Trees & Woods
some 'shifting baselines'

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'Shifting baseline syndrome'

'Shifting baselines' is an incremental lowering of standards, in which each new generation:

- redefines what is normal, according to personal experience.
- lacks knowledge of how the environment used to be.
- sets the stage for the next generation's shifting baseline.

…….So lets explore this by asking ourselves a couple of questions…..

…..what should a tree even look like?

…..and what is a 'woodland' anyway?

What should a tree even look like?

Shifting baseline example #1

Tree decorations

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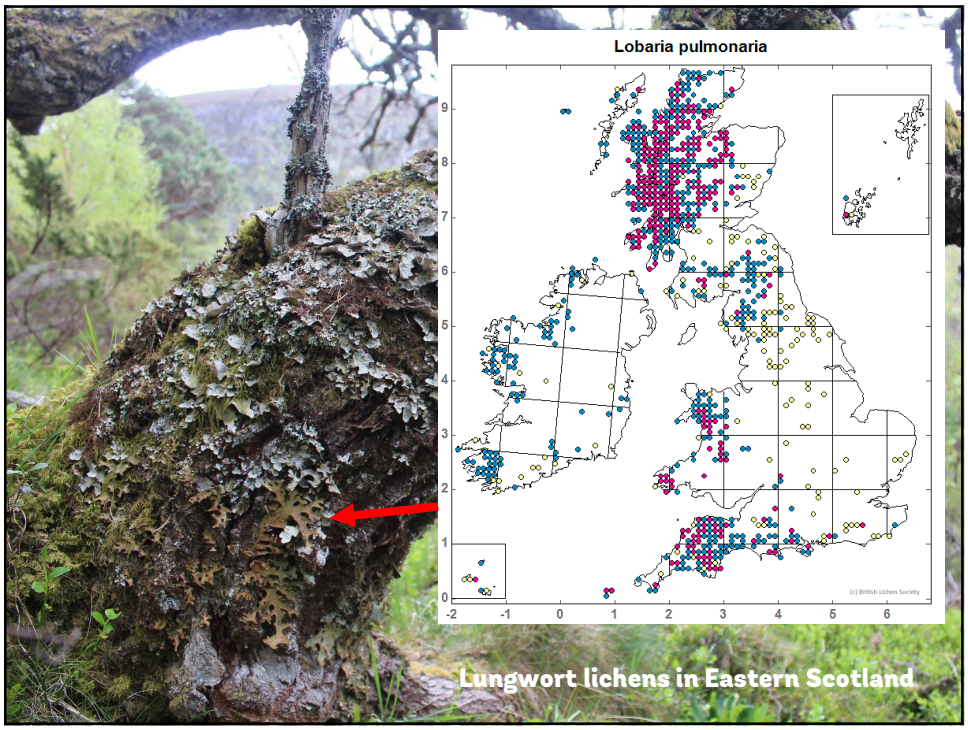
Oak canopy, Dartmoor


Lobaria pulmonaria
Lungwort lichens in Eastern Scotland


Beard lichens in
southern England


GARTH.
'Hoar Trees'

Lichens – tree decorations and early-warning systems.

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- Lichens are powerful indicators for monitoring air pollution impacts.
- Most woodland lichens evolved and developed in naturally low levels of atmospheric nitrogen and are highly sensitive to change.
- Geography, historical management etc. do all influence – but western extremities also suffered least air pollution historically.
- Lichens on trees provide resources for animals and & wider ecosystem services, for example in carbon cycling, water retention[14], and medicine[22].

14 Esseen et al. (2017). Externally held water – a key factor for hair lichens in forest canopies. Fungal Ecology 30 (2017), 29-38.
22 Johnson et al. (2011). Degradation of Prion Protein by a Serine Protease from Lobaria. PLoS ONE 6(5).

Air Pollution in UK – What's changed?

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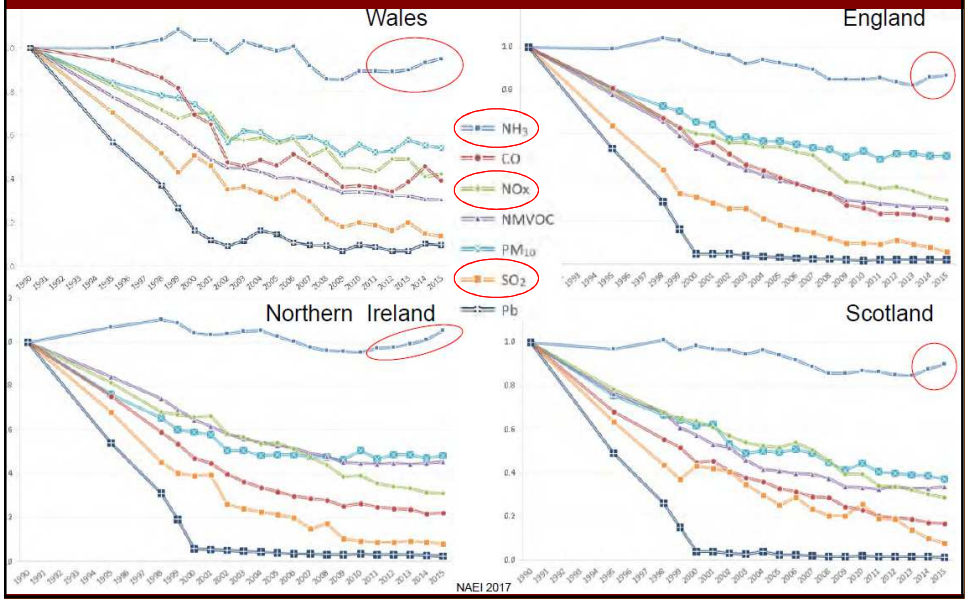
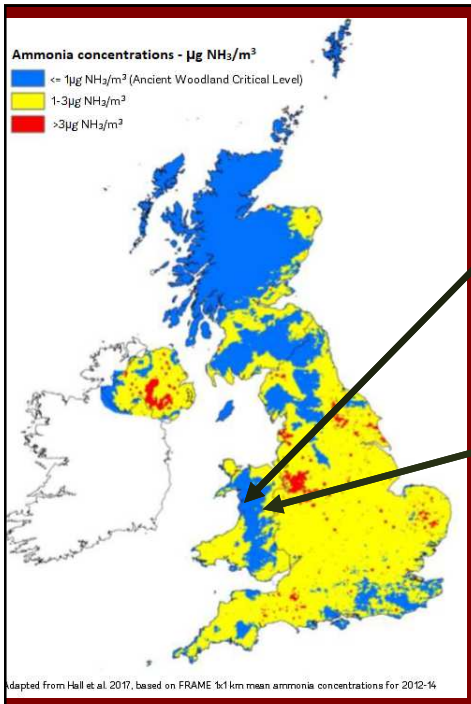




Twig Comparisons

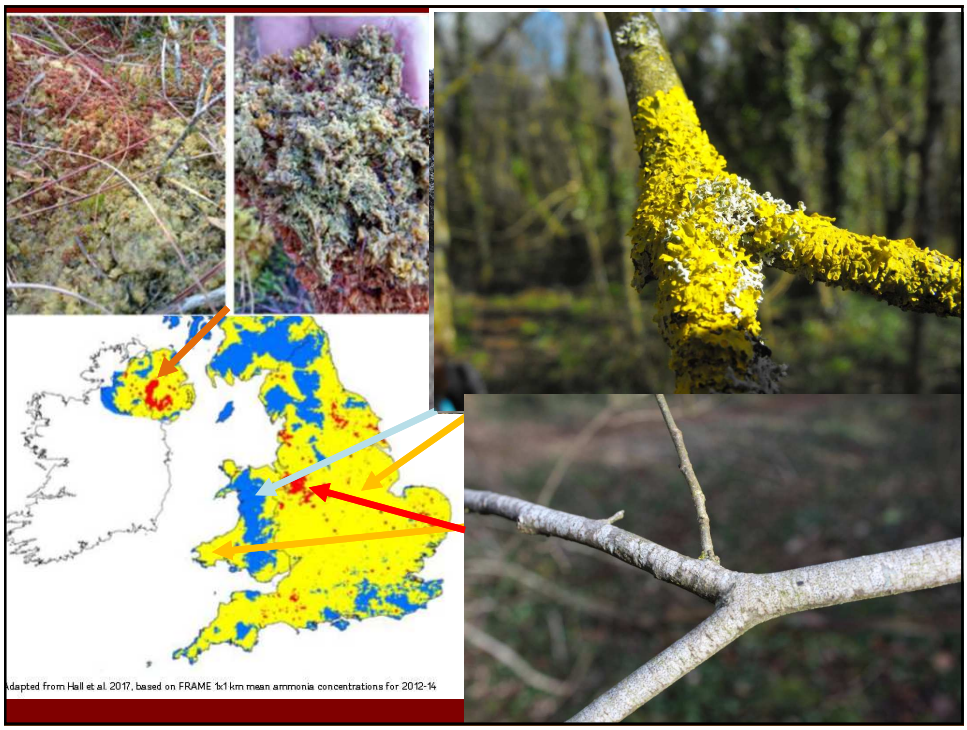
Site 1 – Oak twigs from relatively clean air site near Cadair Idris

Background ammonia = 0.65 µg m-3

Site 2 – Oak twigs from central Powys.

Background ammonia = 1.43 µg m-3

Critical Level = 1 µg m-3
(100% threshold for AW)



Acleris literana (a tortrix moth)

An inhabitant of oak woodlands, where larvae feed on oak leaves spun together with silk.

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What should a tree even look like?

Shifting baseline example #2

Sick and stressed trees

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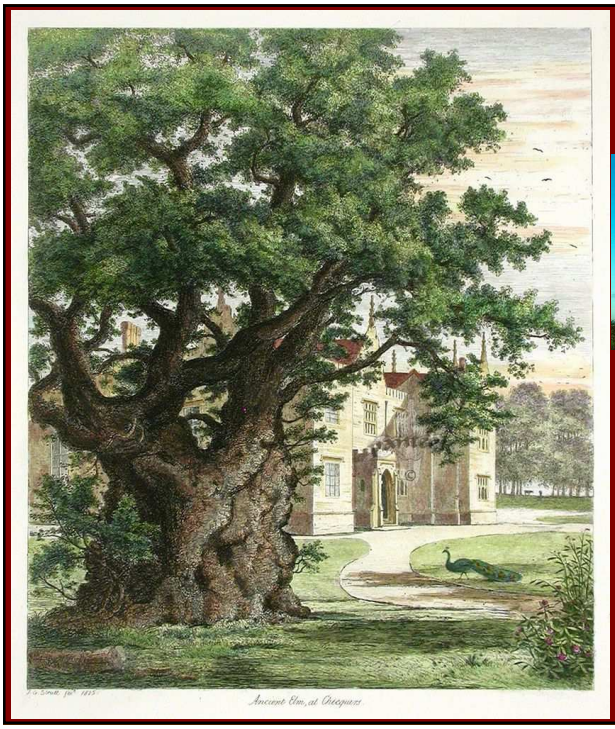

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Ancient Elm at Chequers, Bucks in 1825 – Jacob George Strutt (Sylva Britannica)

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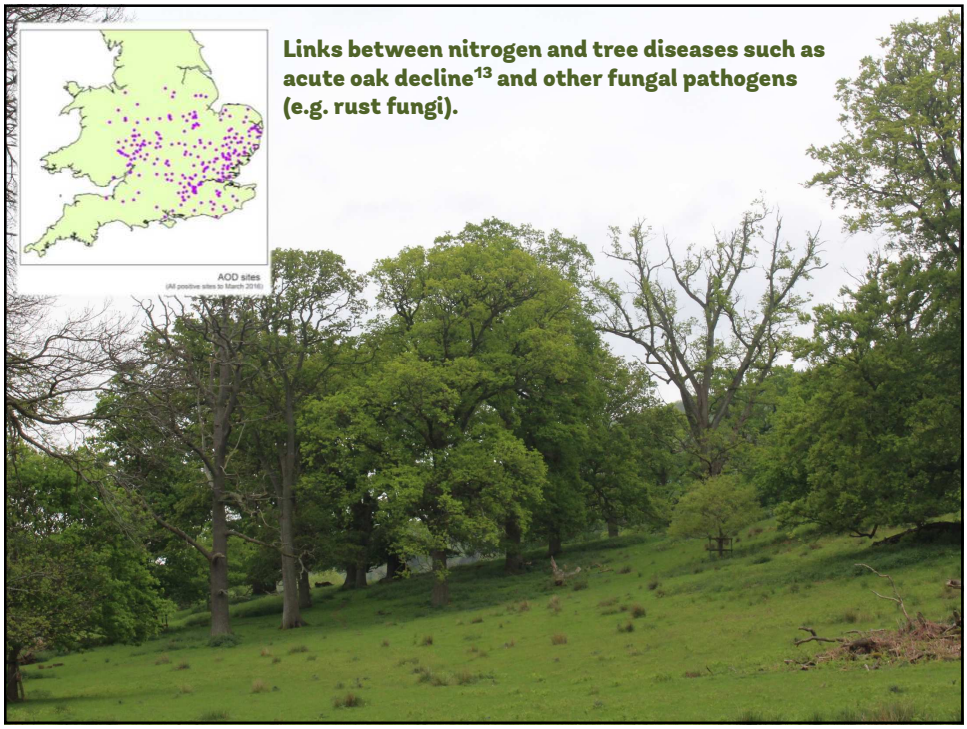
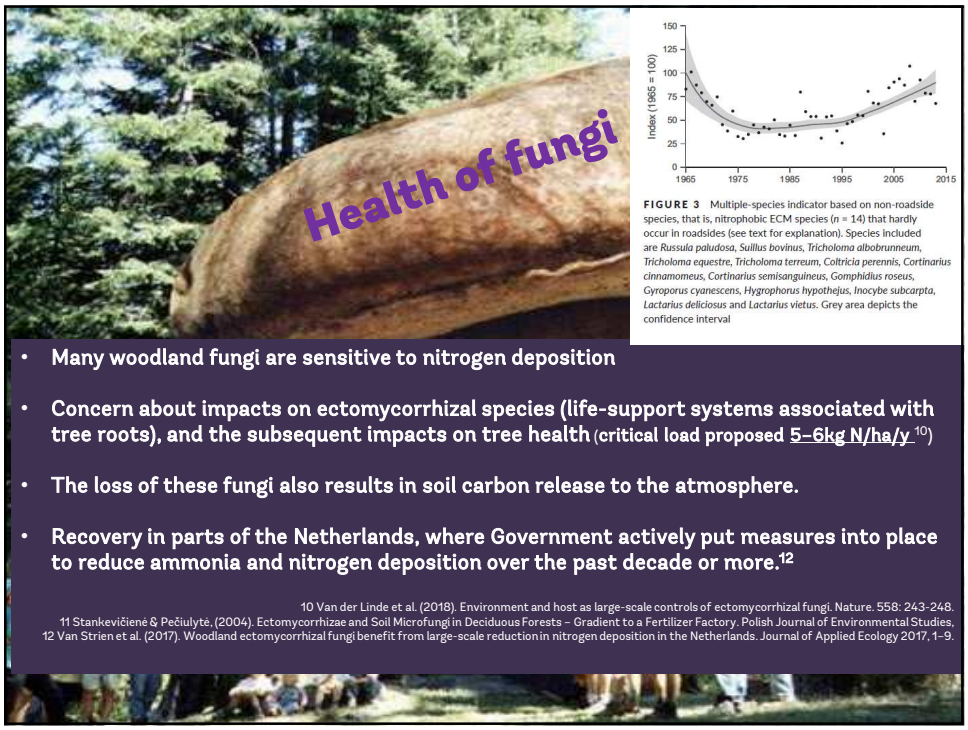
Ancient ash in Montgomeryshire


Links between nitrogen and tree diseases such as acute oak decline[13] and other fungal pathogens (e.g. rust fungi).
AOD sites


Health of fungi
Index (1965 = 100)
150
125
100
75
50
25
0
1965
1975
1985
1995
2005
2015
FIGURE 3 Multiple-species indicator based on non-roadside species, that is, nitrophobic ECM species (n = 14) that hardly occur in roadsides (see text for explanation). Species included are Russula paludosa, Suillus bovinus, Tricholoma albobrunneum, Tricholoma equestre, Tricholoma terreum, Coltricia perennis, Cortinarius cinnamomeus, Cortinarius semisanguineus, Gomphidius roseus, Gyroporus cyanescens, Hygrophorus hypothejus, Inocybe subcarpta, Lactarius deliciosus and Lactarius vietus. Grey area depicts the confidence interval
• Many woodland fungi are sensitive to nitrogen deposition
• Concern about impacts on ectomycorrhizal species (life-support systems associated with tree roots), and the subsequent impacts on tree health (critical load proposed 5–6kg N/ha/y [10])
• The loss of these fungi also results in soil carbon release to the atmosphere.
• Recovery in parts of the Netherlands, where Government actively put measures into place to reduce ammonia and nitrogen deposition over the past decade or more.[12]
10 Van der Linde et al. (2018). Environment and host as large-scale controls of ectomycorrhizal fungi. Nature. 558: 243-248.
11 Stankevičienė & Pečiulytė, (2004). Ectomycorrhizae and Soil Microfungi in Deciduous Forests – Gradient to a Fertilizer Factory. Polish Journal of Environmental Studies,
12 Van Strien et al. (2017). Woodland ectomycorrhizal fungi benefit from large-scale reduction in nitrogen deposition in the Netherlands. Journal of Applied Ecology 2017, 1–9.

Nutritional health

- Alarming deterioration in the mineral nutrition of European trees.
- Linked to carbon dioxide and nitrogen deposition increases, with consequences for ecosystem functioning and climate-change response.[21]

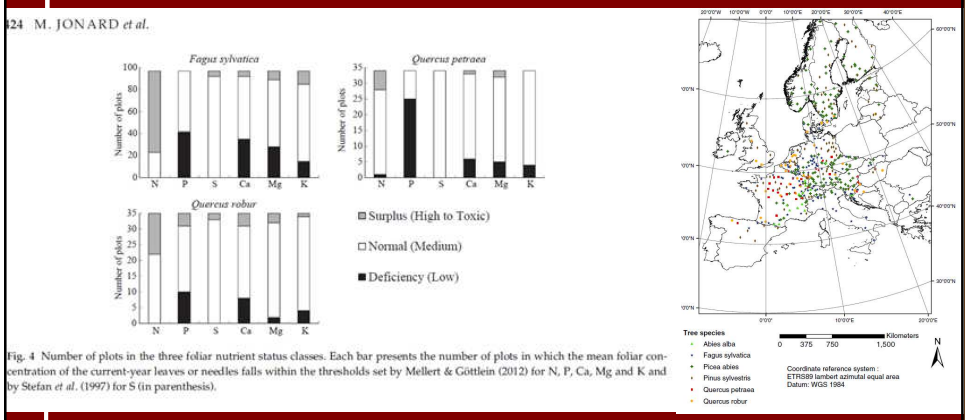


Fig. 4 Number of plots in the three foliar nutrient status classes. Each bar presents the number of plots in which the mean foliar concentration of the current-year leaves or needles falls within the thresholds set by Mellert & Göttlein (2012) for N, P, Ca, Mg and K and by Stefan *et al.* (1997) for S (in parenthesis).

21 Jonard et al. (2018). Tree mineral nutrition is deteriorating in Europe. Global Change Biology (2015), 21, 418–430.

What is a woodland anyway?

Shifting baselines example #1

Where are the old-growth characteristics?

Firstly, what do I mean by old-growth characteristics?

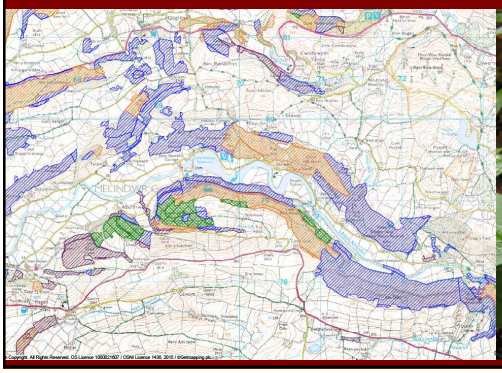
- An abundance of trees that have veteran characteristics, those that are ancient in age (megaflora), and are living out their natural lifespans.
- Volumes of large and coarse decaying woody debris as both fallen and a significant proportion of standing snags.
- The complexity and continuity of these features and their microhabitats is also an important factor in determining the richest old-growth woods.

But what about Ancient Woodland?

A concept - "Ancient woodlands are those that have persisted since the Middle Ages…

"A threshold date of 1600 (1750 in Scotland) used to distinguish between ancient woodland and more recent secondary woodland."

Enshrined in policy, with maps/inventories.




Ancient woodland


Ancient woodland


Approx. 50% of UK's
remaining Ancient Woodland


Ancient woodland


Ancient woodland, with old-growth characteristics
(with megaflora)


Ancient woodland, with old-growth characteristics

What is a woodland anyway?

Shifting baseline example #2

Language / Land-use

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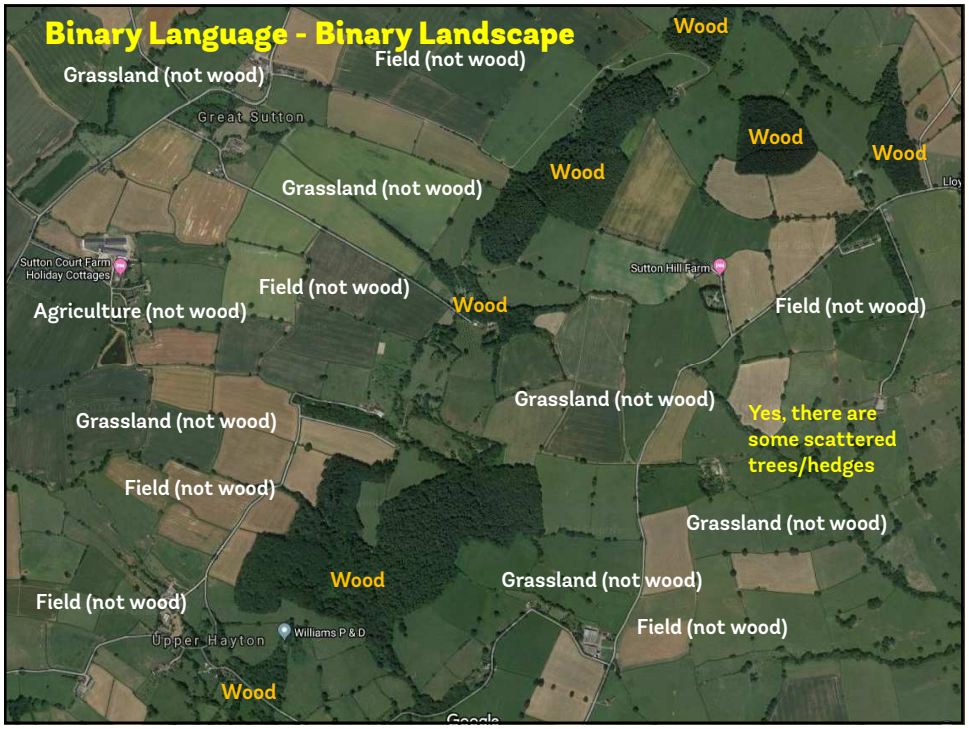
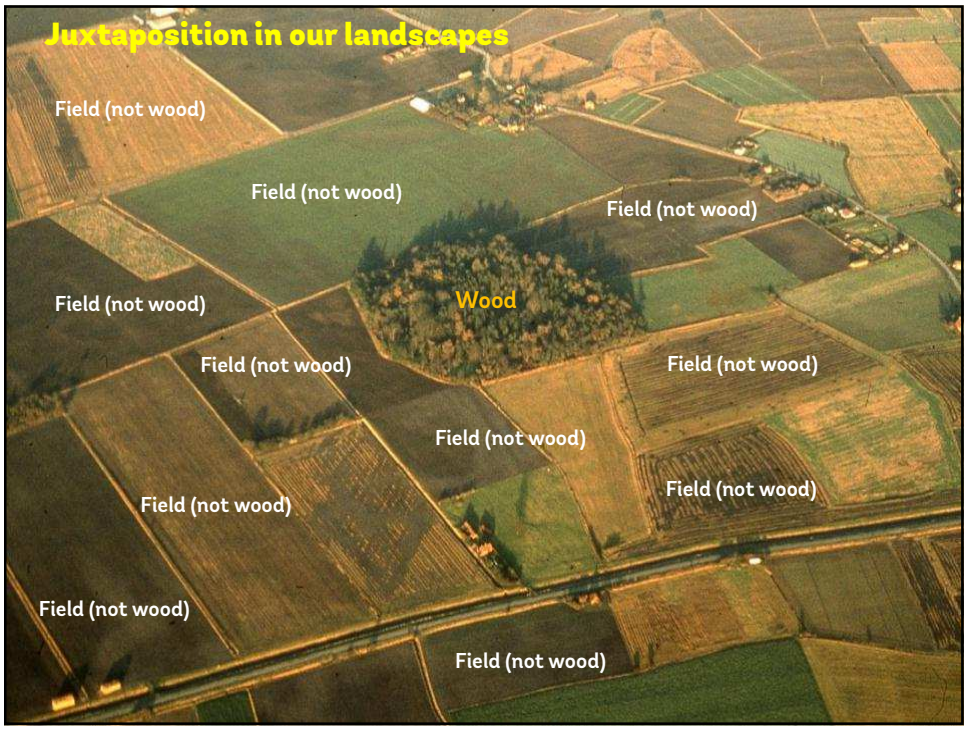
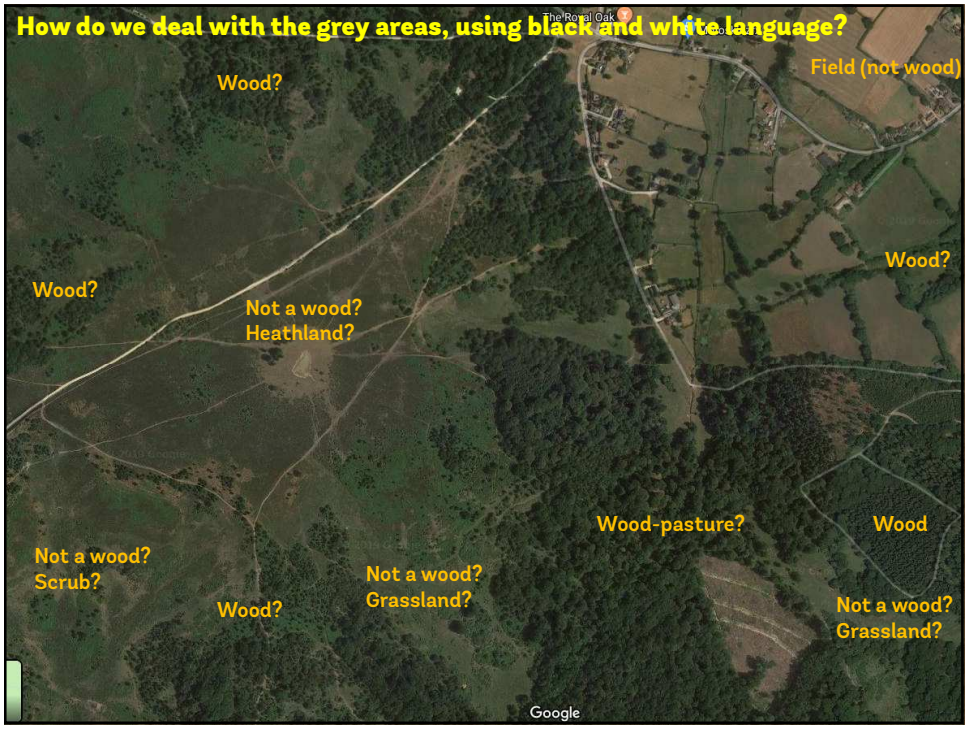
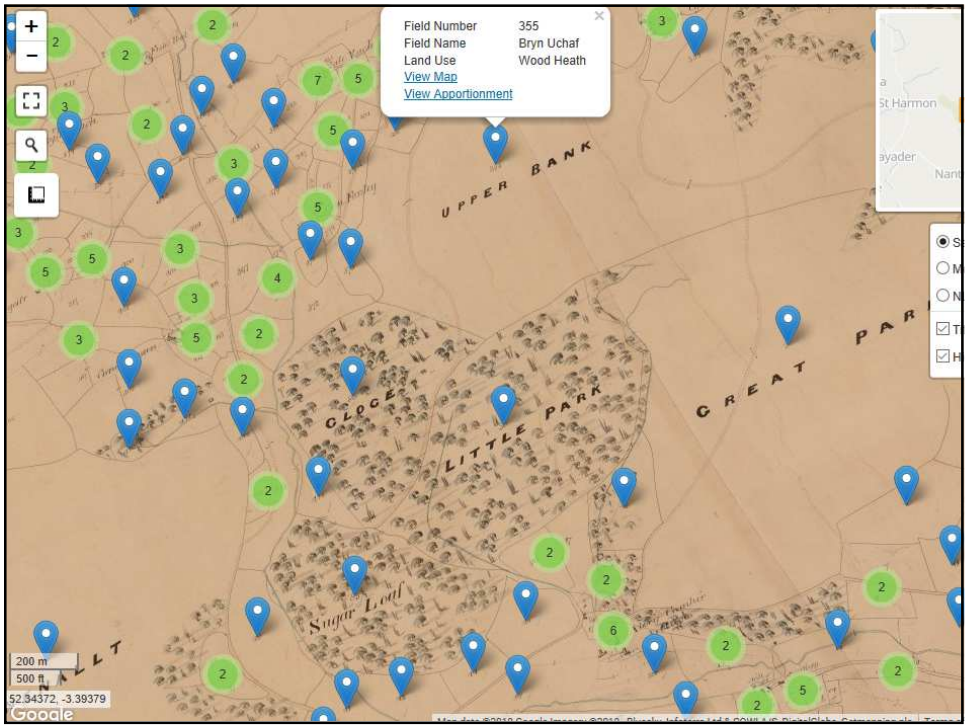

Binary Language - Binary Landscape
Wood
Field (not wood)
Grassland (not wood)
Great Sutton
Wood
Wood
Wood
Grassland (not wood)
Sutton Court Farm Holiday Cottages
Sutton Hill Farm
Field (not wood)
Wood
Field (not wood)
Agriculture (not wood)
Grassland (not wood)
Yes, there are some scattered trees/hedges
Grassland (not wood)
Field (not wood)
Grassland (not wood)
Wood
Grassland (not wood)
Field (not wood)
Field (not wood)
Upper Hayton
Williams P & D
Wood


Juxtaposition in our landscapes
Field (not wood)
Field (not wood)
Field (not wood)
Field (not wood)
Wood
Field (not wood)
Field (not wood)
Field (not wood)
Field (not wood)
Field (not wood)
Field (not wood)
Field (not wood)


How do we deal with the grey areas, using black and white language?
Wood?
Field (not wood)
Wood?
Wood?
Not a wood?
Heathland?
Wood-pasture?
Wood
Not a wood?
Scrub?
Not a wood?
Grassland?
Wood?
Not a wood?
Grassland?
Google

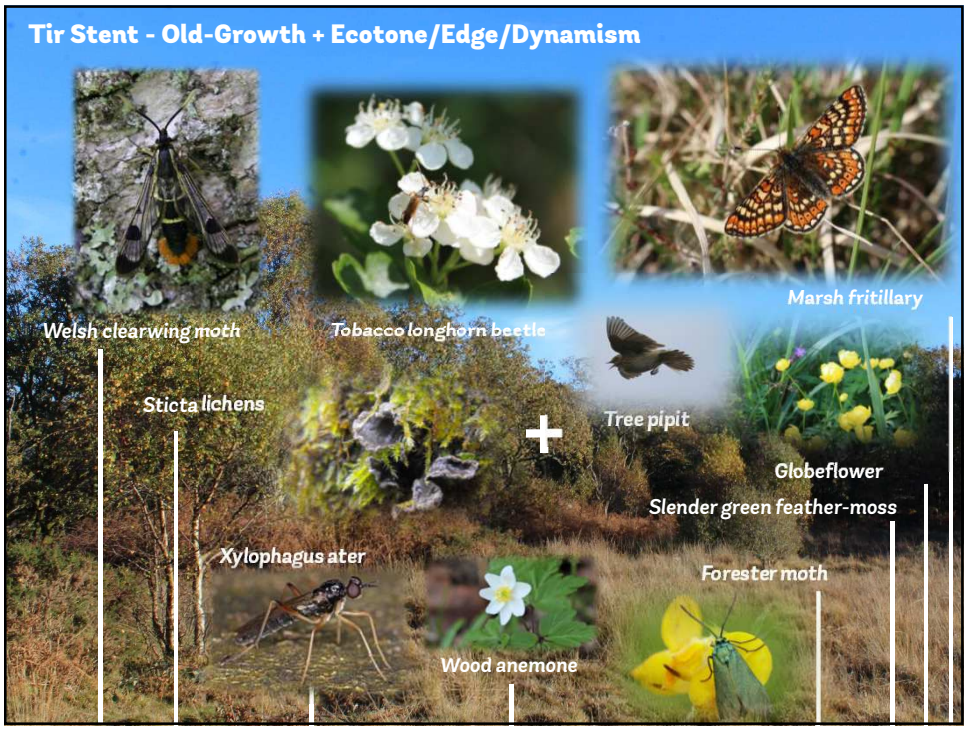

Field Number 355
Field Name Bryn Uchaf
Land Use Wood Heath
View Map
View Apportionment
UPPER BANK
GLOGER
LITTLE PARK
GREAT PAR
Sugar Loaf
200 m
500 ft
52.34372, -3.39379
Google

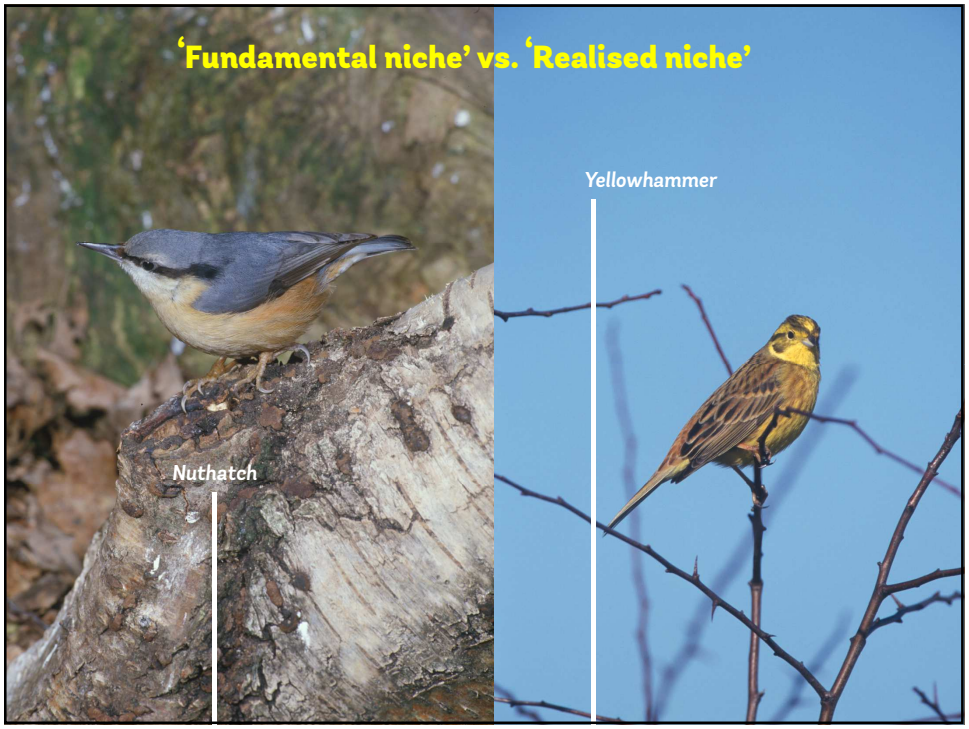

'Ffridd' - Aber Valley, near Bangor


Mynydd Llysiau near Crickhowell

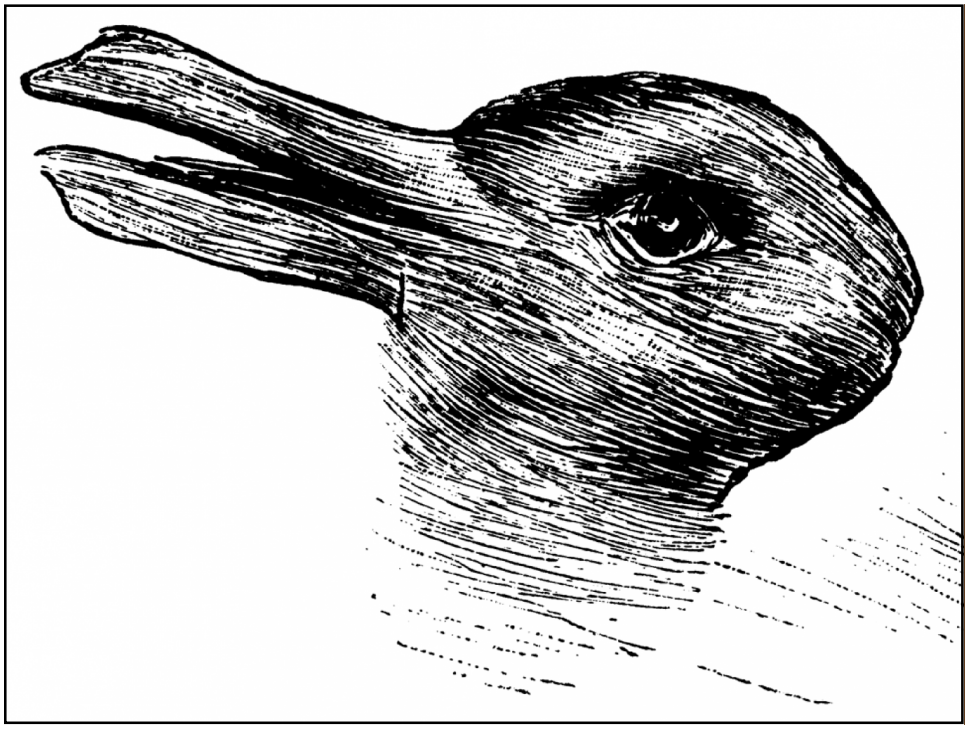

Tir Stent, Meirionnydd

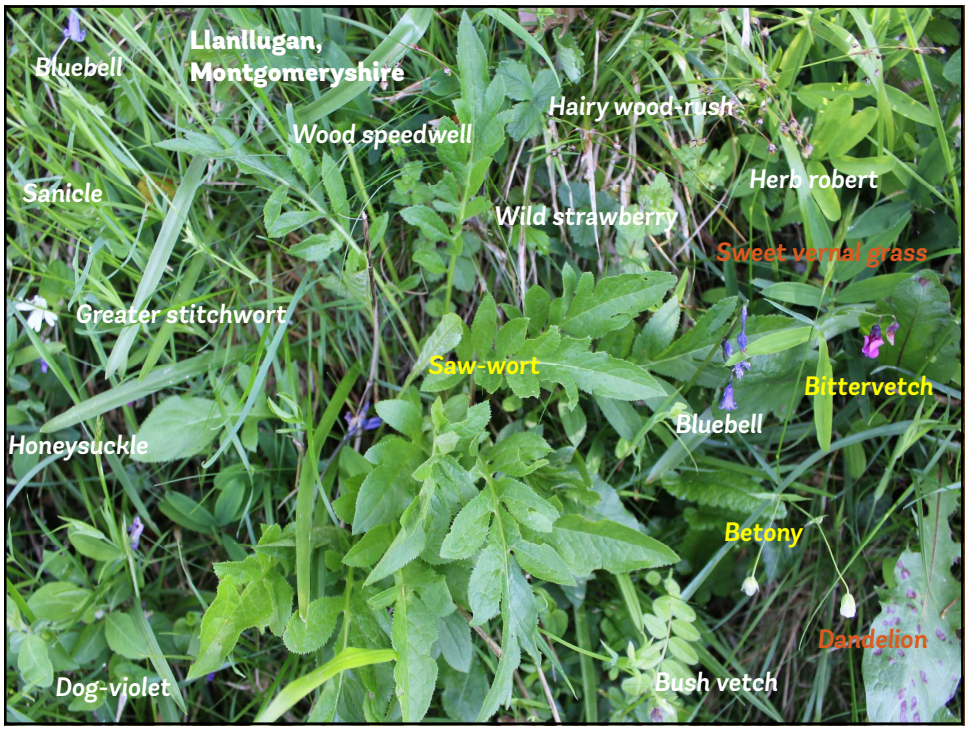

256m

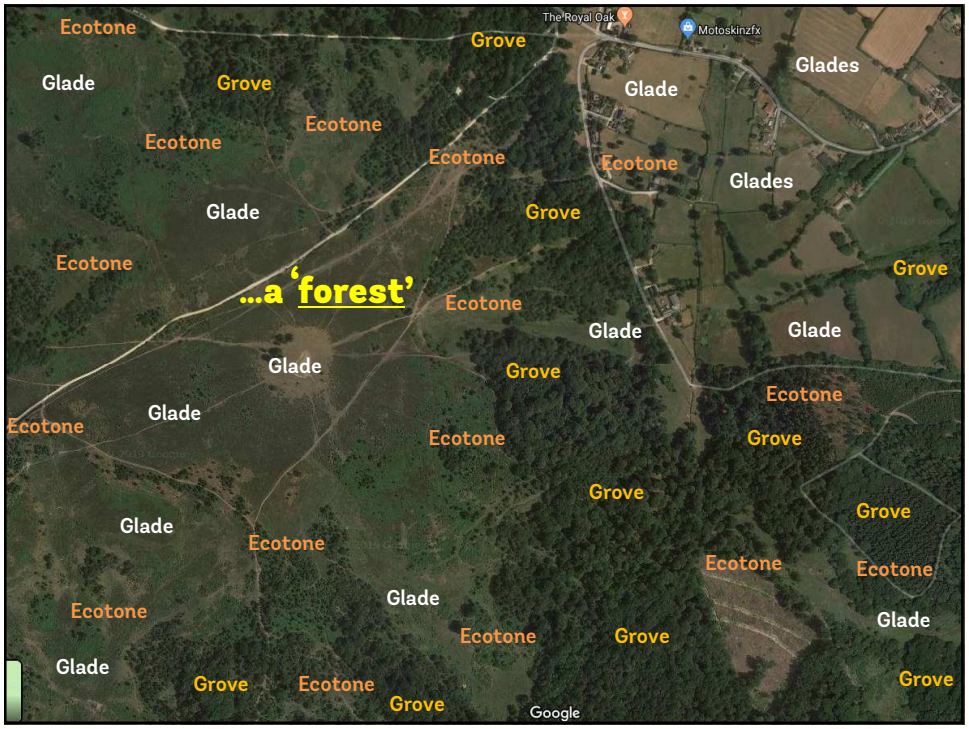

Tir Stent - Old-Growth + Ecotone/Edge/Dynamism
Welsh clearwing moth
Tobacco longhorn beetle
Marsh fritillary
Sticta lichens
Tree pipit
Globeflower
Slender green feather-moss
Xylophagus ater
Forester moth
Wood anemone


'Fundamental niche' vs. 'Realised niche'
Yellowhammer
Nuthatch


Pinewood mason bee




Llanllugan,
Montgomeryshire
Bluebell
Hairy wood-rush
Wood speedwell
Herb robert
Sanicle
Wild strawberry
Sweet vernal grass
Greater stitchwort
Saw-wort
Bittervetch
Bluebell
Honeysuckle
Betony
Dandelion
Dog-violet
Bush vetch


Ecotone
Grove
Glade
Grove
Ecotone
Ecotone
Ecotone
Ecotone
Glade
Glades
Glade
Grove
Glades
Ecotone
...a 'forest'
Ecotone
Glade
Glade
Grove
Grove
Glade
Grove
Ecotone
Ecotone
Ecotone
Grove
Grove
Glade
Ecotone
Grove
Ecotone
Ecotone
Glade
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Ecotone
Grove
Glade
Grove
Ecotone
Grove
Google


Glade
Google

...a heap of sand

'Heaps' can exist, but they are heaps of stuff that aren't them.

In trees we recognise distinct individuals, and woods themselves often have their own personality or name. But today, that name often relates to a place on a map, where 'woodland' and 'non-woodland' are separated -the reality is more complex (Firth 2017, the woods of Morvern).

...the whole (a wood) is *less* than the sum of its parts

Thank you for listening

Ancient Woodland Restoration
Ammonia Impacts
woodlandtrust.org.uk/publications

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