Current and Future Degradation Risks to Forest Soils in Ireland

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FORRISK International Workshop on 'Soil Degradation Risks in Planted Forests',
Bilbao, 10th September 2014

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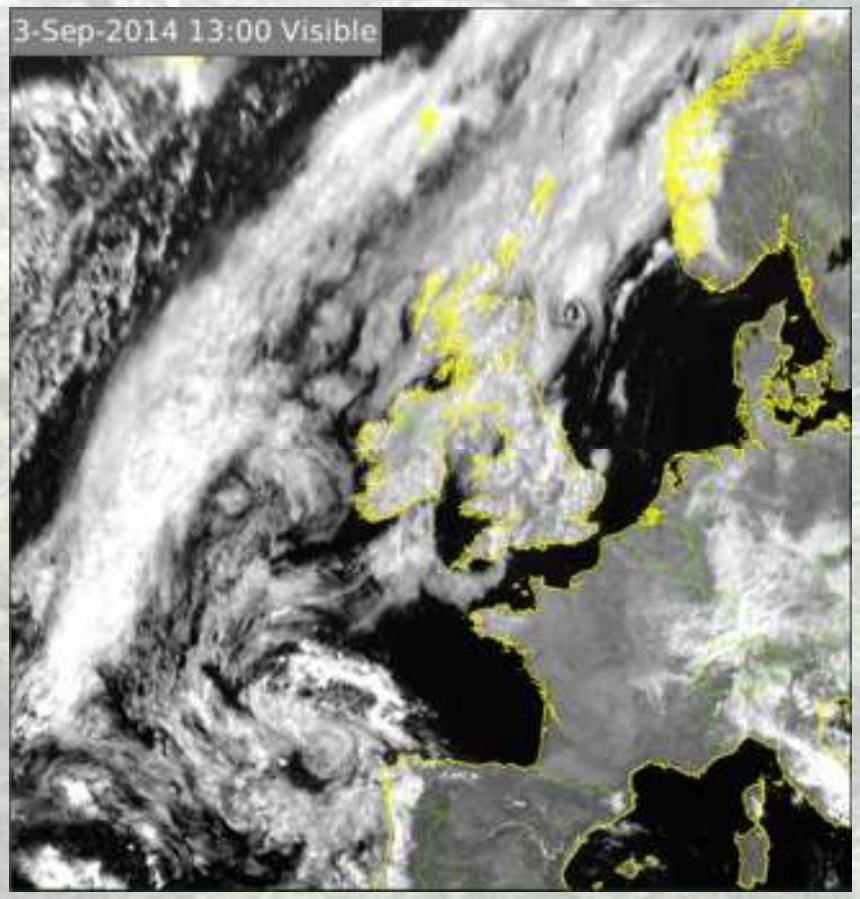
Content

- Introduction
  - Climate, soils and forests of Ireland
  - Soil degradation

Climate of Ireland



Meteireann.ie

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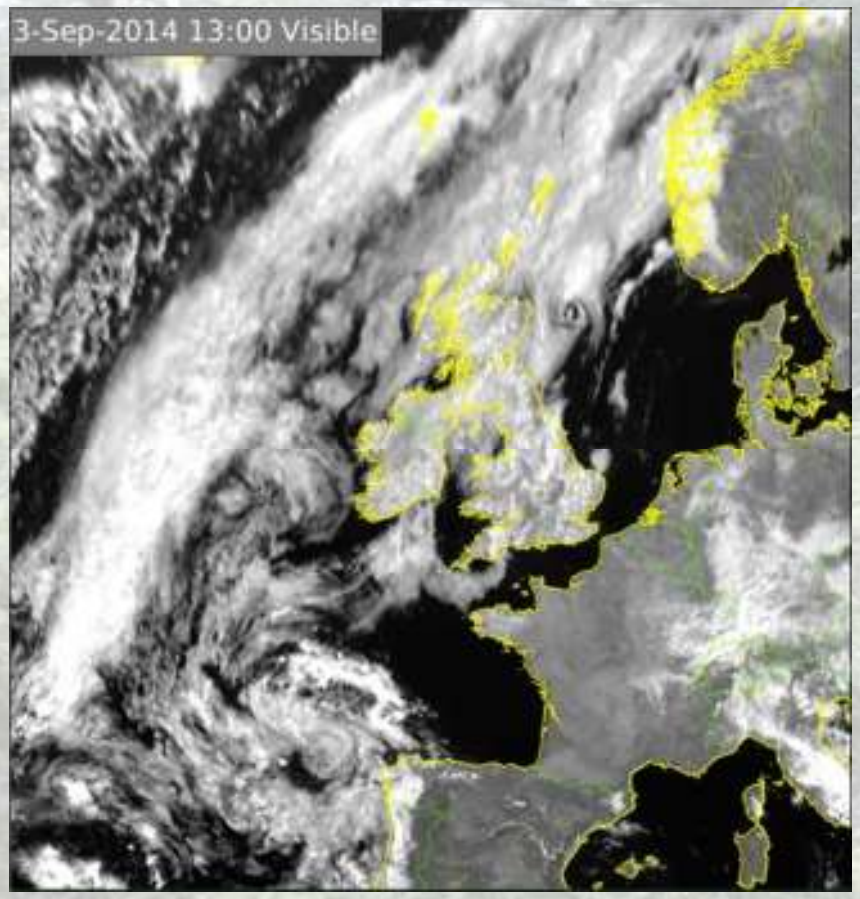
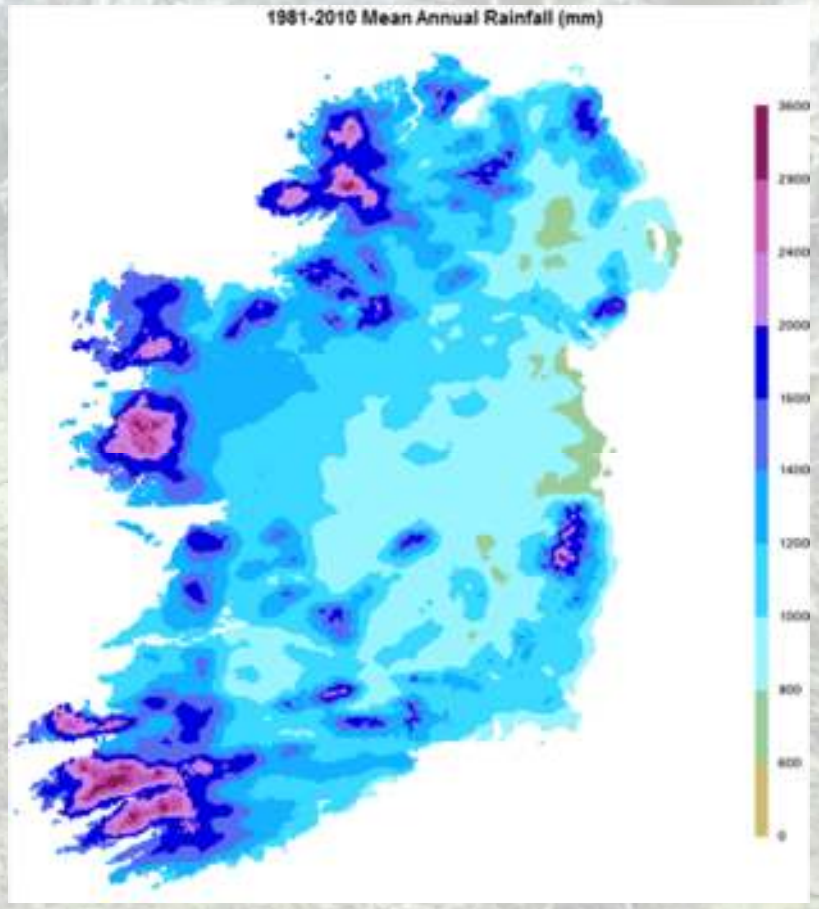


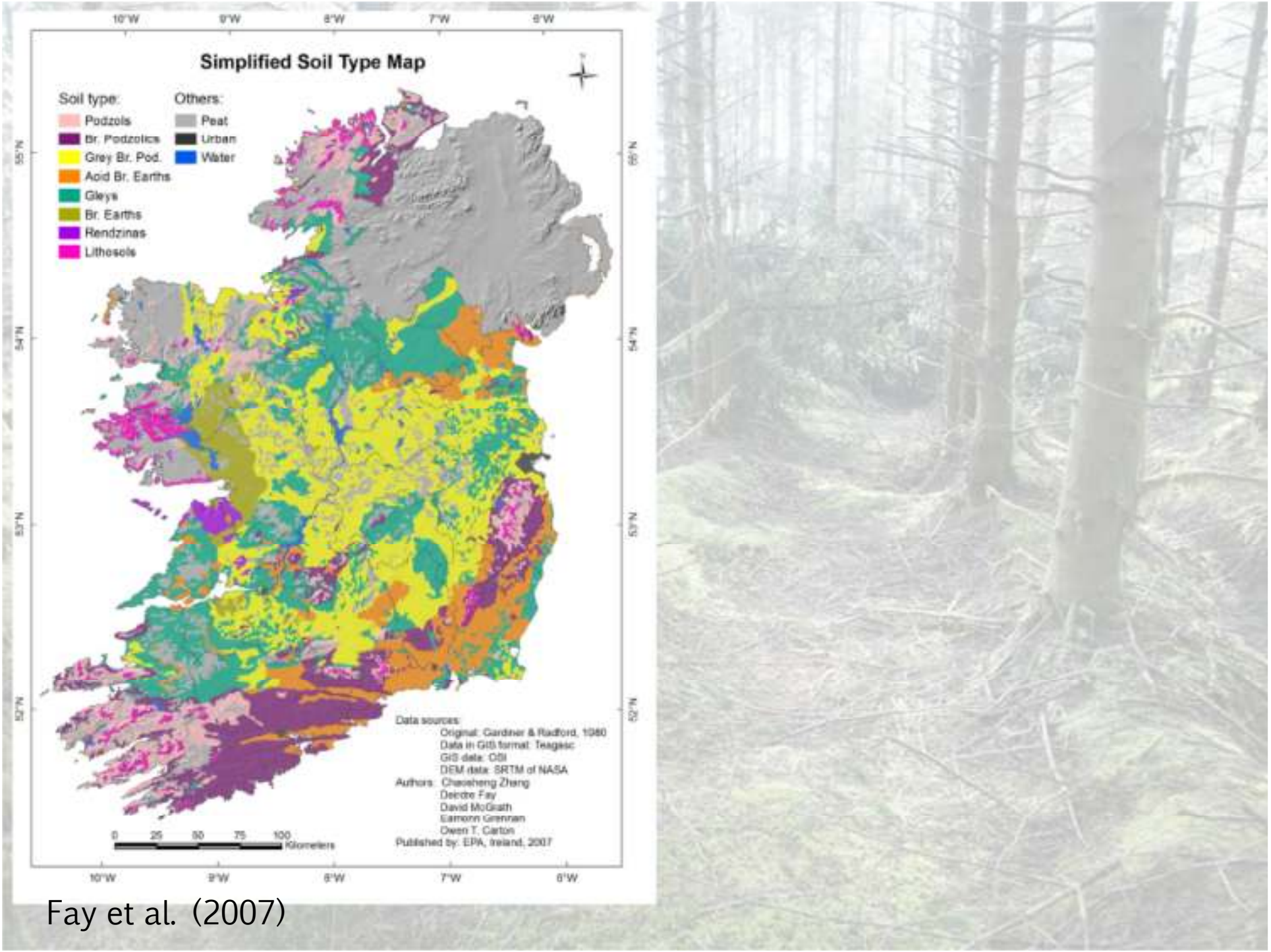


Meteireann.ie

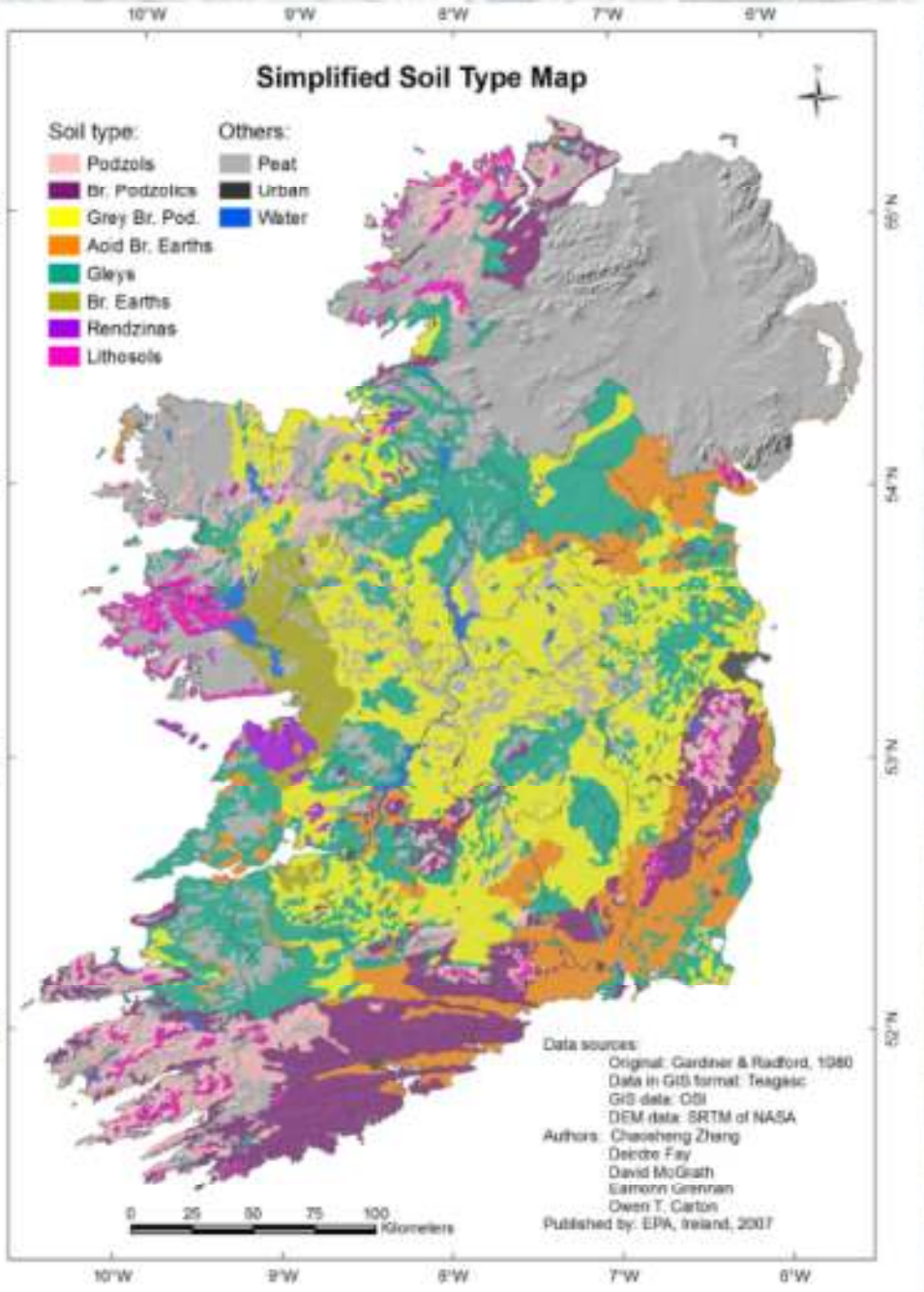
Irish Soils

- Relatively young 10,000 – 20,000 years old
- Dominant pedogenic processes:
  - Widespread **acidification** due to excessive leaching
  - **Movement/translocation of silicate clay** leading to the development of clay-rich subsurface horizons
  - **Accumulation of the oxides of iron and aluminium** and to a lesser extent, humus in coarse textured soils
  - A reasonably high level of **soil organic matter accumulation**
  - Development of conditions associated with **wetness**
  - Biological homogenization of soil

(Collins et al. 2004)



Fay et al. (2007)



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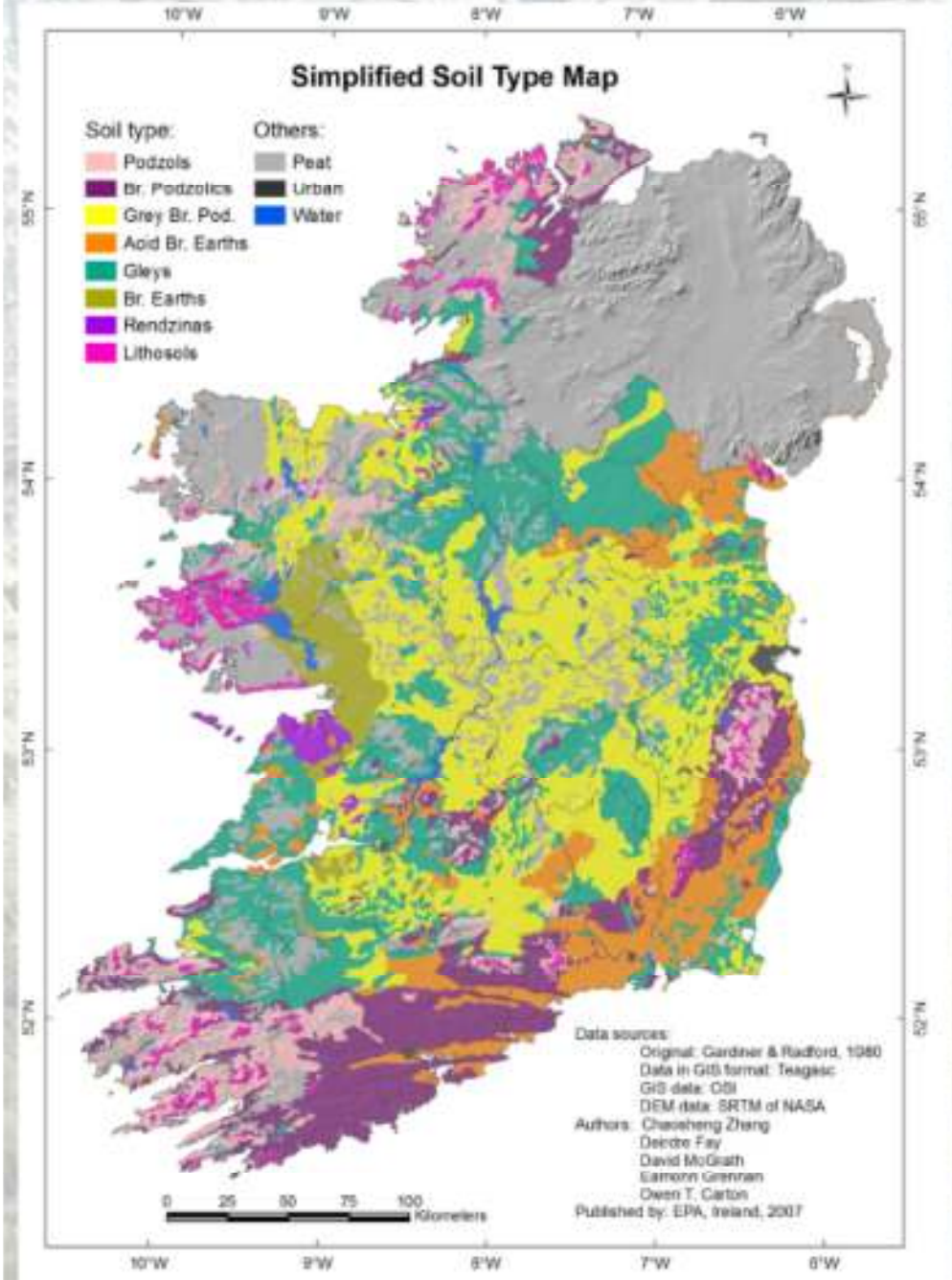
Podzol



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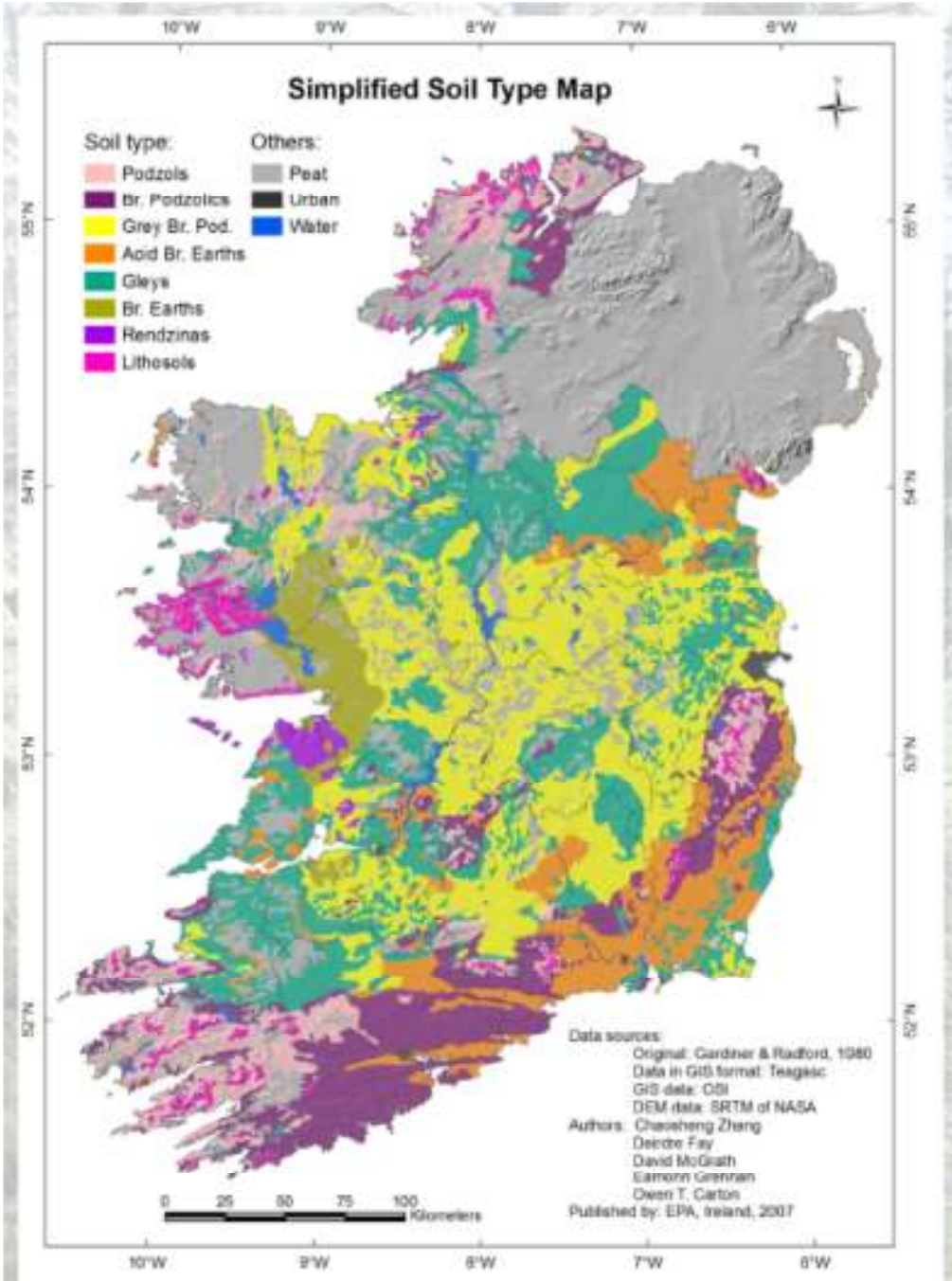
Podzol

Gley



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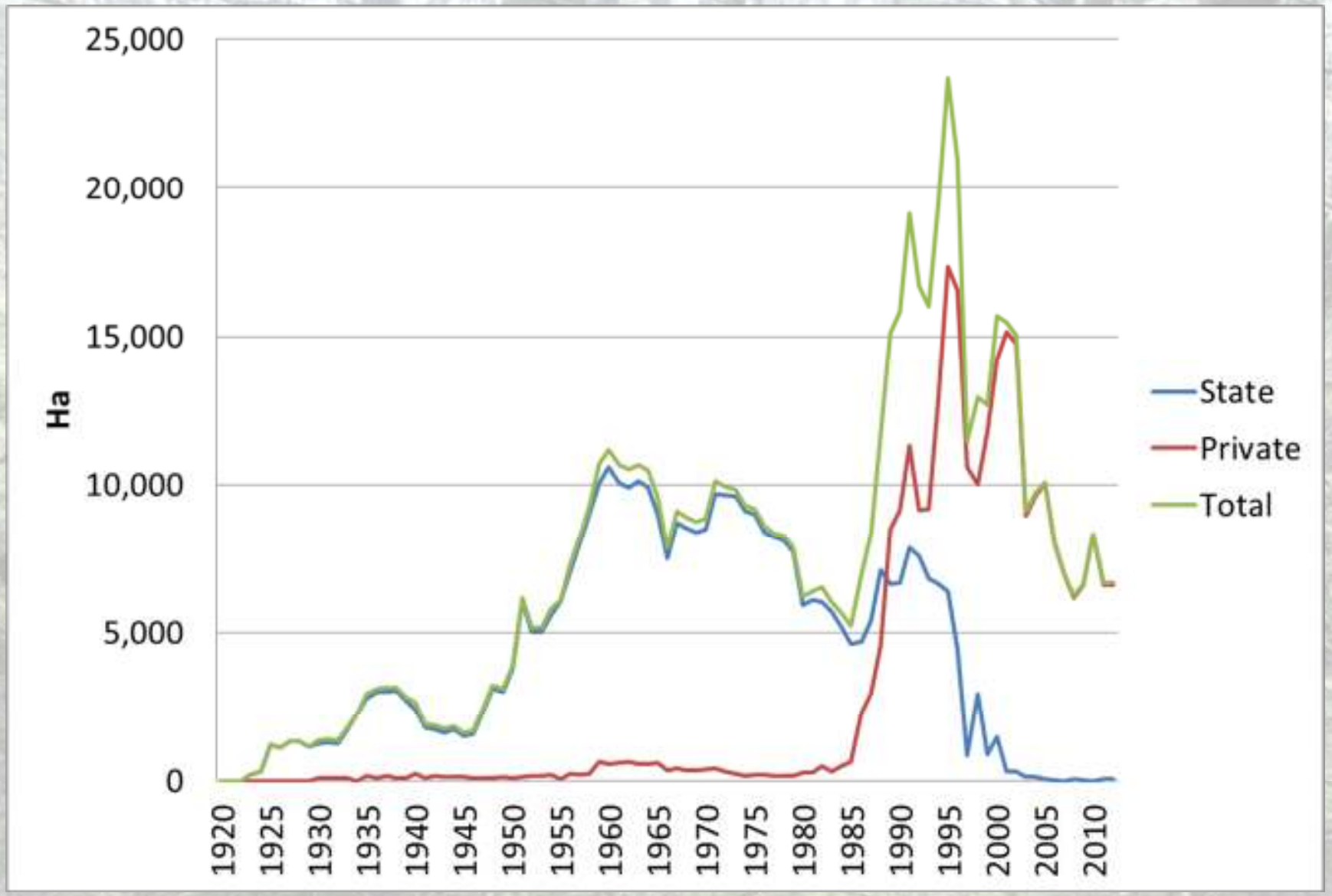
Podzol

Gley

Peat

Annual rate of Afforestation 1922-2013



Irish Forests: Area and Composition

- Area in 2012: 731,650 ha (10.5% of land area)
- 57% publicly owned and 43% private.
- 74.2% of forests are coniferous
- 25.8% are broadleaf

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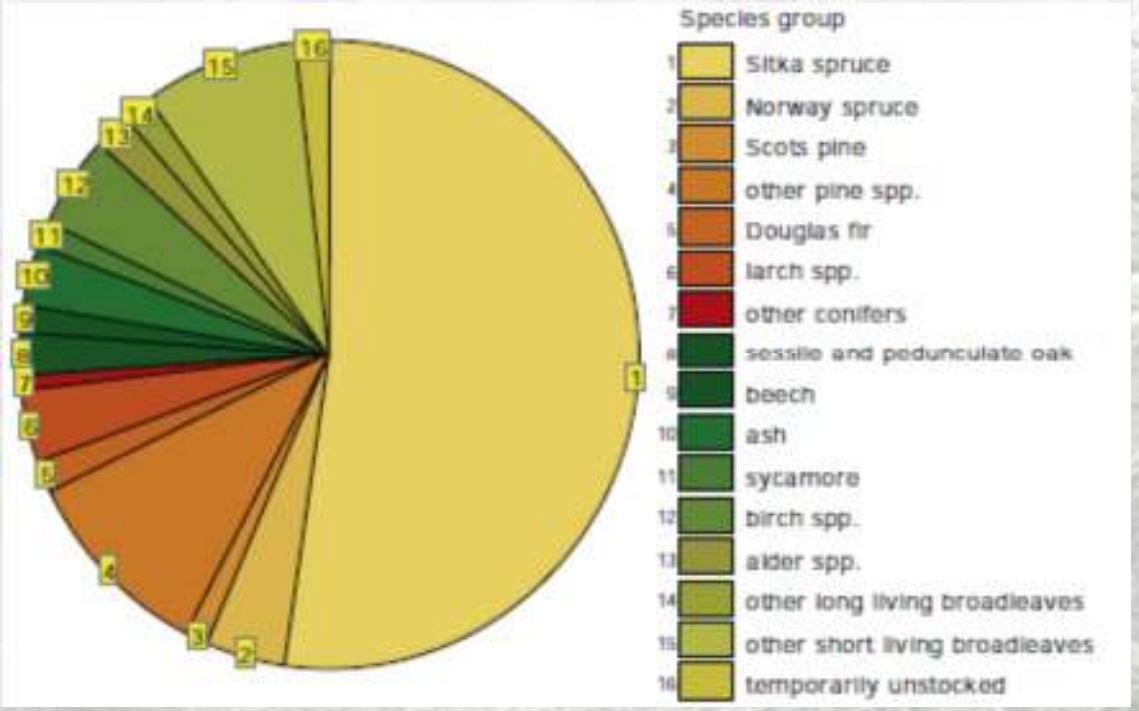

Redmond (2007)

Irish Forests: Soils

Soil type	% of forest estate
Blanket peat	31.5
Gley	26.2
Basin peat	10.7
Podzol	10.6
Brown earth	8.4
Other	12.6

Soil Degradation Risks

- Soil erosion
- Nutrient Depletion / acidification
- Climate Change
- Loss of organic carbon

Soil erosion

Impact of harvesting on solid yield from blanket peatland forest

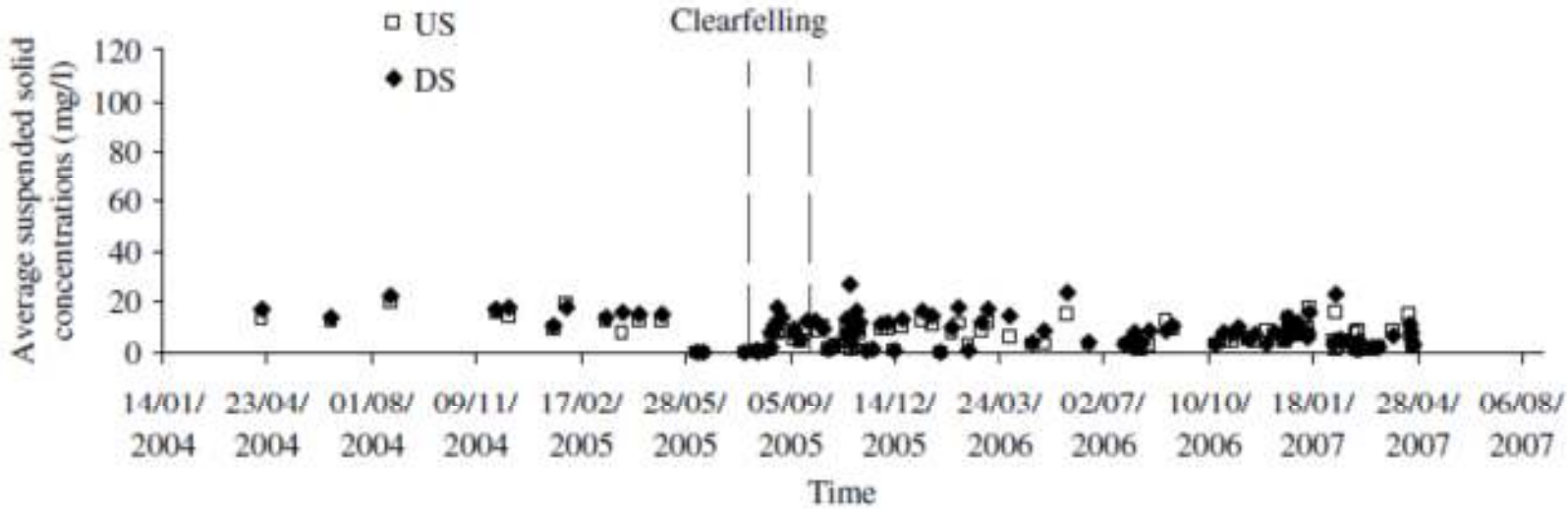

Figure (a) Daily average suspended solid concentrations at US and DS stations before and after harvesting

Solid yields slightly increased after harvesting could be due to the increase in water discharge from the experimental area.

The study indicated that it is possible to prevent the solid concentration increase after harvesting if good management practices are strictly followed. (Rogers et al. 2010)

Soil erosion
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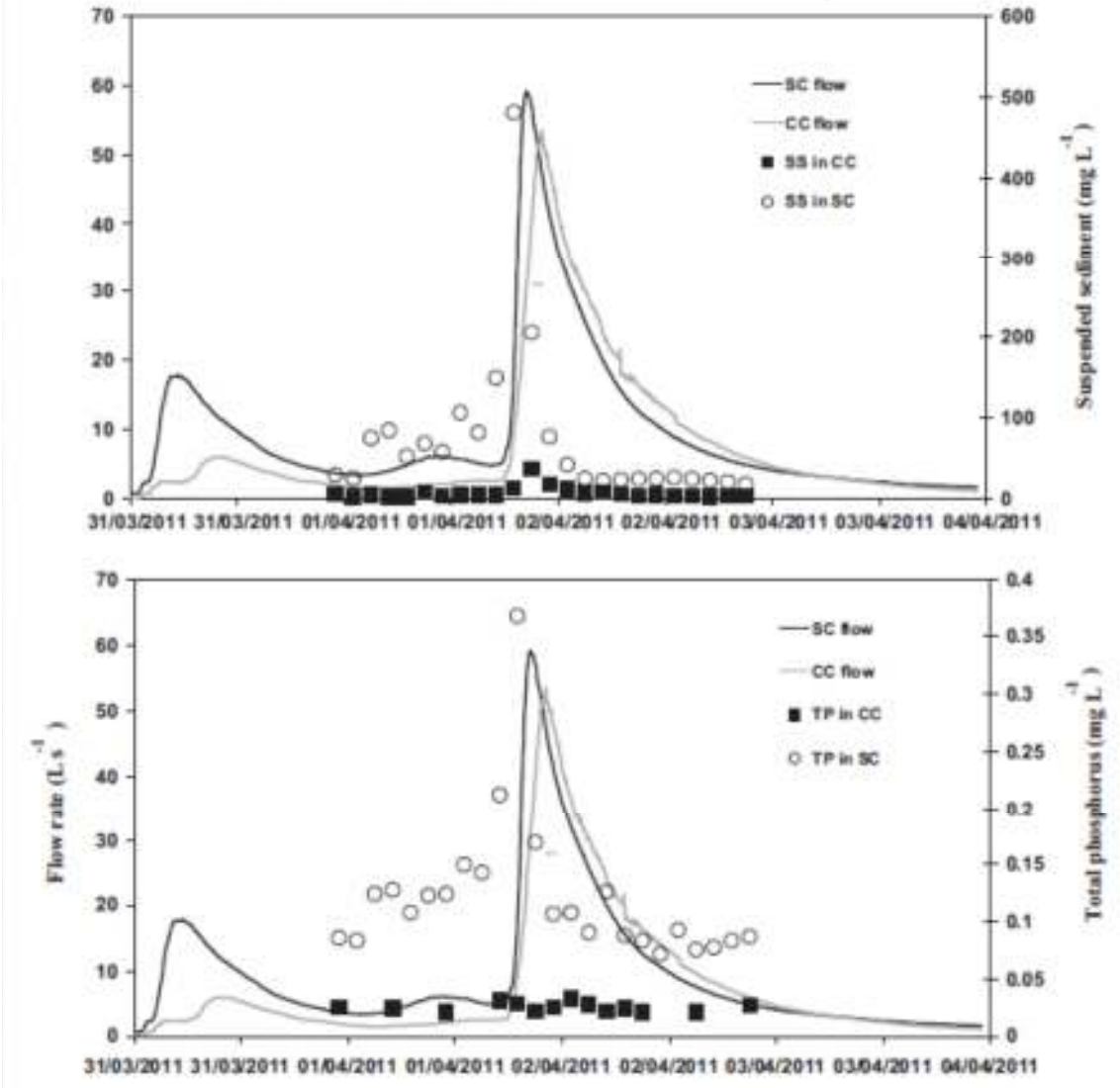

- Suspended solids and total P loss in a storm during clearfelling
- SC = study catchment
- CC = control catchment

- Suspended solids returned to pre felling levels in 6 months

- P is difficult to retain, even with mitigation measures

Finnegan et al. (2014)

Loss of soil nutrients / acidification

- Assumption: conventional forestry is sustainable
- Increasing demand for forest biomass for energy
- Volume of wood from forestry thinnings and forestry residues available for bioenergy will increase from approx. 0.5 million m3 in 2011 to 1.25 m3 in 2030.
- Currently
  - 300,000 t yr^{-1} of chipped logs
  - 25,000 t yr^{-1} of brash bales

Loss of soil nutrients

http://www.ucd.ie/forsite/

Loss of organic carbon

- Ireland has had an active afforestation programme for almost a century
- 299,738 ha since 1990
- Potential for soil carbon storage
- But 53% of forests are on peat……
- 26% are on gleys, some have C rich surface horizons…..

Peatland Forests

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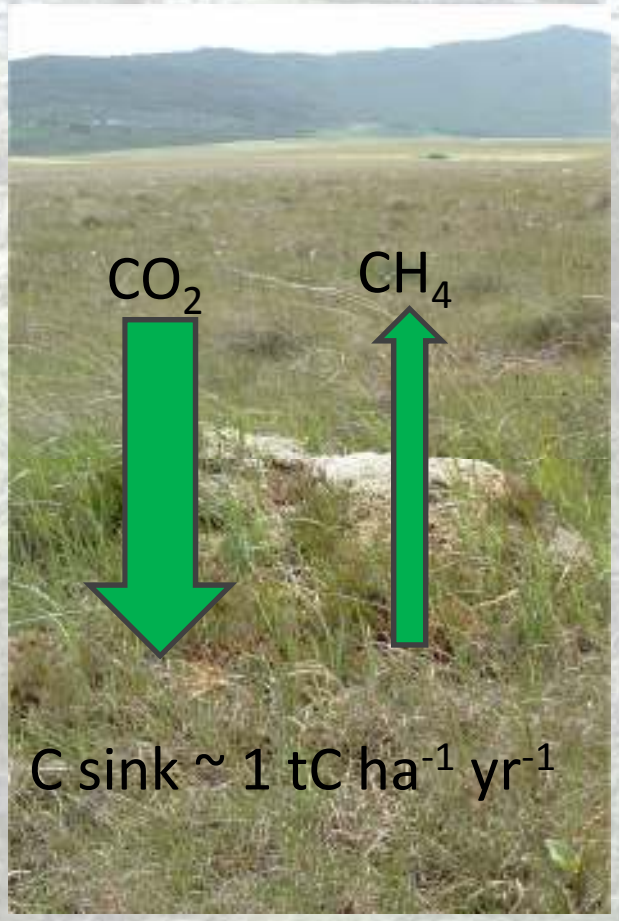

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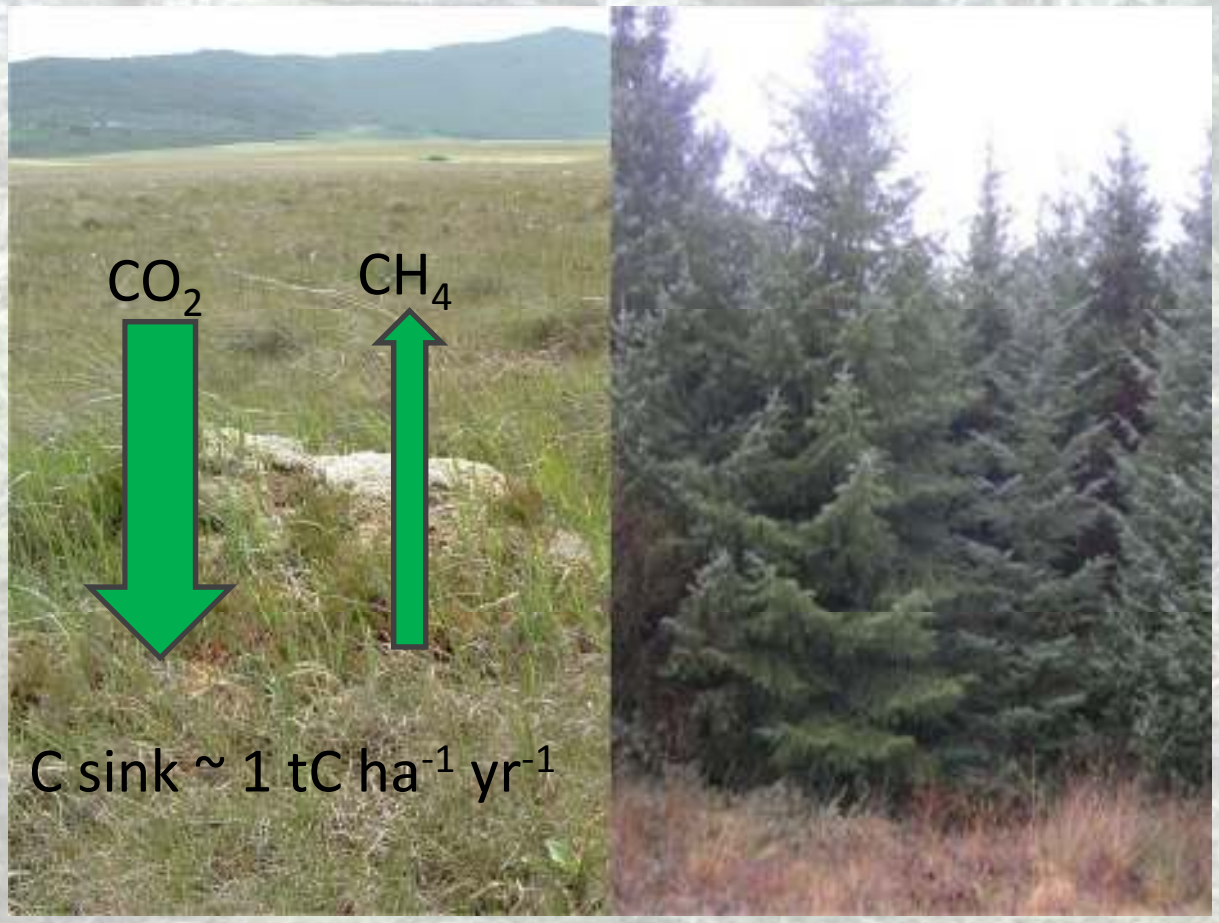

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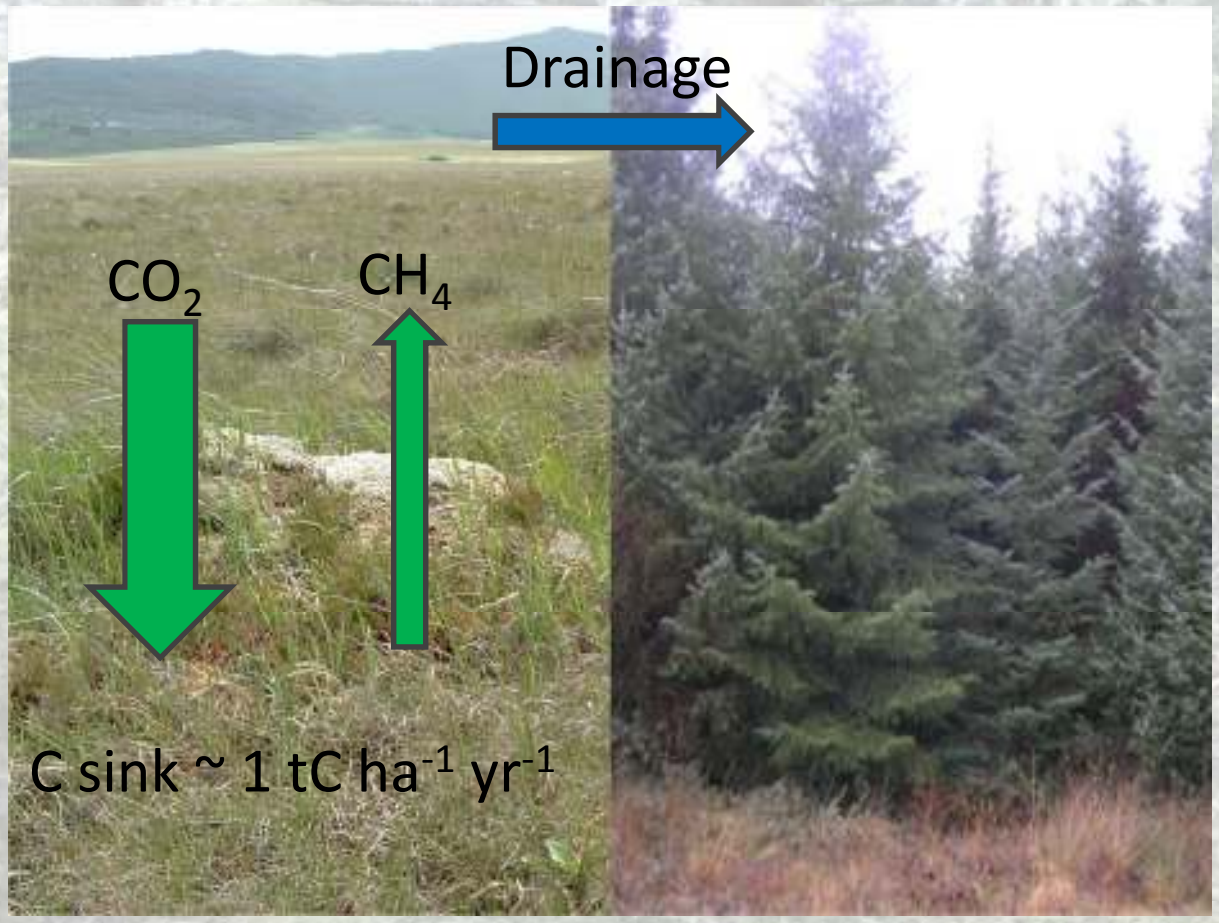

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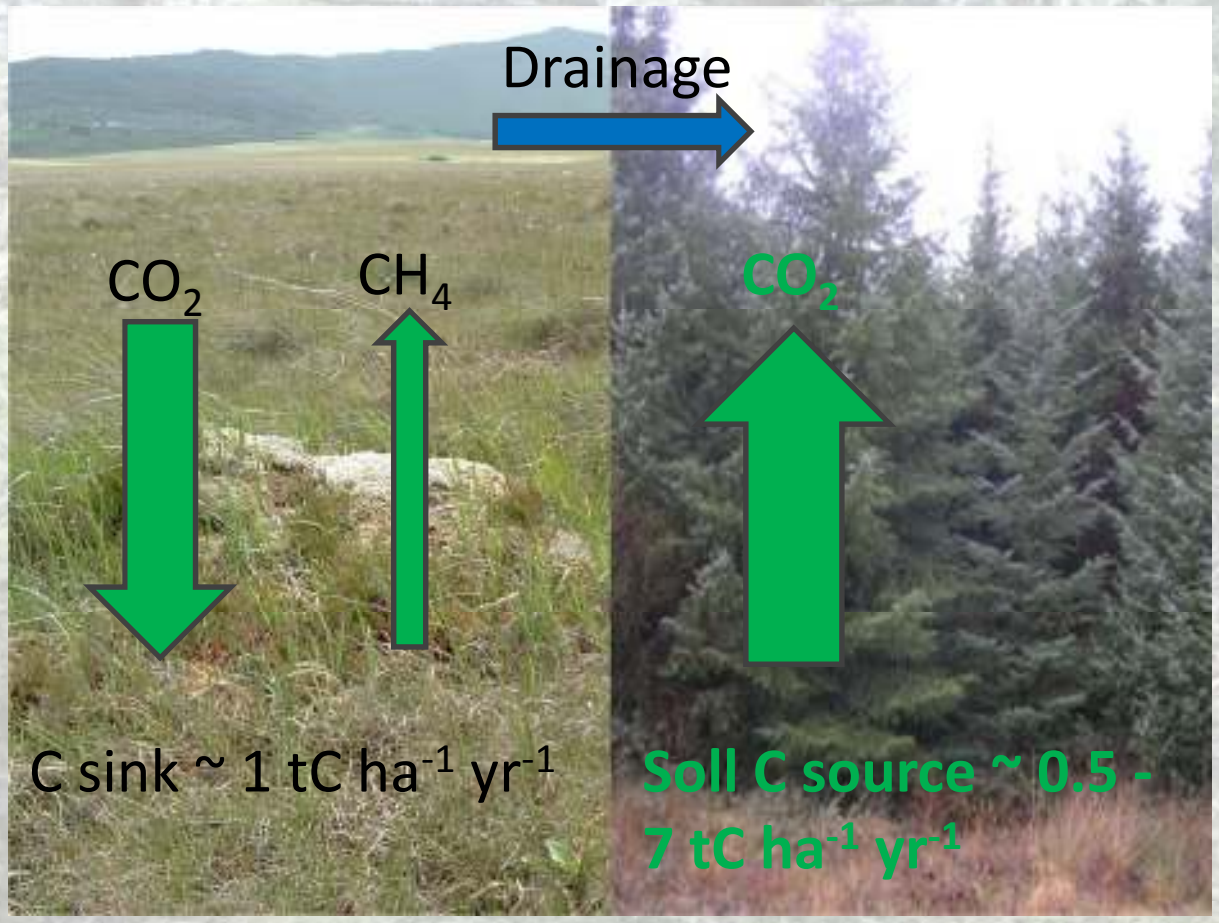

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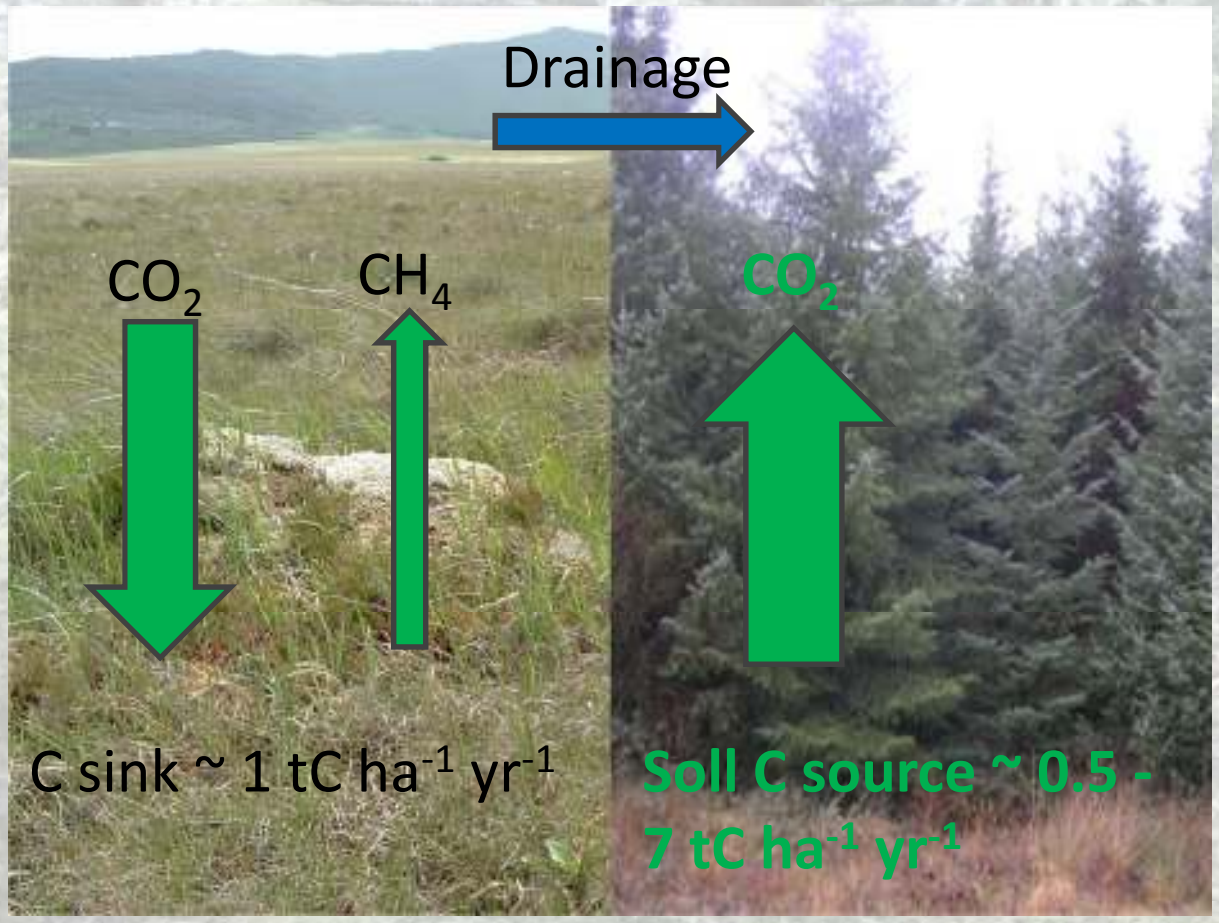

20% of peatland forests (64,548 ha) are uneconomic and unsustainable (Tiernan 2008)

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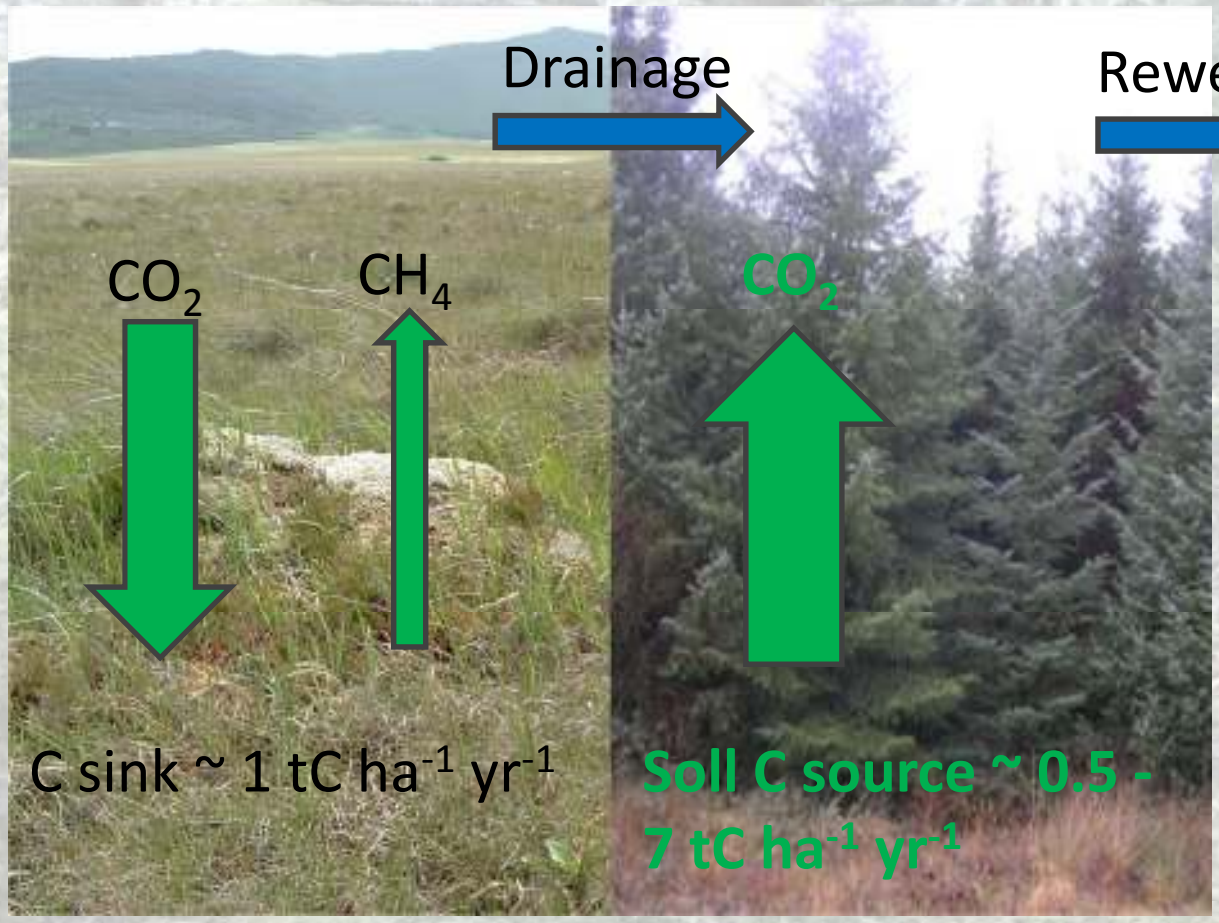

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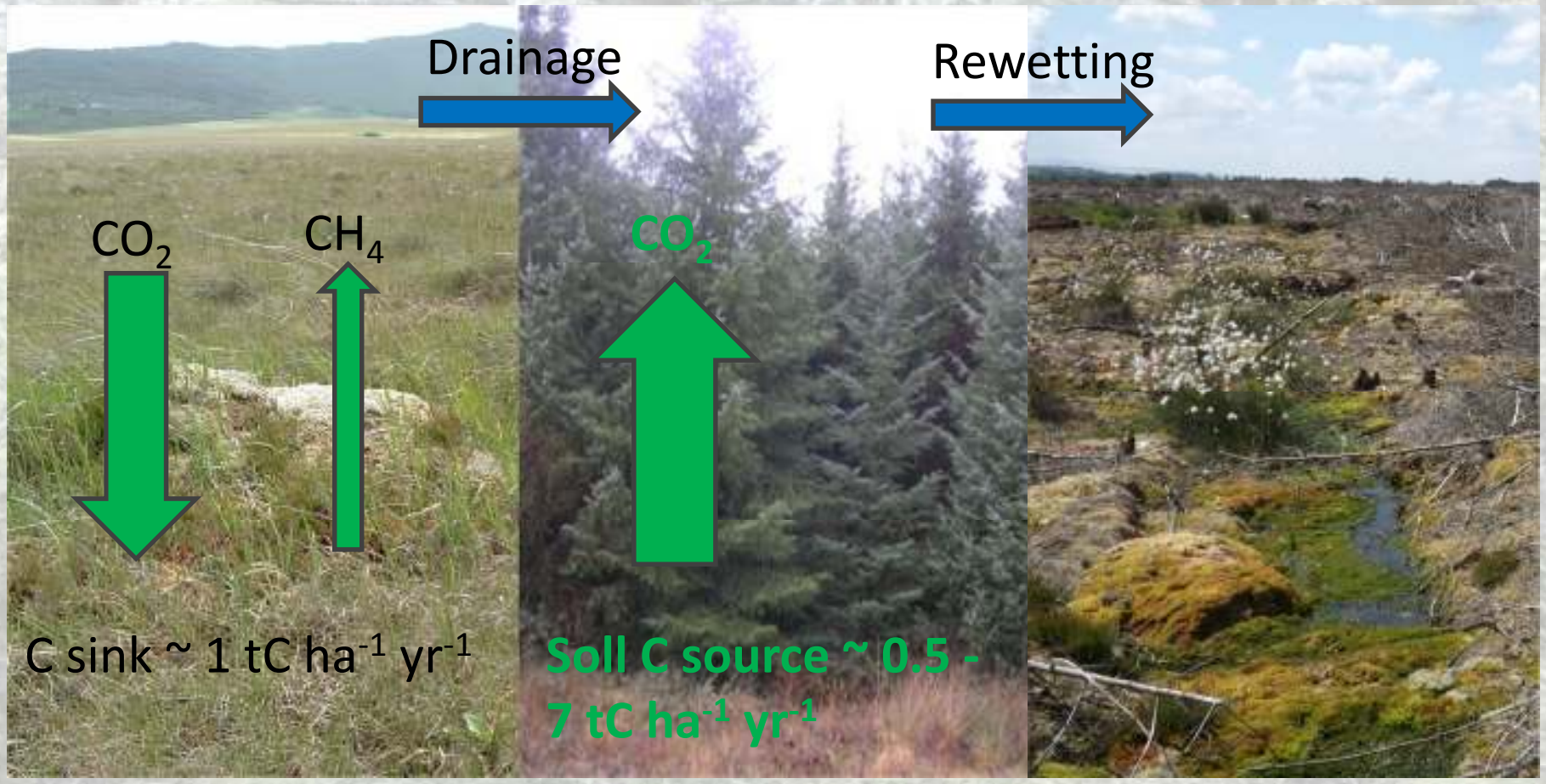

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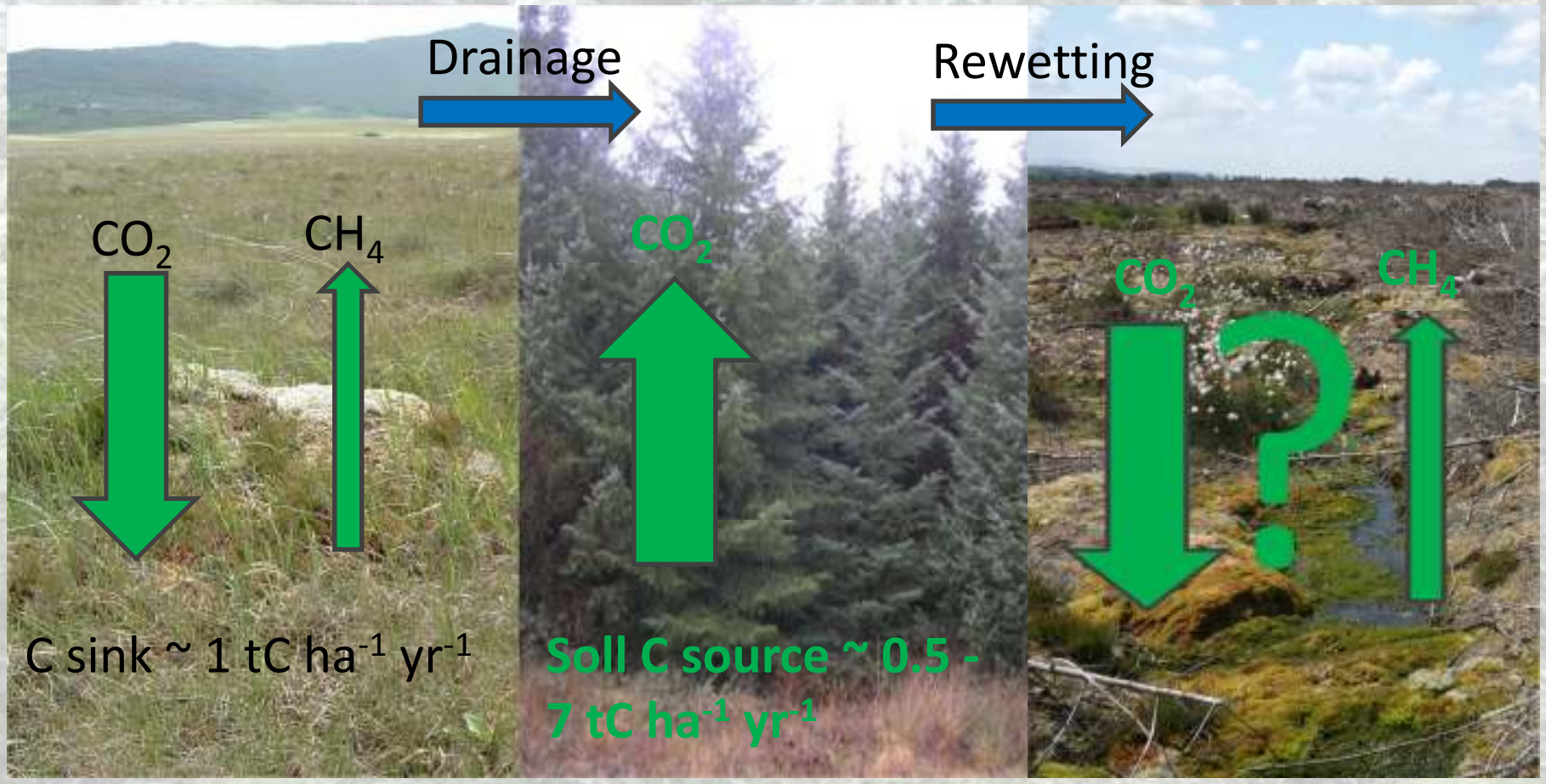

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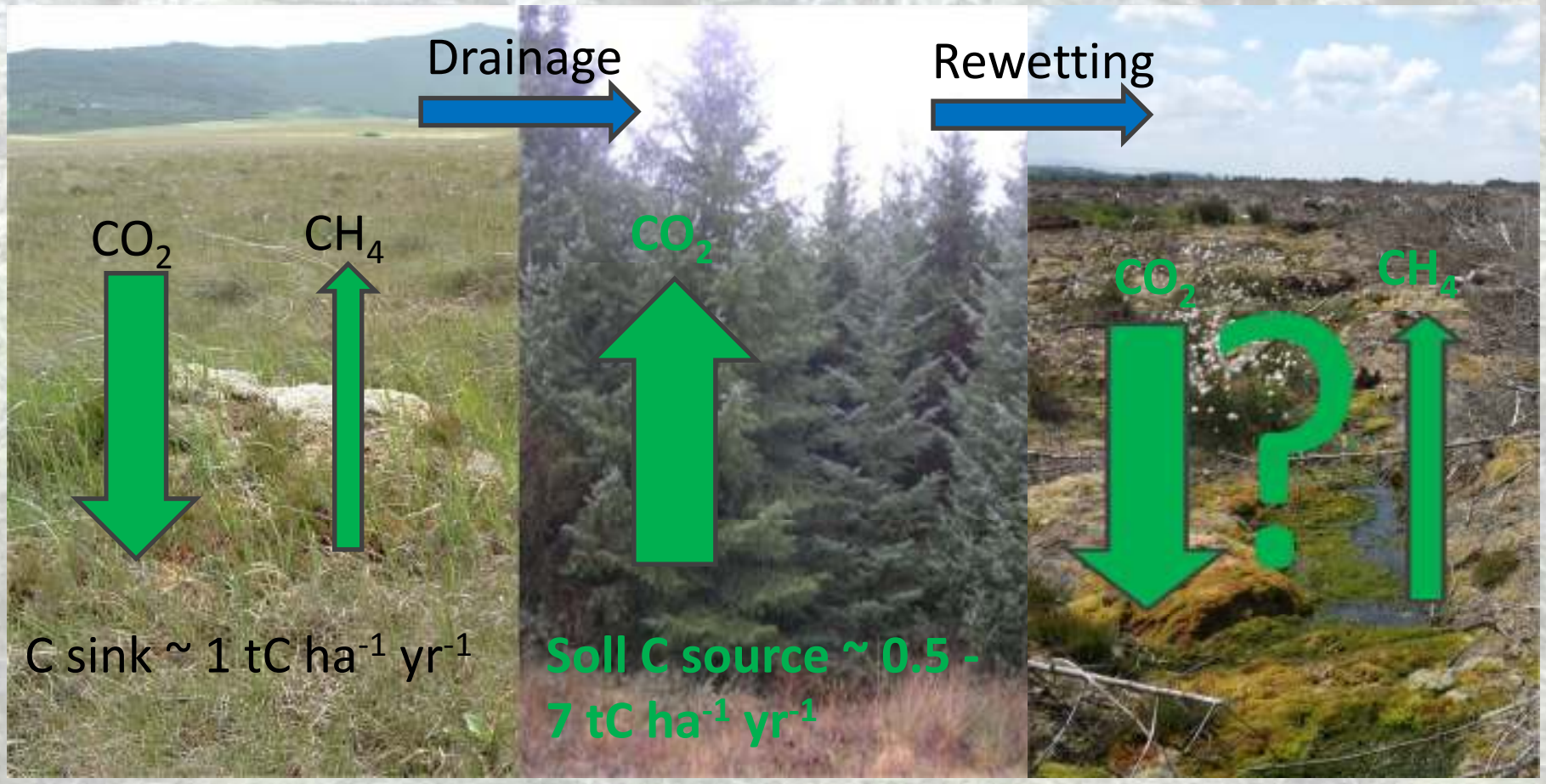

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3,100 ha rewetted to date

Climate Change

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