

# Simulating potential GHG mitigation from woodland expansion in Scotland

## Introduction

- Scotland has one of the lowest areas of forest cover in Europe.
- Scottish Government plans to create 10 000 ha of new woodland/yr to increase woodland cover by 100 000 ha by 2022.
- This expansion is estimated to sequester an additional 4 million tonnes CO<sub>2</sub> by 2027.
- The WEAG (2012) report demonstrated ~ 2.5 million ha (34% of land area) of land in Scotland could support woodland.
- A ClimateXChange (CXC) collaborative project will:
  - simulate this land use change and predict the changes in carbon (C) stocks.
  - calculate the greenhouse gas (GHG) mitigation potential and associated ecosystem service (ES) benefits
  - consider the complex spatial and temporal impacts of land-use change to forestry.
  - model incentives to evaluate where and when expanding woodland landscapes will provide benefits.

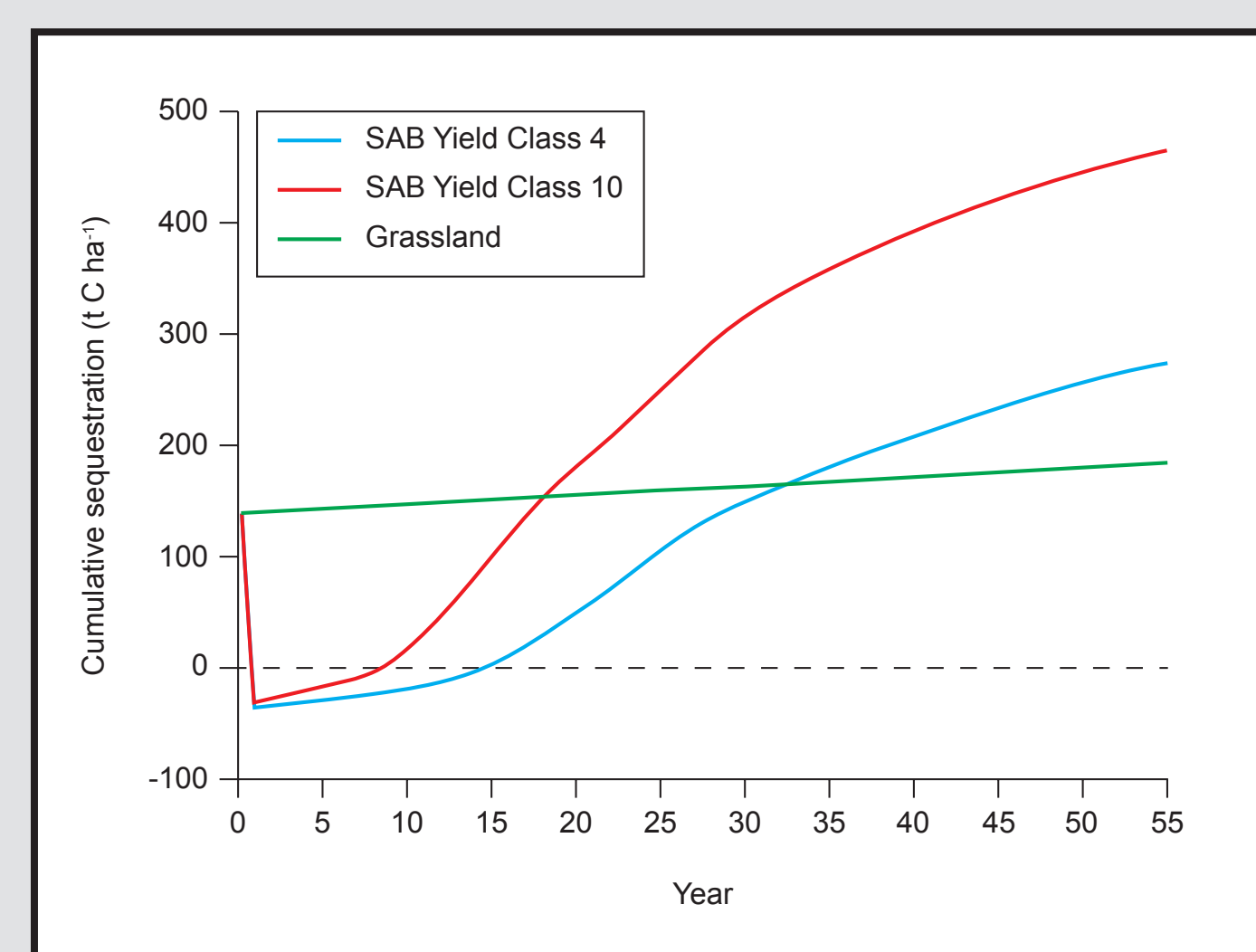
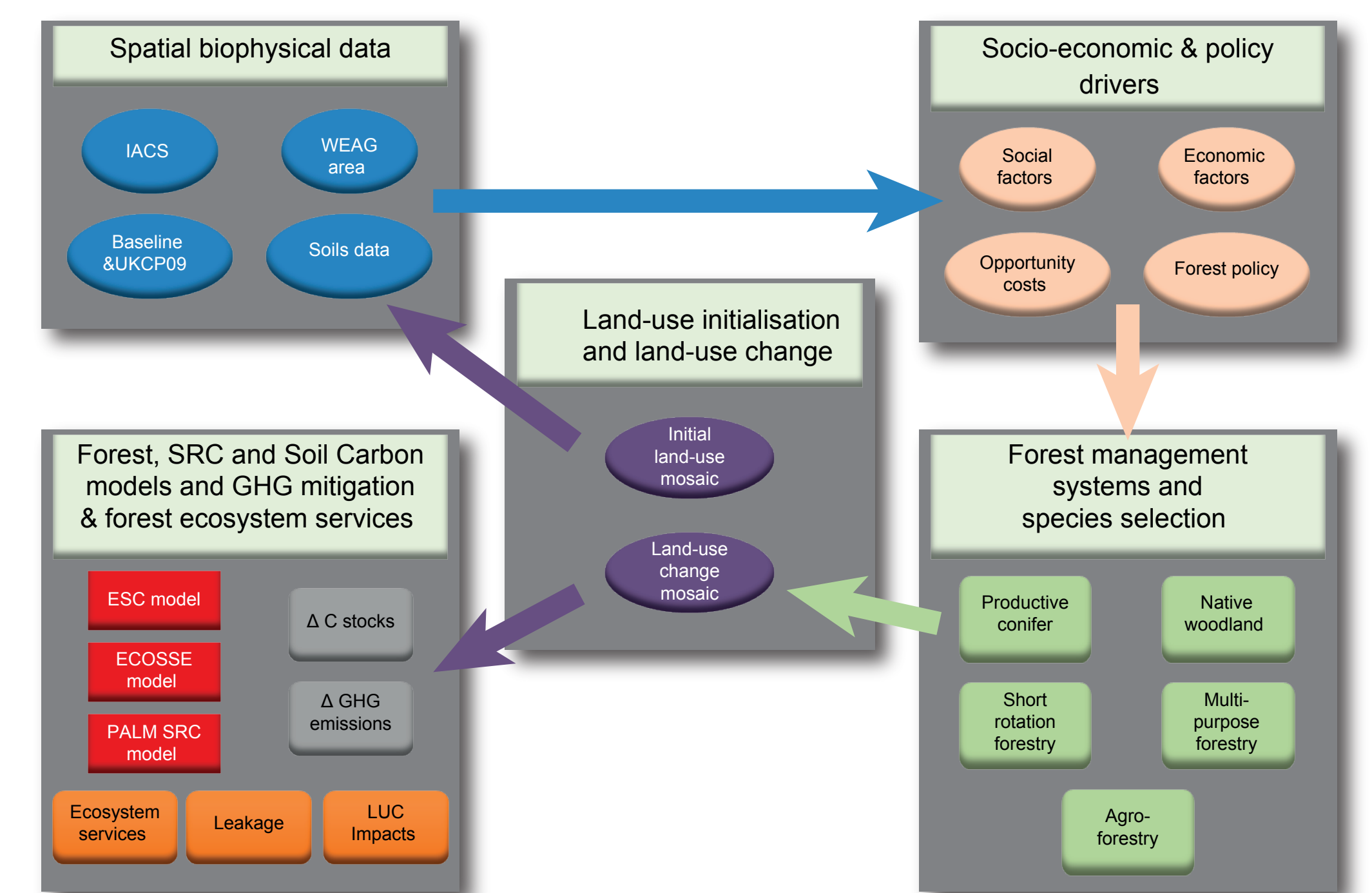
## The approach

Tree species suitability, yield, productivity and carbon models will be integrated with land use cover, soils, and climate data.

Species suitability and potential yield are modelled using Ecological Site Classification (ESC). Soil quality is modelled from soil type and combined with climate in ESC (Ray 2008; Broadmeadow *et al.* 2009) to predict yield of four forest expansion types using 11 species by yield-range combinations, with the addition of short rotation coppice using PALM. Types are:

- native woodland,
- multi-purpose forest,
- production forest, and
- short rotation & Agro-forestry

Forest management expansion types will be presented as map layers, showing C stocks at selected ages of forest growth, which can be mapped onto IACS parcels on the WEAG Phase 3 land (Sing *et al* 2013). By utilising UKCP09 climate projections, the simulation will examine species suitability, yield, and include C stocks in trees and changes in soil C using ECOSSE (Smith *et al* 2010).



## The synergy

Forest expansion models use land cover datasets so bringing additional synergy through associated mapping of land value, land capability for agriculture, less favoured area status etc. In addition, socio-economic models are being developed to understand how and where incentives can be used to promote woodland expansion. Such incentives can be tailored towards targeting one or more of the woodland expansion types. The models may be used to predict how much and what type of woodland would be appropriate in landscapes (see photograph), and how farmers might be encouraged to mix agriculture and forestry in their business.

## Authors include the whole project team

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## References

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