New nation-scale forests: climate silver bullet or ecological upgrade for the UK?

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Background

Global context

- Between 1850 to 2019 avg. increase of 1.07 °C
- Est. 440 $GtCO_2$ remaining for 1.5 °C inc (=11 years)
- Carbon Dioxide Removal technology can help
- This includes Trees! International initiatives:
-- Bonn Challenge
-- UN Decade of Ecosystem Restoration

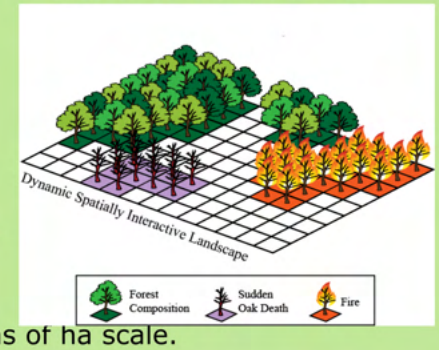
UK context

- Birthplace of the industrial revolution
-- accounted for 62% of global emissions in 1850
- Current emissions: 341.5 $MtCO_2$ in 2021
- Currently 13% forest cover
- Pledged 18% forest cover by 2050
- Increase to 25% by 2100 (4 mha)

Existing Research

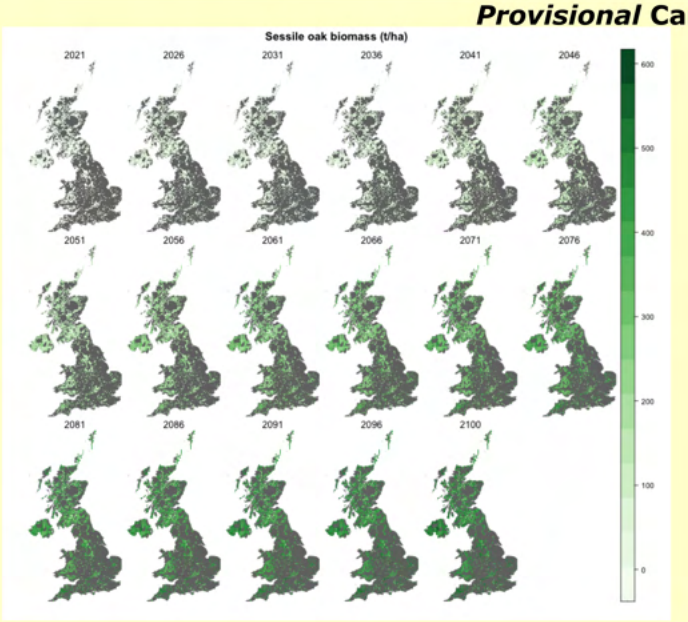
Burke et al 2021 est. 4.7 million ha available for new forests
Bradfer-Lawrence et al 2021 est. 4.6 million ha available
- highlighted that 2.5 million ha are on carbon rich soils
- additionally calculated estimates of carbon potential

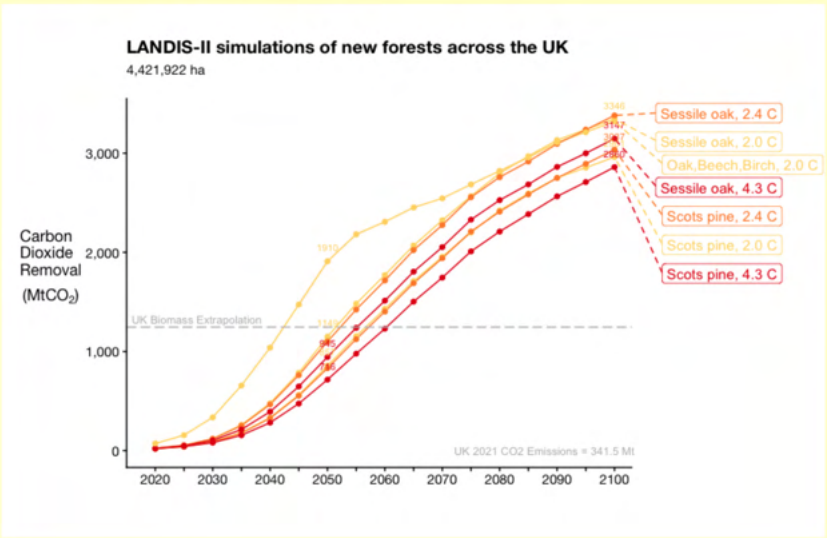
We lack quantitative data on national impact of new forests!



LANDIS-II v7.0 >>
Is a spatially explicit, mechanistic, and modular forest landscape model. Previously used in UK and Europe, and at millions of ha scale.

Provisional Carbon Storage Projections





Ecological Upgrade

Multi-species forests:
- increase biodiversity = help tackle the biodiversity crisis
- improve water and air quality
- decrease flood and landslide risk
- increase local cloud cover = +precipitation, -temperature
- increase human physical and mental health
- fulfil state actors' international commitments
- compensate for emissions from hard-to-abate sectors

Carbon capture could be viewed as a transitory co-benefit to planting trees for a more livable planet for local and global populations.

Burke, T., Rowland, C., Whyatt, J. D., Blackburn, G. A. & Abbatt, J. Achieving national scale targets for carbon sequestration through afforestation: Geospatial assessment of feasibility and policy implications. Environ. Sci. Policy 124, 279–292 (2021)
Bradfer-Lawrence, T. et al. The potential contribution of terrestrial nature-based solutions to a national 'net zero' climate target. J. Appl. Ecol. (2021)
Scheller, R. M. et al. Design, development, and application of LANDIS-II, a spatial landscape simulation model with flexible temporal and spatial resolution. Ecol. Modell. 201, 409–419 (2007)