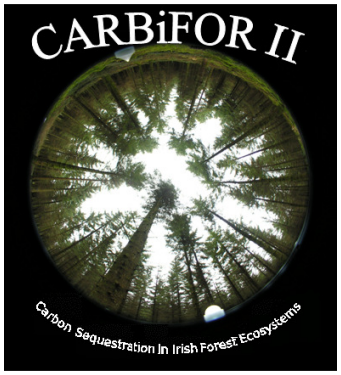

Comparison of forest tree carbon stocks across three afforested chronosequences

Brian Tobin

UCD Forestry

CARBiFOR project

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Overview

- CARBiFOR
- 3 Chronosequences / forest types
  - Dooary (Sitka spruce on mineral soil)
  - Mount Lucas (ash on mineral soil)
  - Cloosh (Sitka spruce on peat soil)
- Sampling tree biomass
- Forest carbon stocks
- Discussion of differences between chronosequences
- Knowledge gaps

CARBiFOR

To investigate the ability of first rotation forests to sequester carbon

Essentially:

What is the effect of afforestation?

How much is sequestered?

What affects the stock or rate?

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CARBiFOR chronosequences

Assumptions, compromises *etc*…..

From previous landuse;

To clearfell & subsequent rotations.

Establishment;

And thinning cycles;

Describing the "typical" development of a forest type

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An ecosystem approach

- Forest tree stocks and sequestration rates
- Decomposition of biomass –CWD, litter…
- Soil carbon store
- Fluxes from soil, debris (CO_2 & trace gasses)
- Ecosystem scale fluxes between forest and atmosphere
- Impacts of changes in climate and extreme events

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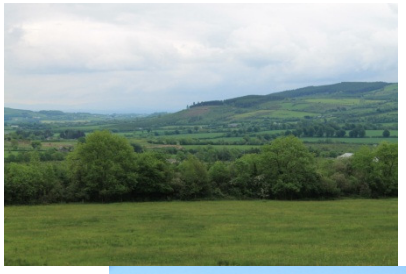
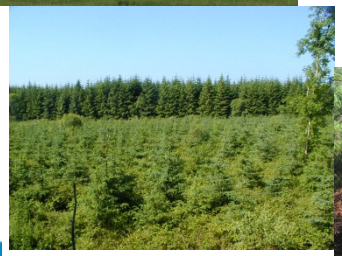
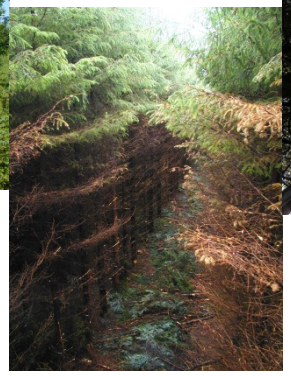
1. Dooary, Co. Laois

- Sitka spruce
- Surface water mineral gley soil
- Highly productive (YC 22 – 26)
- Mix of Coillte & private ownership



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2. Mount Lucas, Co. Offaly

- Ash on brown earth soil
- Productive (YC *c.* 9/10)
- Privately owned sites

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3. Cloosh, Co. Galway

- Sitka spruce on blanket peat
- Low productivity (*c.* YC 12)
- Mixed ownership

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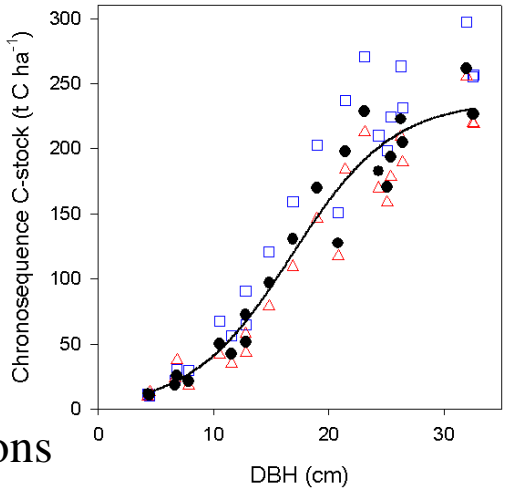
Tree biomass sampled

- Trees sampled from chronosequence stages
- Variation in tree sizes covered
- Sample trees sectioned into components:
  - Stem
  - Branches
  - Needles / Leaves
  - Roots



Tree biomass equations

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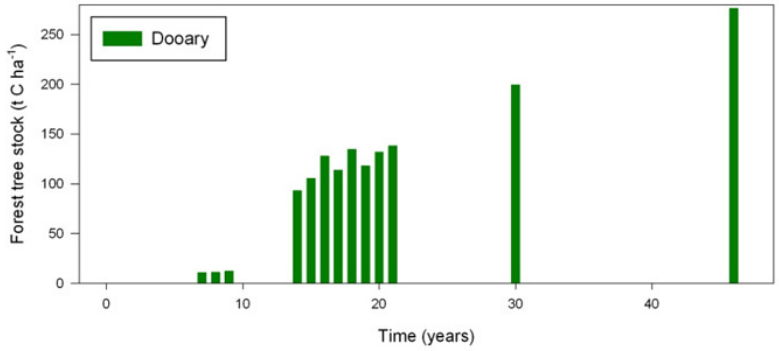
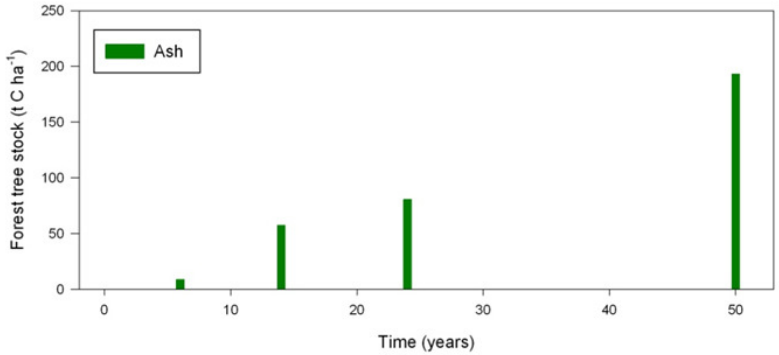
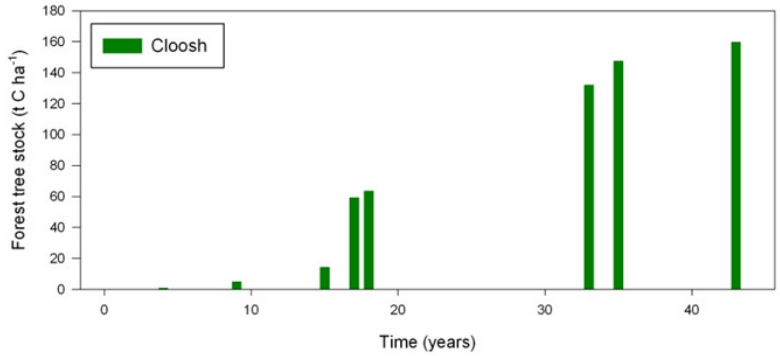
Forest stocks







Inventory plots
Biomass models applied

Chronosequence C stocks populated

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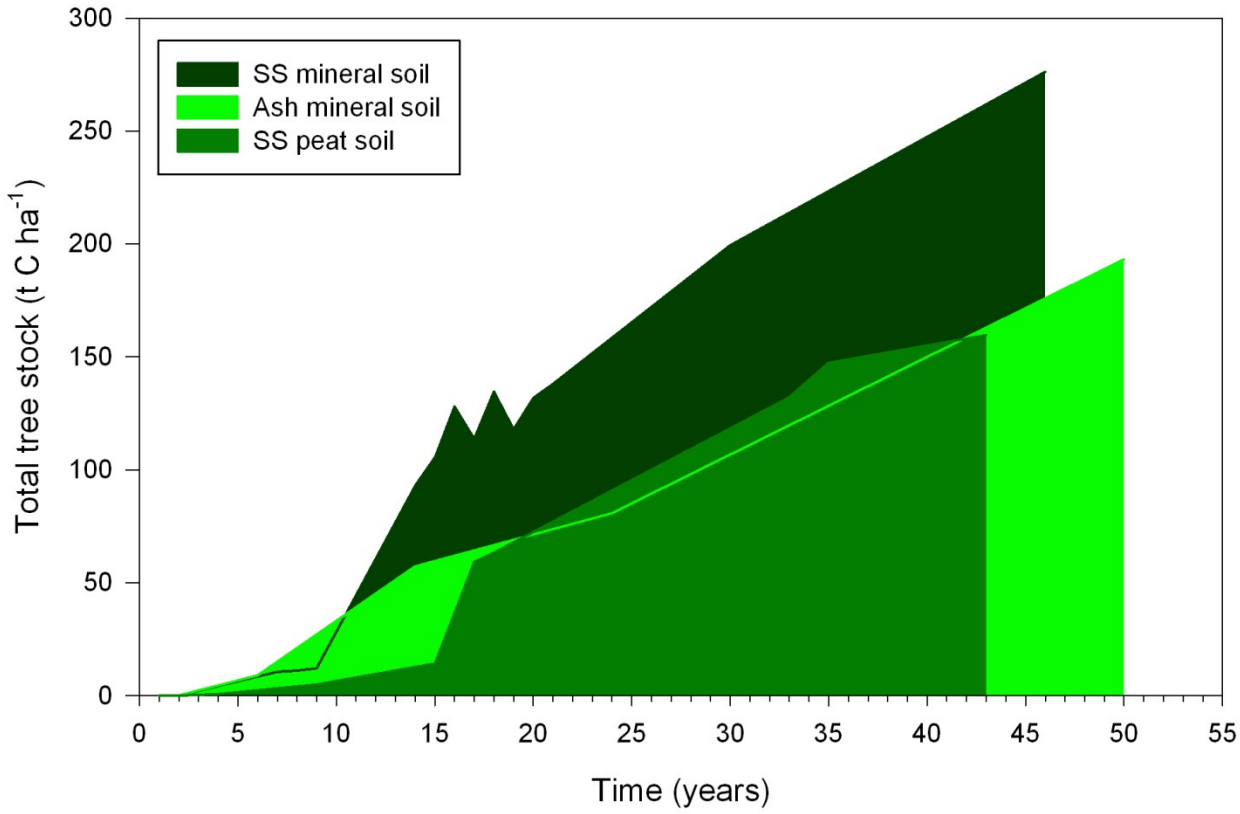
Projected chronosequence stocks

A once-off gain of sequestered atmospheric C



Remember:

Forest types

Series of similar sites with similar management

Tree standing stock only

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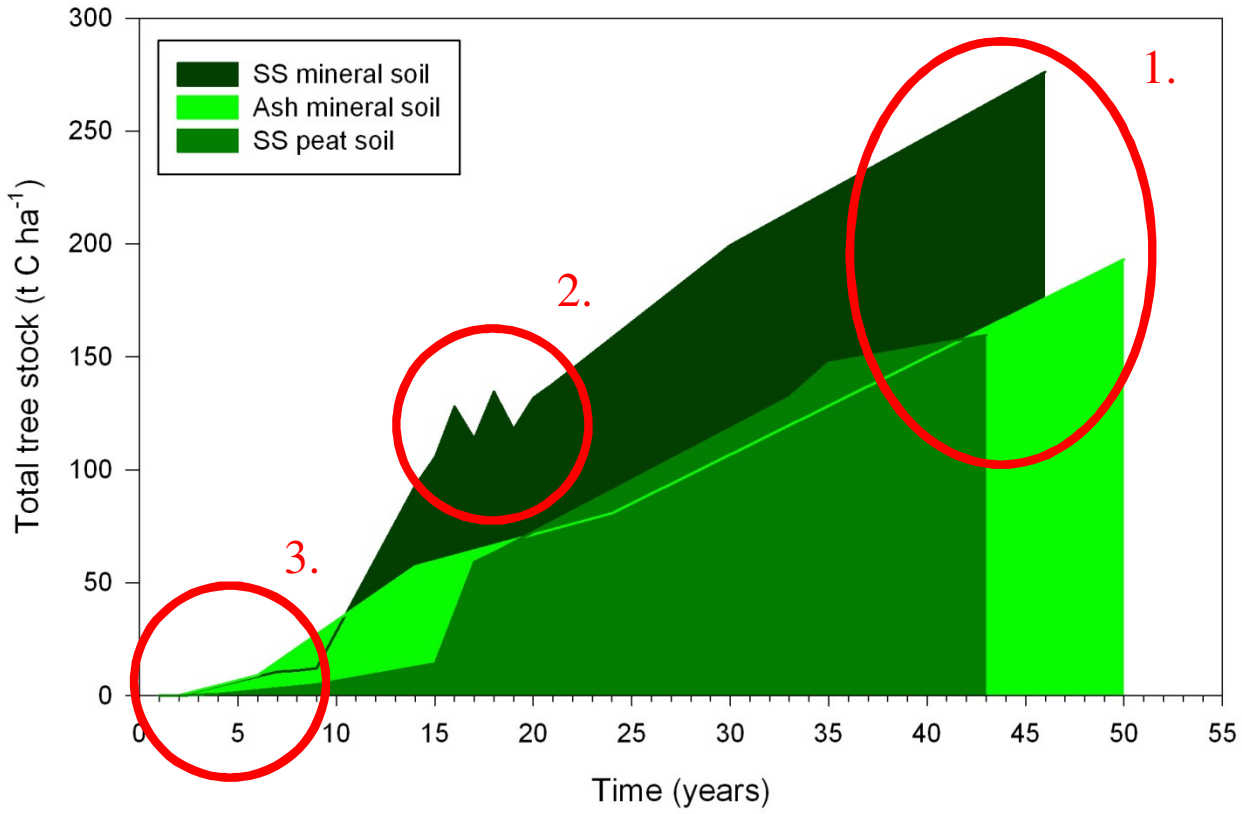
Projected chronosequence stocks

Three points of discussion:



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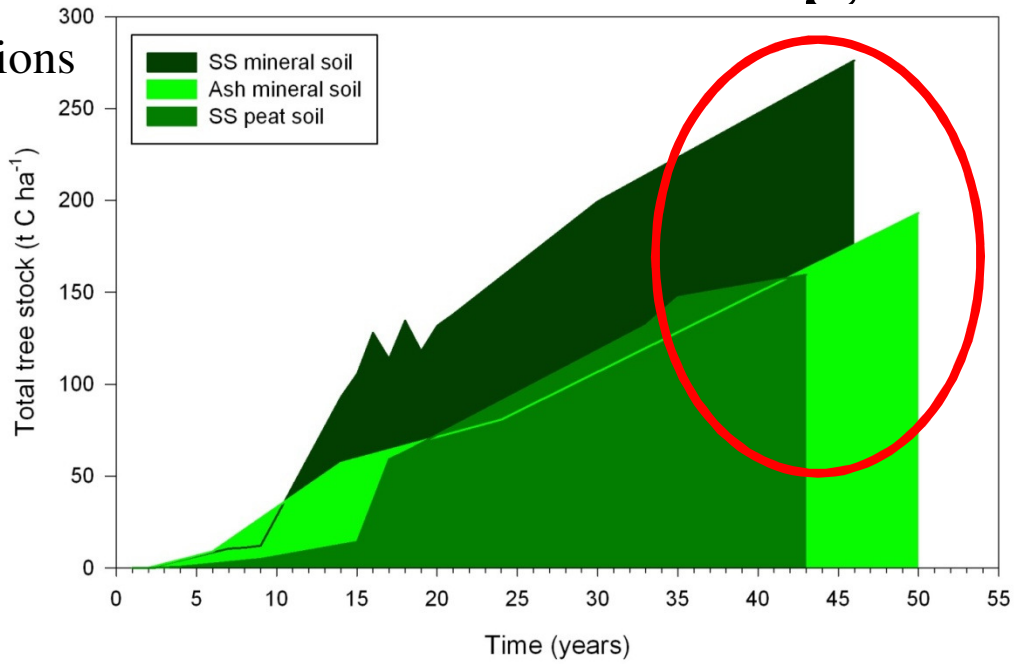
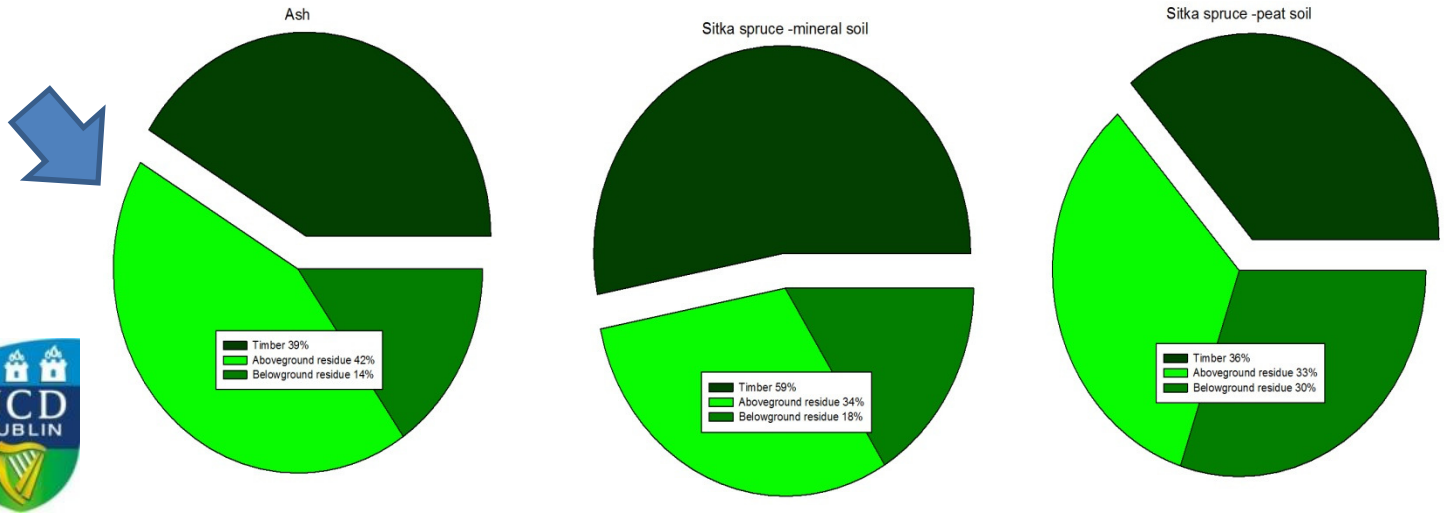
1. Rotation length

Economic considerations





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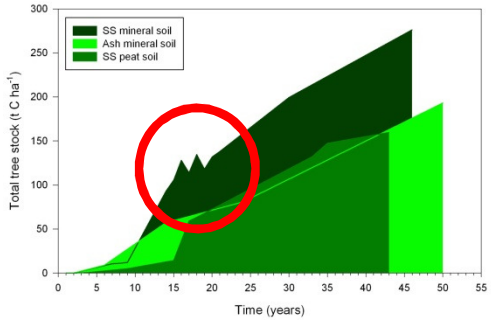
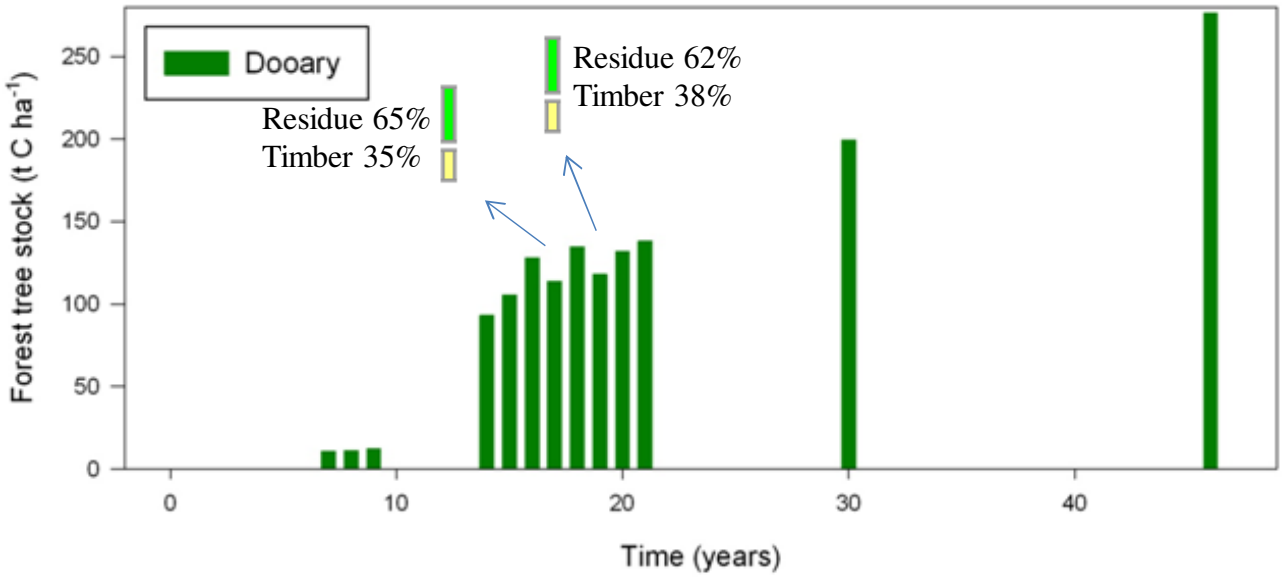
2. Thinning



E.g. Two thinnings at Dooary tower stand: 54 t C ha^{-1} removed from forest standing stock



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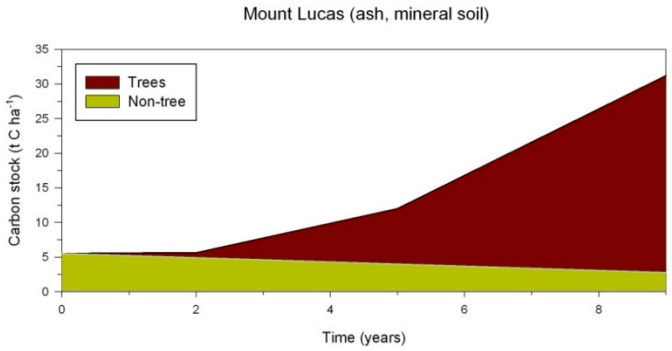
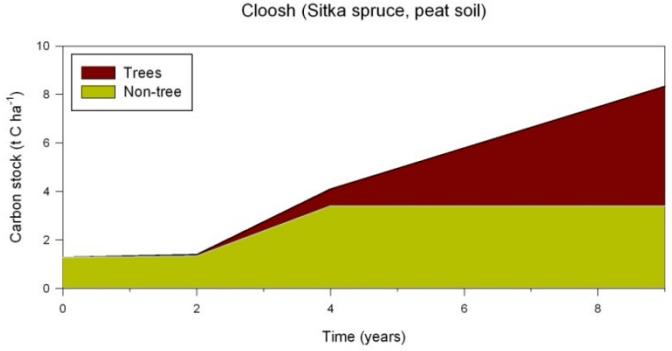
3. Vegetation

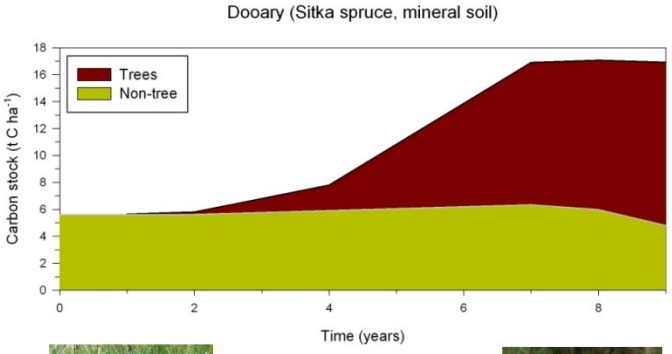
Ash

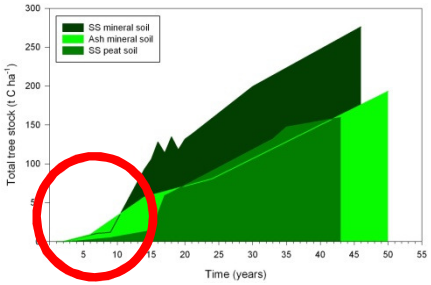


SS peat



SS mineral





Significant levels of biomass in under-storey –add to site stocks

Non-tree vegetation increased for a short period in the conifer forests

- dependant on cultivation type / veg. management

Eventually supressed by overhead canopy

Maintenance of ground cover reduces losses of soil fertility, emissions and aids earlier net C sink status

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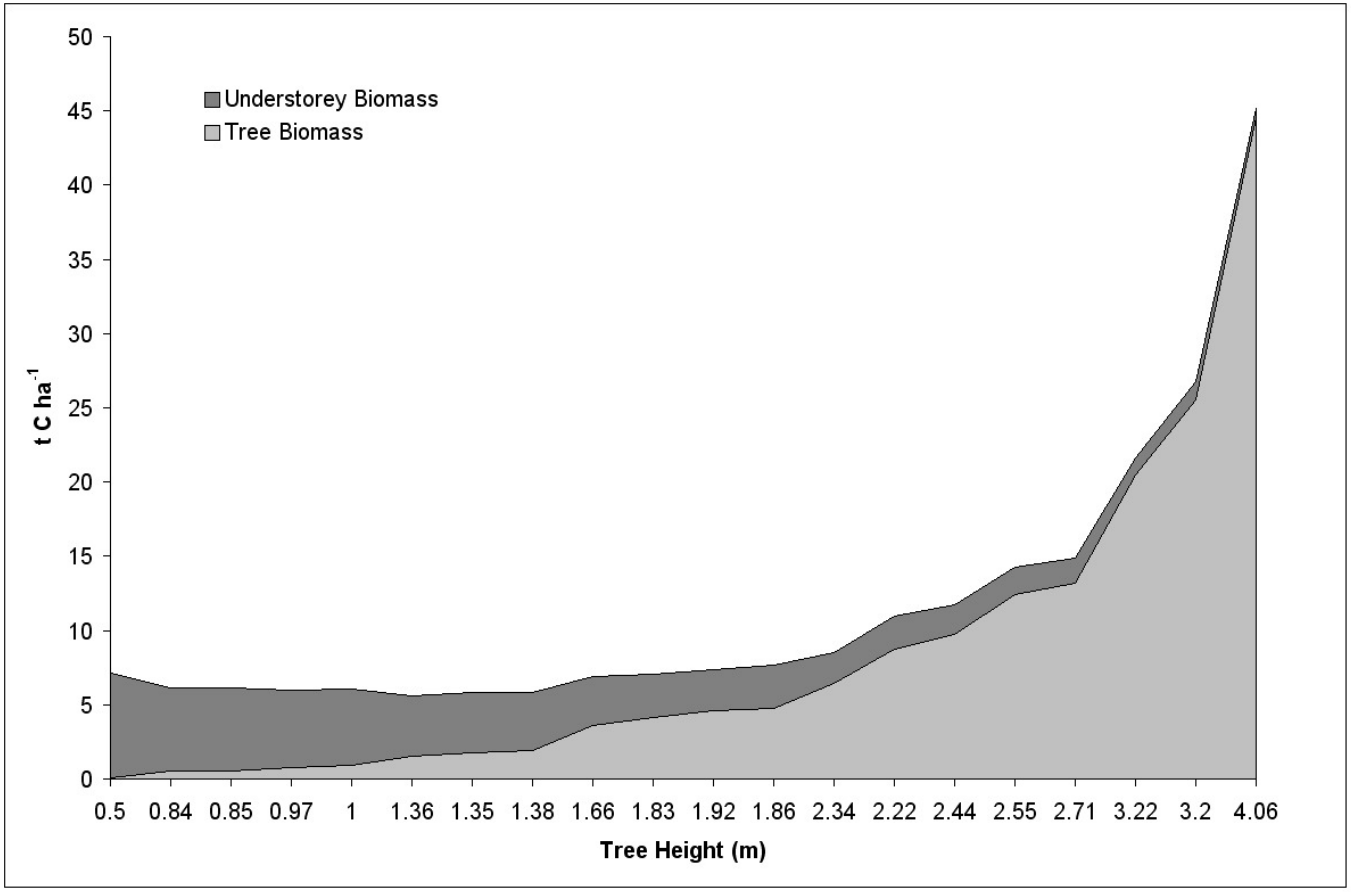

Non-tree vegetation vs. tree height in Sitka spruce and lodgepole pine stands, Co. Mayo

Green et al.

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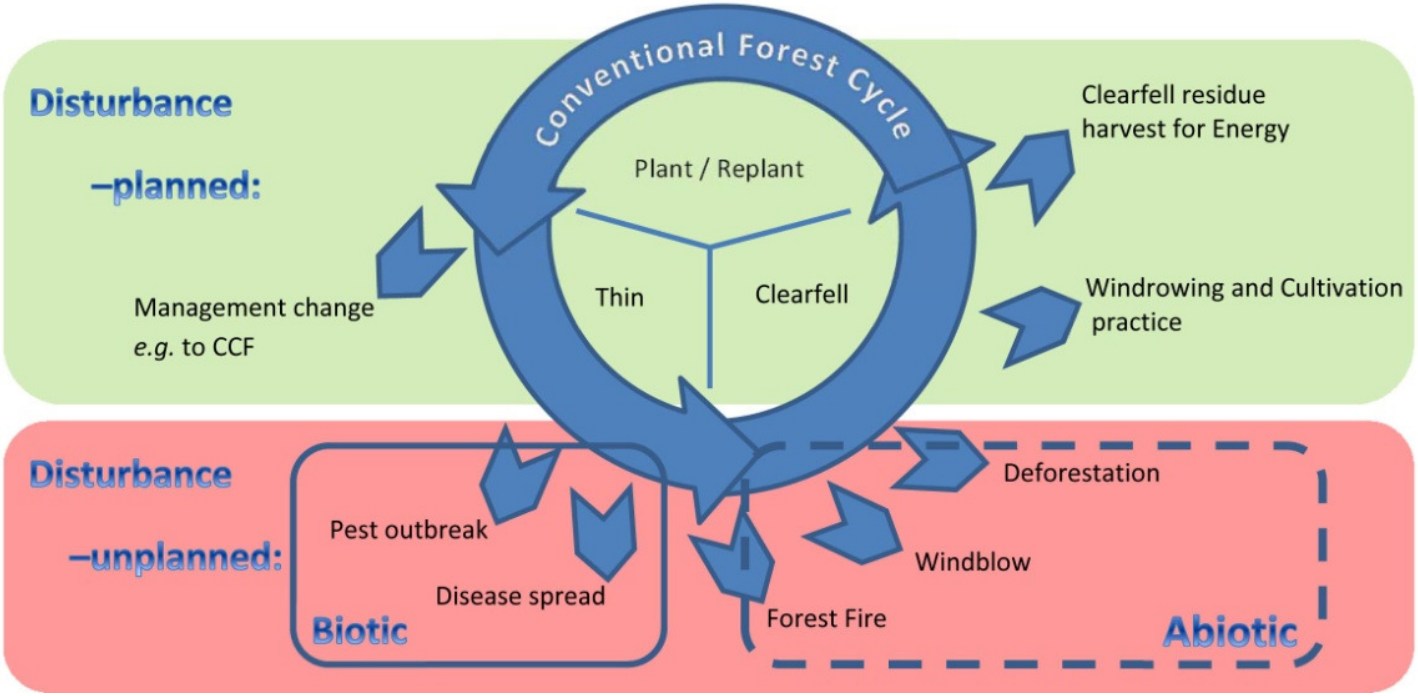
Conclusions

- Stocks dependant on spp. (up to 250 $tCha^{-1}$ for SS) management/stocking/rotation length
- Forest types indicate product types and consequent management
- Significant non-tree vegetation in early stages adding to sequestration
- Forest type and management also lead to different residue inputs (long term site C store and soil source) and subsequent decomposition rates

Knowledge gaps

Impact of disturbances



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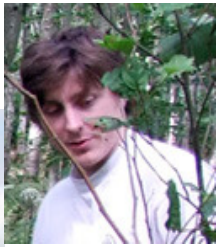
Acknowledgments

- COFORD
- Coillte & private forest owners
- CARBiFOR project team
- David Farrell, QPP





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Thanks for your attention!