

Forests crucial for limiting climate change to 1.5 degrees

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Field of miscanthus -- a tall grass used by BECCS power stations. Credit: Anna Harper

Trying to tackle climate change by replacing forests with crops for bioenergy power stations that capture carbon dioxide (CO₂) could instead increase the amount of CO₂ in the atmosphere, scientists say.

Biomass Energy with Carbon Capture and Storage (BECCS) power stations are designed to produce energy and store the resulting carbon dioxide (CO₂) in bedrock deep underground.

But a study led by the University of Exeter suggests that converting large land areas to growing crops as biomass for BECCS would release so much CO₂ that protecting and regenerating forests is a better option in many places.

"The vast majority of current IPCC scenarios for how we can limit global warming to less than 2°C include BECCS," said lead author Dr. Anna Harper, from the University of Exeter.

"But the land required to grow biomass in these scenarios would be twice the size of India".

This motivated the research team to look at the wider consequences of such a radical change in global land use.

The researchers used a cutting-edge computer model of global vegetation and soil and presented it with scenarios of land-use change consistent with stabilising the climate at less than 1.5oC and 2oC of [global warming](#)

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The results warn that using BECCS on such a large scale could lead to a net increase of carbon in the atmosphere, especially where the crops are assumed to replace existing forests.

Co-author Dr. Tom Powell, from the University of Exeter, explained: "In some places BECCS will be effective, but we've found that in many places protecting or regenerating forests is much more sensible."

How well BECCS works depends on factors such as the choice of

biomass, the fate of initial above-ground biomass and the fossil-fuel emissions offset in the energy system—so future improvements could make it a better option.

Professor Chris Huntingford, of the UK Centre for Ecology and Hydrology, said: "Our paper illustrates that the manipulation of land can help offset [carbon dioxide emissions](#), but only if applied for certain quite specific locations."

Dr. Harper concluded: "To meet the [climate change](#) targets from the Paris agreement, we need to both drastically reduce emissions and employ a mix of technologies to remove [carbon dioxide](#) from the atmosphere. There is no single get-out-of-jail-free card."

The team involved in the new study included researchers from the Centre for Ecology and Hydrology and the Met Office.

Drawing together expertise to create solutions to the global changes that humans are now causing is a key focus of the University of Exeter's new Global Systems Institute.

The paper, published in the journal *Nature Communications*, is entitled: "Land-use emissions play a critical role in land-based mitigation for Paris climate targets."

More information: Anna B. Harper et al, Land-use emissions play a critical role in land-based mitigation for Paris climate targets, *Nature Communications* (2018). [DOI: 10.1038/s41467-018-05340-z](https://doi.org/10.1038/s41467-018-05340-z)

Provided by University of Exeter

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