How do we support decision-making around non-CO_2 greenhouse gases?

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Introduction

- Compared to carbon dioxide (CO_2), methane (CH_4) has strong warming effects in the near term, but only persists in the atmosphere for a relatively short time (decades vs centuries+).
- Methane is usually reported as CO_2-equivalents, CO_2e, using GWP100, which cannot reflect the timescale-dependency of its warming impacts.

There are questions about the effectiveness of some emission reduction practices. Working with the Wildlife Trusts and DAERA, our study sought to answer these question in the following contexts:

Peatland restoration – rewetting may reduce CO_2 losses while increasing CH_4 emissions

Is it climatically beneficial if we swap CO_2 for CH_4?

Agricultural policy – reduce CH_4

Can we provide a deeper quantification of the benefits of reducing agricultural CH_4?

Methods

How did we do it?

Peatlands – The Wildlife Trusts

- Estimated the total greenhouse gas emissions from peatlands managed by the Wildlife Trusts before and after restoration, and assessed net climate impact using multiple pulse-emission metrics (GWP100, GWP20, GTP100).
- Set up different restoration scenarios and explored their climate impacts over time using a new metric/modelling approach (GWP*).

Agriculture – DAERA (Department of Agriculture, Environment & Rural Affairs of Northern Ireland)

- Co-created activities with timeline to support their Climate Action Plan
- Used multiple metrics and GWP* to illustrate the importance of CH_4 reduction.

Outcomes

Peatlands

- Shift to carbon sequestration overcomes increased CH_4 warming (Figure 1)
- Confirmed that restoring degraded peatlands is unambiguously beneficial
- Supported The Wildlife Trusts in their emission inventories and net-zero planning

Agriculture

- Met legislative needs around quantifying methane reductions as required by the Climate Change Act (Northern Ireland) 2022
- Provided guidance and explanatory notes to support deployment of agricultural mitigation measures

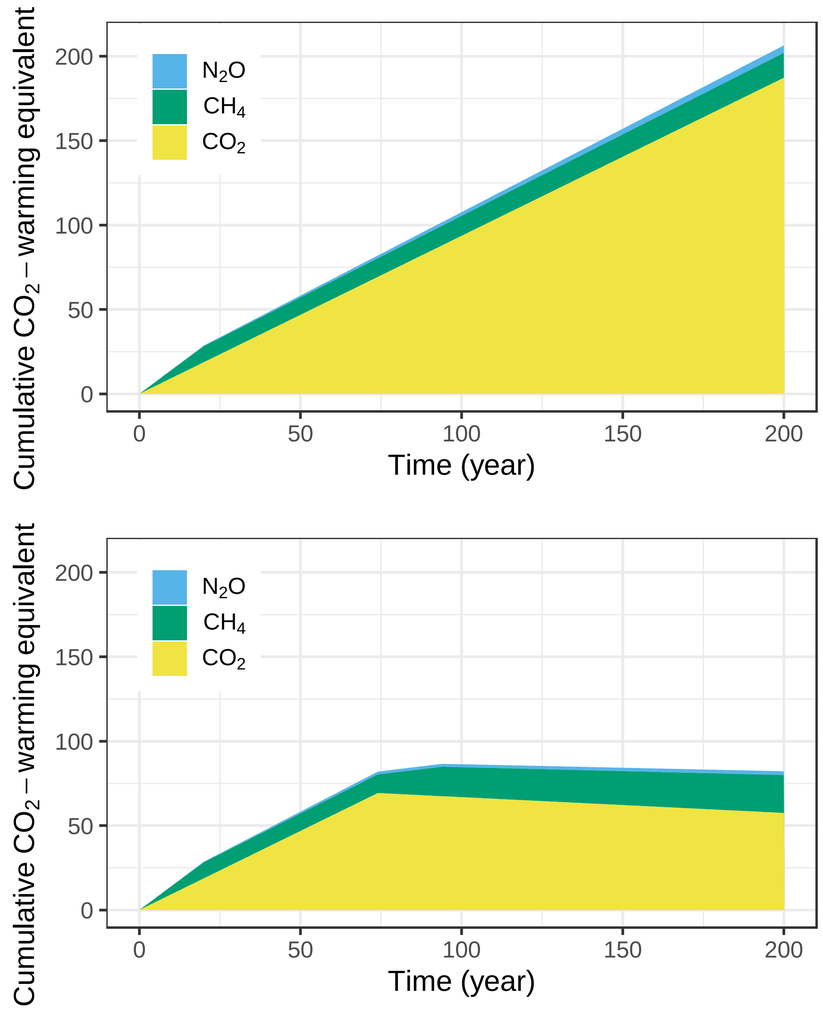

Figure 1. Cumulative 'CO_2-warming equivalent' emissions from the degraded peatlands (top) and if restored (bottom). Directly corresponds with contributions to global temperature increase.

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The Agile Initiative is supported by the Natural Environment Research Council as part of the Changing the Environment Programme – NERC grant reference number NE/W004976/1

Prompts for reflections

How do we support decision-making around non-CO_2 greenhouse gases?

The Topic

- Were you familiar with different approaches to evaluating and reporting non-CO_2 greenhouse gases?
- What's your opinion on the strengths and weaknesses of the current expectations for reporting methane emissions?
- Should we take different approaches to target-setting and evaluation of emissions depending on the context? For example, in environmental restoration and agricultural emission reduction?

Outcomes

- Do you think our results will successfully support mitigation policy and on-the-ground action?
- Apart from The Wildlife Trusts and DAERA, do you see opportunities for collaboration or integration with other organisations or initiatives?
- As well as our main partners, to which other audiences should we try and communicate the approach and outcomes?

The Method

- How else could we investigate questions that result from greenhouse gases having differences in warming over time?
- Were there any gaps or limitations in the research process that you think should be addressed?
- How well does this approach balance speed and robustness in generating evidence-based solutions for policy makers and practitioners?
- How would you suggest extending the project into relevant economic and deployment factors, that might build on the research carried out here?

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