks and monitoring the utilisation of bioenergy could have positive impacts on biodiversity.