

Concentrate farming to leave room for species and carbon, better than 'eco-friendly' agriculture

October 6 2021



Credit: Pixabay/CC0 Public Domain

Farming should be as high-yield as possible so it can be limited to relatively small areas, allowing much more land to be left as natural

habitats while still meeting future food targets, according to a major new analysis of over a decade of research.

Most [species](#) fare better under this "land sparing" approach than if farming tries to share land with nature—as wildlife-friendly agriculture still damages most biodiversity and requires far more land to produce the same amount of food.

This is the conclusion of research that takes into account over 2,500 individually assessed plant, insect and [vertebrate species](#) from five continents. The review, conducted by Prof Andrew Balmford, also suggests that "land sparing" sequesters more carbon, and may well benefit [marine life](#) if applied to oceans.

"Figuring out how to feed, clothe and power 11 billion people without causing mass species extinction and wrecking the climate is this century's greatest challenge," he said. "Preserving diverse life while meeting humanity's needs will mean enormous trade-offs, but the evidence is starting to point in one direction."

In a paper published today in the *Journal of Zoology*, Balmford lays out the case for securing the highest levels of production we can from land—and water—already farmed, in order to spare remaining wilderness from cows, plows, chainsaws and trawler nets.

"Most species fare much better if habitats are left intact, which means reducing the space needed for farming. So areas that are farmed need to be as productive as we can possibly make them," he said.

Some species thrive on traditional farmland, particularly in Europe, where light grazing by livestock can imitate "disturbance" once caused by large prehistoric mammals, creating habitats for many species that otherwise struggle. As such, some low-yield farming should be factored

in, says Balmford, but at a low level.

The UK Government-commissioned National Food Strategy (NFS), published in the summer, recommended that Balmford's "three-compartment" model—harnessing high-yield farming in order to leave space for many more protected habitats, with pockets of traditional agriculture to preserve farmland-associated species—should form the basis of a new "Rural Land Use framework".

The NFS points out that around 21% of farmed land in England will need to be re-wilded to some extent or used for biofuel if the UK is to meet its net zero targets, and that the entire bottom third of farmed land produces just 15% of English agricultural output.

Balmford's latest paper summarizes a decade of global research on trade-offs between crop production and biodiversity. This includes Cambridge-led studies on bird and tree species in India and West Africa, finding that—while all species are "losers" if mid-century food targets are met—more species "fare least badly" under extreme land sparing: concentrated farming that allows for more natural habitat.

"Colleagues have replicated these findings in field sites ranging from Mexico and the Pampas to Colombia and Kazakhstan," said Balmford. "Most species are specialized to particular environments. Even minor disruptions reduce their populations. This is why so many species decline even with gentler farming."

Retaining and increasing habitats to create patchwork landscapes of nature and mostly high-yield farming will not just preserve species in isolated areas but allow them to "seed" and repopulate entire regions and nations.

Balmford highlights the success of just four sq. kilometers of restored

wetland near Lakenheath in the east of England. Covered with carrot fields as recently as 1995, the site is now a launchpad for egrets spreading northwards under climate change, and home to the first breeding cranes seen in The Fens for over 300 years.

In addition to biodiversity benefits, emerging evidence from areas including the Andes, the US and the UK suggests "land sparing" is an ally in the fight against climate change, as carbon storage levels are higher if high-yield production allows for more natural vegetation.

Previous research by Balmford suggests that if 30% of UK land was spared for woods and wetlands, it could store enough carbon to offset almost all emissions from UK farming by 2050—and provide a colossal boost to British wildlife.

Support for "land sparing" is not a whole-hearted endorsement of industrial production, says Balmford. Driving up [farm](#) yields also means supporting [smallholder farmers](#) and adopting nature-based agricultural science.

For example, when millions of Chinese farmers turned to a simple system that matched methods to local soil and weather conditions, yields went up 11% while fertilizer use fell by a sixth.

Farming carp in rice paddies—the fish eat pests, provide fertilizer through feces, and are themselves an extra crop—is another of numerous possibilities that utilize natural ecosystems. Emerging technologies such as boosted photosynthesis in rice also offer hope for sustainably high yields.

More recently, the concept of "land sparing" has been used by researchers to investigate recreation, forestry and even urban planning—with early evidence pointing to this approach as the most

promising way of meeting human demands at least cost to nature.

The effects of tourism on wildlife appear to be reduced by concentrating visitors to wild areas into small portions of the landscape, while New Zealand is already taking a "sparing" approach to its forests: over 70% is now protected, while timber is intensively harvested from pockets of pine plantation.

Early research suggests the "sparing" philosophy also offers hope for depleted oceans. Aquaculture farming and locally intensive fishing could provide enough "output" to allow dramatic expansion of "no-take" Marine Protected Areas, and avoid the costs of trying to regulate equipment and catch sizes across all open water.

However, support for high-yield techniques must be tied to saving or restoring habitats—and not exploited to increase profit. Linking financial support for smallholders or access to high-value markets with land-use restrictions that preserve forests has already proved successful in India and the Brazilian Amazon.

Public pressure on business and government to commit to sparing land for nature will be vital, says Balmford. As with emissions, the organizations causing the most damage to habitats may find it increasingly difficult to hide. "Some giant corporations, often the worst offenders for land conversion, are actually in a position to think longer-term than many democratic governments," he said.

Balmford's research is partly inspired by Cambridge polymath David MacKay, who died of cancer in 2016 aged just 48. Mackay had a no-nonsense take on sustainability—insisting that low-carbon initiatives can only be meaningfully compared at the same level of output. Without that, humanity risks getting distracted by solutions that don't come close to meeting energy needs.

Similarly, farming systems can only be usefully compared when they're actually meeting society's food needs. "You can't convince people to save nature if they are hungry. We need to ensure we can harvest enough from the biosphere while preserving the planet," said Balmford.

"Conservation has to be pragmatic if we are to interrupt an ecological catastrophe."

More information: Concentrating vs. spreading our footprint: how to meet humanity's needs at least cost to nature, *Journal of Zoology* (2021). DOI: [10.1111/jzo.1292](https://doi.org/10.1111/jzo.1292)

Provided by University of Cambridge

Citation: Concentrate farming to leave room for species and carbon, better than 'eco-friendly' agriculture (2021, October 6) retrieved 17 July 2024 from <https://phys.org/news/2021-10-farming-room-species-carbon-eco-friendly.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.