

# Climate predictions should include impacts of CO<sub>2</sub> on life

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Climate change predictions are not taking account of the full range of possible effects of rising carbon dioxide levels, researchers say.

Scientists currently use models in which [warming](#) of 1.5°C coincides with [carbon dioxide](#) in the atmosphere of between 425 and 520 parts per million (ppm).

But analysis by the University of Exeter and the Met Office suggests that if the [climate](#) warms slower, 1.5°C warming could be delayed until CO<sub>2</sub> reached higher levels—up to 765ppm if no other greenhouse gases played a part or their effects were counteracted by pollution particles in the atmosphere.

Increased CO<sub>2</sub> affects [crop yields](#), plant biodiversity and ocean acidification—and the researchers warn studies can underestimate such impacts by using too narrow a range of CO<sub>2</sub> levels.

"As well as being a major cause of [global warming](#), CO<sub>2</sub> also affects life directly," said Professor Richard Betts.

"Higher CO<sub>2</sub> concentrations cause increased growth in many plant species. This causes a general 'greening' of vegetation, but also changes the makeup of ecosystems—some species do better than others. Slower-growing large tree species can lose out to faster-growing competitors.

"It can also reduce the effects of drought to some extent, because many plants use less water when CO<sub>2</sub> is higher.

"Both of these factors can potentially enhance crop yields, possibly helping to offset some of the negative impacts of [climate change](#)—although even if that happens, the nutritional value of the crops can be reduced as a result of the extra CO<sub>2</sub>.

"Rising CO<sub>2</sub> also causes ocean acidification which is damaging to corals and some species of plankton.

"There is now a huge scientific effort going into figuring out what the world will look like when global warming reaches 1.5°C. To get the full picture, we need to consider these other effects of CO<sub>2</sub> as well as those of rising temperatures."

There is uncertainty about how much the atmosphere will warm in response to particular greenhouse gases—a measure known as "climate sensitivity".

The study concluded that a wide range of CO<sub>2</sub> concentrations could accompany global warming of 1.5°C or 2°C.

Explaining the new study, Professor Betts said he and Dr. Doug McNeall did calculations by Intergovernmental Panel on Climate Change (IPCC) "in reverse".

"Instead of calculating the probability of a particular amount of warming if CO<sub>2</sub> doubles, we calculated the probability of a particular amount of CO<sub>2</sub> rise for a particular level of warming (1.5°C and 2°C)," he said.

"This lets us estimate what the range of CO<sub>2</sub> concentrations would be when global warming passes those levels, if CO<sub>2</sub> were the only thing in the atmosphere that we are changing."

**More information:** Richard A. Betts et al, How much CO<sub>2</sub> at 1.5 °C and 2 °C?, *Nature Climate Change* (2018). [DOI: 10.1038/s41558-018-0199-5](https://doi.org/10.1038/s41558-018-0199-5)

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