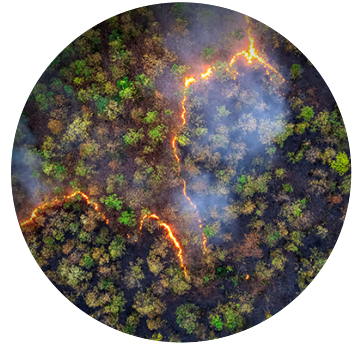


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Global carbon levels: how bad is it?



Summary

Carbon moves between land, ocean and atmosphere through two linked cycles: a fast cycle (seconds to years - photosynthesis, growth, decay) and a slow cycle (millions of years - rock and fossil fuel formation).

By burning fossil fuels, humans have injected slow-cycle carbon into the fast cycle far quicker than nature ever would, driving climate change. Of the CO₂ we emit, roughly half stays in the atmosphere; the other half is absorbed by land (21%) and ocean (29%) ecosystems.

Rising atmospheric CO₂ has already pushed global temperatures 1–1.5°C above pre-industrial levels, with real regional consequences: more wildfires, drought, storms and pests, especially across Europe.

Crucially, this warming is now damaging the very ecosystems that absorb our carbon, weakening their capacity to continue doing so, creating a positive feedback loop that could further accelerate warming (Amazon dieback is one worst-case example).

Yet the lecture's central message is one of agency: the latest climate models show that once fossil fuel emissions reach zero, global warming stops.

Key concepts

- Fast vs slow carbon cycle - and how humans have artificially coupled them
- Natural carbon sinks (land + ocean) as a free ecosystem service, absorbing half of emissions
- Positive feedback loops - warming weakens sinks → more CO₂ stays airborne → more warming
- Agency framing: “when the emissions stop, the warming stops” - climate change is not fixed fate

Discussion prompts

1. Natural ecosystems absorb about half our fossil fuel emissions, “a service for free.” What happens if that service breaks down, and who ends up paying the cost?
2. Scientists call the weakening of carbon sinks a “positive feedback,” even though the effect is harmful. Why use that term? Is it a good way to explain the idea to a general audience, or misleading?
3. The lecture ends on a hopeful note: “when the emissions stop, the warming stops.” Is this reassuring, or does it risk making the challenge sound simpler than it is? Argue both sides.

STUDENT SHEET

4. The Amazon rainforest is raised as a possible tipping point this century. What responsibility, if any, do people and countries far from the Amazon have in preventing that outcome?
5. The fast carbon cycle operates on timescales of seconds to years; the slow cycle operates over millions of years. Why might this mismatch in timescales make climate change especially hard for people to grasp or act on?