# Modelling peatland plant life

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BioSS

INTRODUCTION

- Peatlands are hugely important ecosystems in the UK, responsible for storing **3 billion tonnes** of CO_2 – **twice** as much as our forests!

- Unfortunately, they are also hugely **degraded** and vulnerable to climate change.

- Plants are a vital component of the peatland ecosystem, but are often overlooked or poorly represented by models – a gap we aim to address.

- Peatlands evolve and change over long timescales (millennia), but site managers need to know how plants will respond to **climate** and **land-use** change in the short term (next century).

"Long-term systems that need solutions now!"
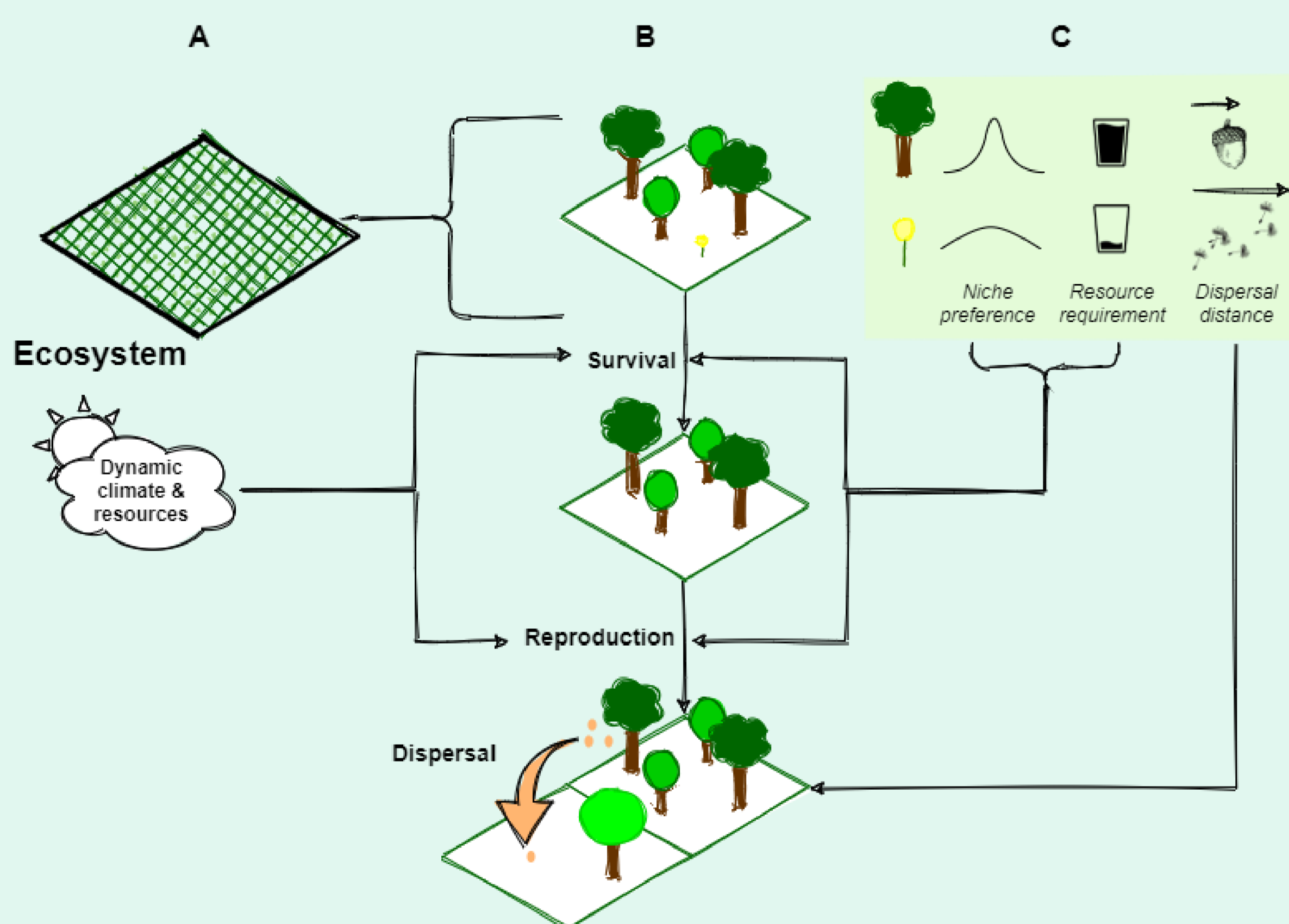
EcoSISTEM: A flexible tool for simulating plant species under climate and land-use change

METHODS

EcoSISTEM an agent based framework for plant species interactions with each other and their environment is applied to model peatland vegetation dynamics:

- species parameterisation : informed by trait mining by the NHM

- environmental layers : climate models, soil and land cover maps.

Models are a useful tool to ask questions of a system and how it might behave under different conditions, e.g. under UKCP RCP 8.5:

- what are the impacts of projected changes in rainfall?

- how much can blocking drainage ditches reduces such impacts?

RESULTS

- Moss species **die off** in the presence of drainage ditches and under future rainfall scenarios.
- The effect of climate change is much worse when we fail to block up the drainage ditches!
- Drying enables shrubs, trees and grasses to **invade** the peatland from drier surrounding edges.
- Over time we see a change in community composition, which would impact the quality and function of the underlying peat.
- These results suggest that the model is capturing well-known peatland vegetation dynamics.
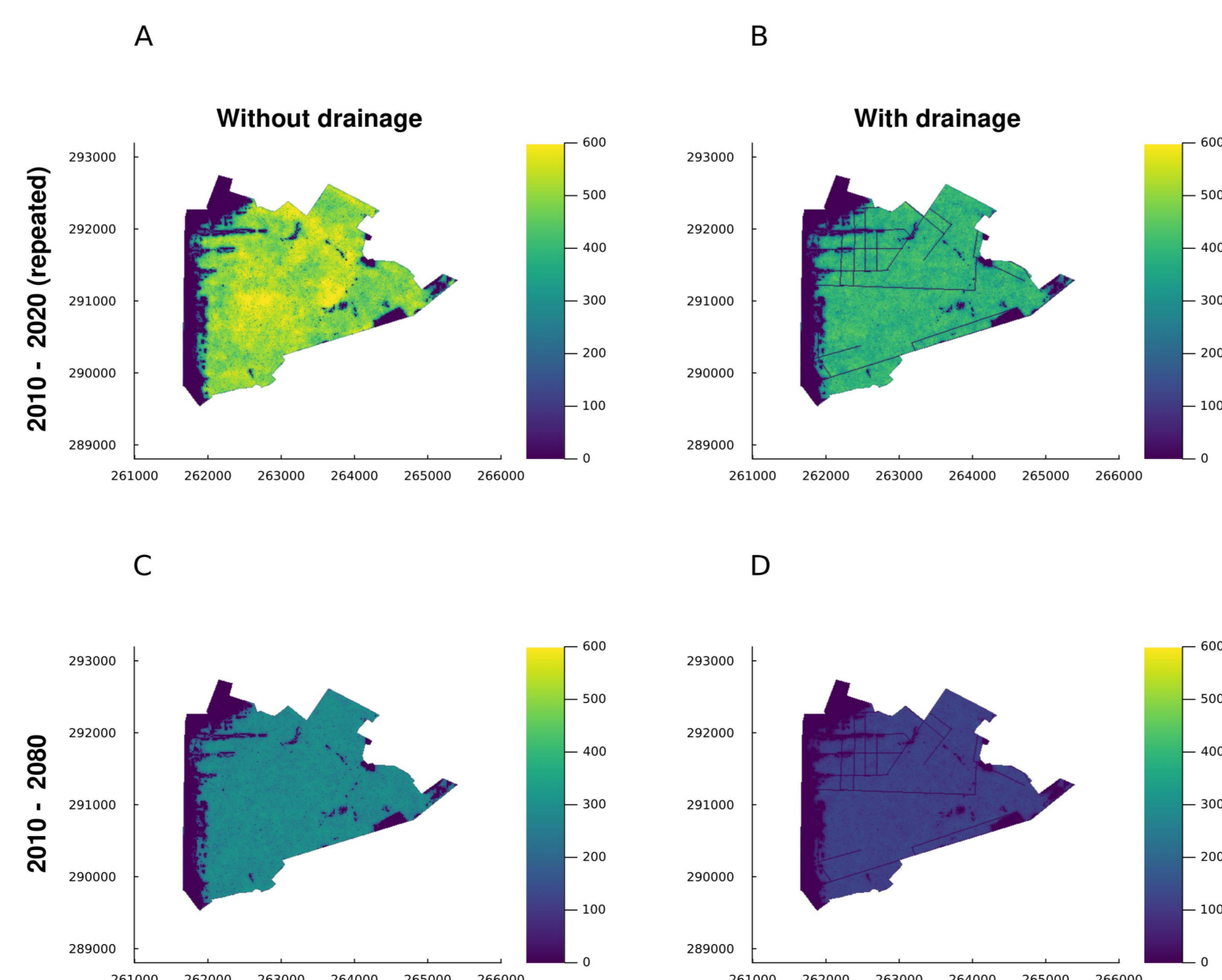
Cors Fochno, a raised bog on the Welsh coast with a typical history of drainage, peat cutting and subsequent restoration

NEXT STEPS

We can use this peatland plant model to ask questions, e.g. what mitigation techniques would work best in different peatlands? Application to Scottish peatland sites!

QUESTIONS?
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Harris, C.L., & Reeve, R. (2022). EcoSISTEM.jl - Ecosystem Simulation through Integrated Species-Trait Environment Modelling (v0.1.3). Zenodo. https://doi.org/10.5281/zenodo.6472202
Harris, C. L., Cobbold, C. A., Brummitt, N., & Reeve, R. (2019). Dynamic virtual ecosystems as a tool for detecting large-scale responses of biodiversity to environmental and land-use change. arXiv preprint arXiv:1911.12257

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