

Introducing trees to agricultural landscapes – economic and ecological benefits

Kate Holl and Cécile Smith



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Why agroforestry?

We are living on the inheritance from forest soils

Only 100 harvests left in UK farm soils, scientists warn



The UK only has 100 harvests left in its soil due to intensi



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NEWS

SOIL FAILS CLIMATE CHALLENGE

Long-term field experiments at Rothamsted Research, dating back as far as 1843, prove that modern carbon emissions cannot be locked in the ground to halt global warming.

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Why agroforestry?

It's all about resilience...

BUSINESS / FARMING

Straw shortage means premium pricing to stay

by Gemma Mackenzie ⌚ August 16, 2018, 4:06 pm



Picture by SANDY McCOOK 29th September '17 Following a very wet harvest, Alan Mathieson of Ardgay collects straw bales from Fearn in Easter Ross.

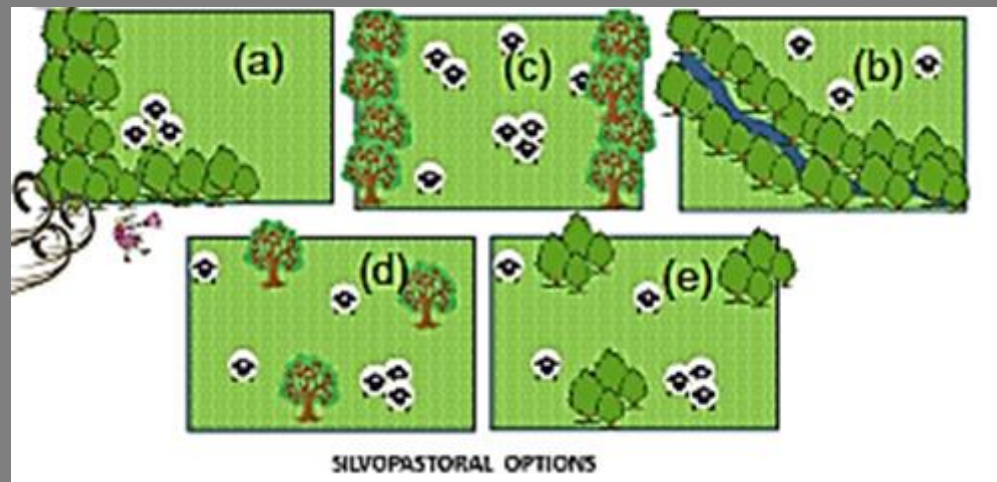
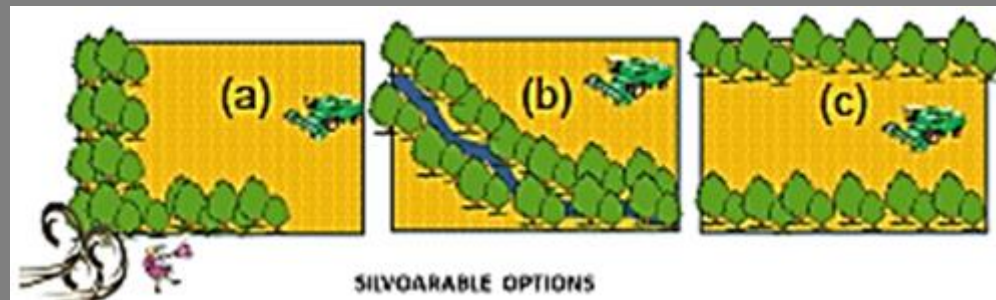
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THE
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What is agroforestry?

It's about integrating trees into agricultural landscapes



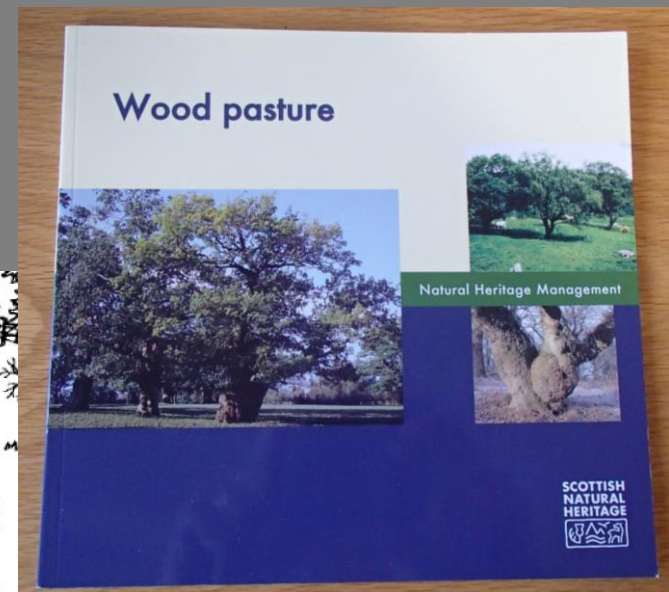
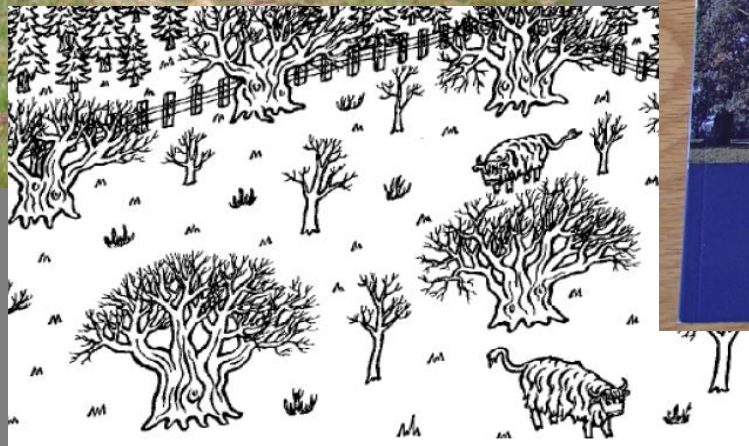
(ClimateXChange)



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Agroforestry as a historic land-use in Scotland



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Orchards – a special kind of agroforestry

SNH's Orchard
Inventory Project –
identified 880
surviving orchards in
Scotland

Some grazed with
livestock



(Orchard Revival)



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Agroforestry – some examples from around the world



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Agroecology project for France



Le bocage dans le Perche, près de Nogent-le-Rotrou (Eure-et-Loir). - Cl. L.P.V.A.



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Hedgerow management in the French Pyrenees



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Leaf hay from pollards – a response to climate change in New Zealand

Pollarding is undertaken in New Zealand to provide fodder to feed livestock, trees are pruned every 3-4 years.

Poplars and Willows are pollarded to provide supplementary feed either for use in times of drought or as a regular supplement



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Fact sheet

MAY 2016

02

The benefits from pollarding poplars and willows to provide fodder

Pollarding is a pruning system in which the upper branches of a tree are removed, promoting a dense head of foliage and branches. Pollarding is primarily undertaken in New Zealand to provide fodder to feed livestock; trees being pruned at intervals of three to four years so their edible material is most abundant.

Summary

The planting of palatable trees for fodder should form part of a farm drought resilience plan. In a drought often the only sight of green on parched farms is trees, particularly poplars and willows. Some farmers are using this resource as a feed source for stock, while other farmers are ignoring this fodder supply on their own farms.

Poplars and willows managed for fodder will still perform a soil conservation and water quality improvement role. In addition they are valuable shade and shelter trees. Wise placement of additional trees for these purposes will make the job of pollarding them for fodder much easier.

Both poplars and willows are very resilient and respond well to removal of branches by growing more. They can be used as regular suppliers of stock fodder, with mature trees capable of sustaining pollarding (see section headed "Pollarding").

- Poplars and Willows can be pollarded to provide supplementary feed either for use in times of drought or as a regular supplement
- Poplars and Willows are deep rooting and draw moisture in times of drought providing nutritious feed when pasture has died off
- The feed value of poplar and willow is well above stock maintenance requirements. Cattle will eat trimmings up to 10mm and sheep up to 5mm in diameter
- Both cattle and sheep will strip off and eat the bark; it takes just one feeding to condition stock to eating tree fodder in drought.
- Research trials by Massey University showed improved lambing percentage for stock fed on poplar and willow foreage compared with stock fed on droughts pasture alone
- High density planting in swampy corners unsuited for good pasture growth draws on otherwise unused nutrients and dries land out while improving pasture and providing fodder.



Even with grass available sheep enjoy poplar fodder



A group of soil conservation "Tangalo" willows ideally spaced for fodder in a few years

www.poplarandwillow.org.nz

Case studies in England

Tim Downes, organic
dairy farmer in
Shropshire



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(Woodland Trust)

Alley cropping in Iceland



Using alley cropping
with willow to protect
crops such as barley,
cabbage and lettuce
on Iceland



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Why do we need agroforestry in Scotland?

- To increase agricultural resilience
- To provide mitigation and adaptation to climate change
- To help deliver Scotland's Climate Change Plan
- To meet Scottish government's woodland planting targets



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Leaf hay for livestock fodder



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Pontbren – tree planting to reduce rainfall run-off



(Woodland Trust, Wales)



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Shade and ...shelter for livestock in the uplands



(Mattias)



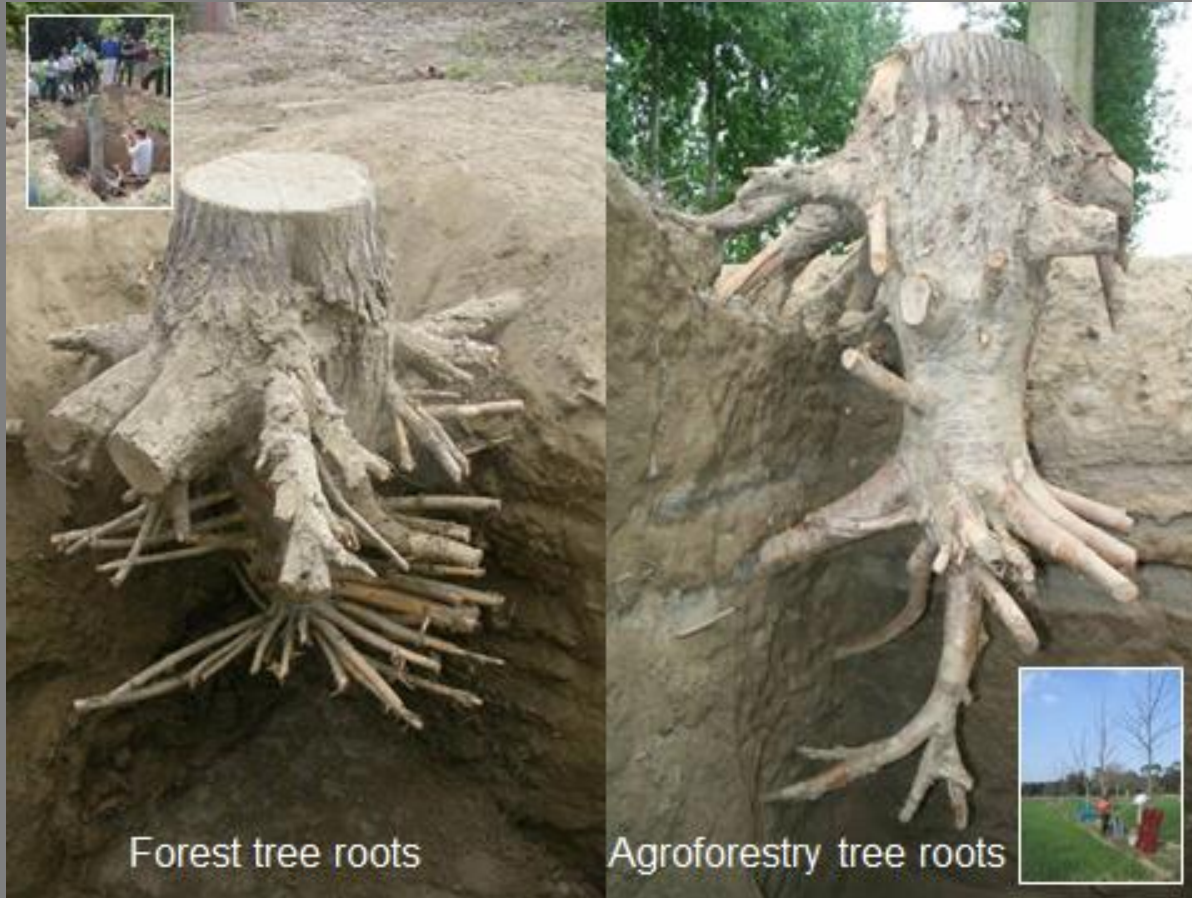
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Carbon sequestration and wood fibre production



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Deep and expansive tree roots in agroforestry trees use soil *underneath* the alley crop



Forest tree roots

Agroforestry tree roots



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(Christian Dupraz, INRA, France)

Land equivalent ratio of productivity

Mixture

1 ha

Agroforestry

=

LER = 1.4

Grown separately

Agriculture

0.8 ha

Trees

0.6 ha



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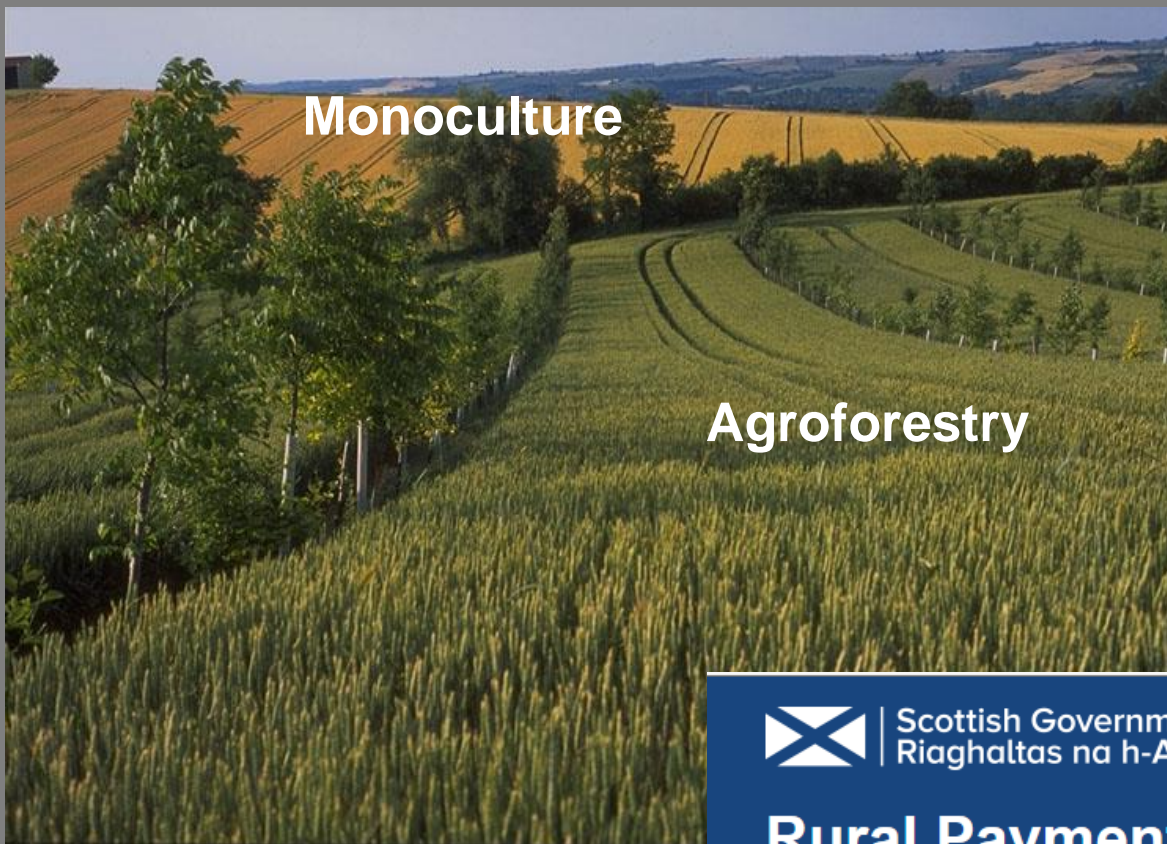
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An LER of 1.4 means 100 ha of agroforestry produces as much crop & tree products as 140 ha farmland where trees and crops are separated

(ClimateXChange)

Land Equivalent Ratio (LER) (Mead and Willey, 1980)

What support is there?



*(Wheat and walnut agroforestry system in Gers, France
– Stephen Briggs)*



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Scottish Government
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Rural Payments and Services

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Agroforestry

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Case studies in Scotland

Roger Howison ,
Parkhill Farm,
Newburgh



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Agroforestry in Scotland – potential benefits in a changing climate

ClimateXChange report 2018 (James Hutton Institute/Forest Research)

- Large swathes of agricultural land suitable
- Carbon sequestration benefits
- Benefits are context specific
- Barriers incl. perceptions, lack of incentives, arboricultural knowledge



(from ClimateXChange report)



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What is needed for more agroforestry:

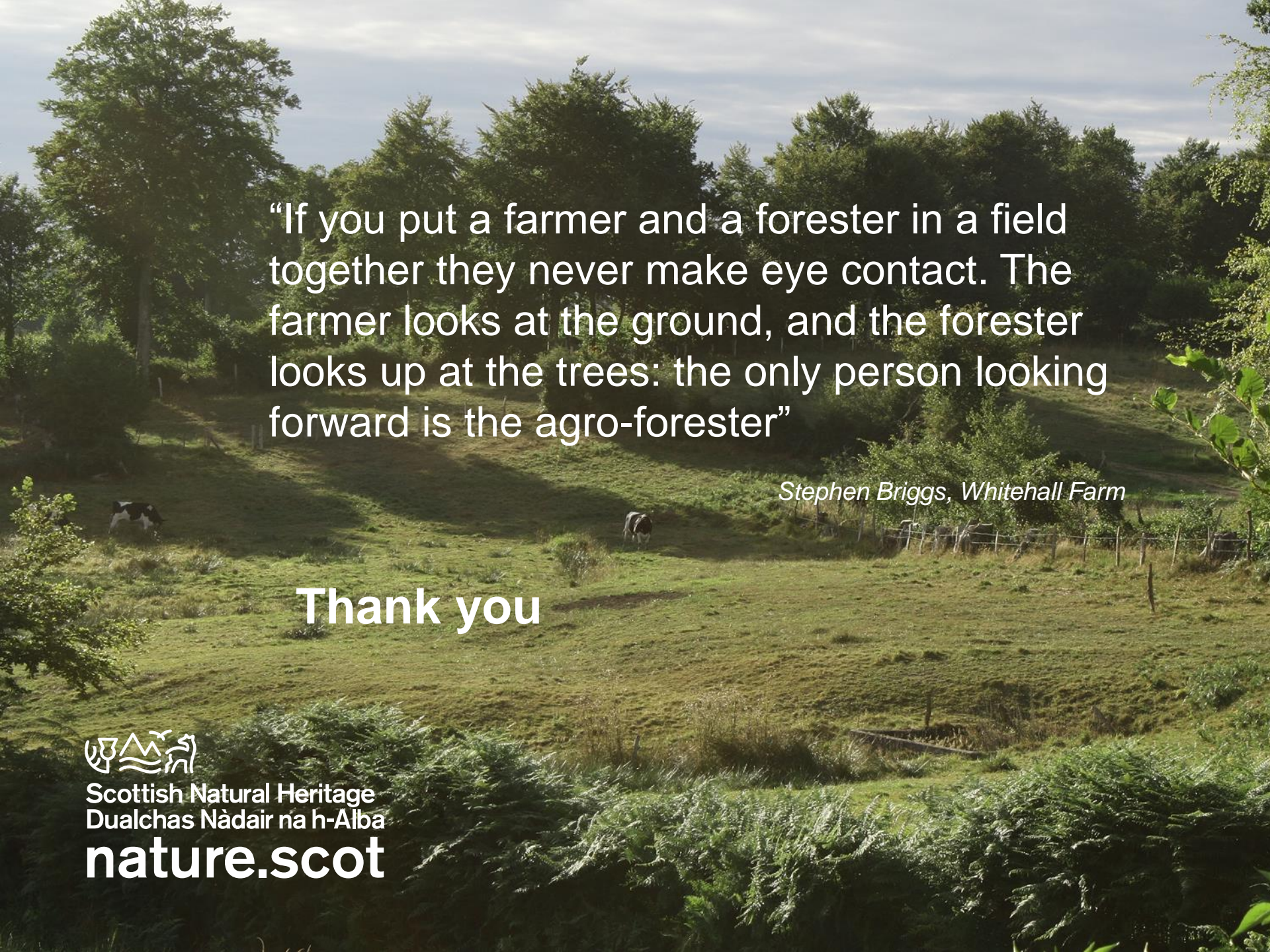
- National action plan
- Demonstration farms
- Encourage further peer to peer knowledge exchange
- Public funding for public goods
- Grant support to enable uptake of a range of agroforestry systems (not too prescriptive)
- Accompany farmers during transition



What will you do?



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“If you put a farmer and a forester in a field together they never make eye contact. The farmer looks at the ground, and the forester looks up at the trees: the only person looking forward is the agro-forester”

Stephen Briggs, Whitehall Farm

Thank you



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