Grasslands

Multi-functional habitats for a sustainable future

Floodplain Meadows Partnership: Who we are

A long-term project collaborating with government agencies and NGOs to conserve this threatened habitat.

Unique relationship with the OU provides a wide audience and academic foundation for our research, advice, and advocacy work.

www.floodplainmeadows.org.uk
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The Importance of Carbon Sequestration and Storage

UK government has committed to achieving net zero greenhouse gas (GHG) emissions by 2050

This requires an emissions reduction of **15.5 million tonnes** of CO_2 equivalent **per year** for the next **30 years**

Nature-based solutions can play a crucial role in addressing both the climate and biodiversity crises

Grasslands: overlooked Carbon sinks?

Less policy attention & funding than woodland planting or peatland restoration

Thought to store less Carbon per hectare than other habitats* storing but cover a **greater extent** c. 40% of UK land[i]

[i]Ward *et al* (2016) Legacy effects of grassland management on soil carbon to depth

Carbon Accounting: Comparing Apples and Oranges

Comparing Carbon stocks and sequestration rates within and between habitats is complex

Grassland Carbon stocks are primarily in the soil and vary depending on soil type & depth, climate, grassland type, management, land use history etc.

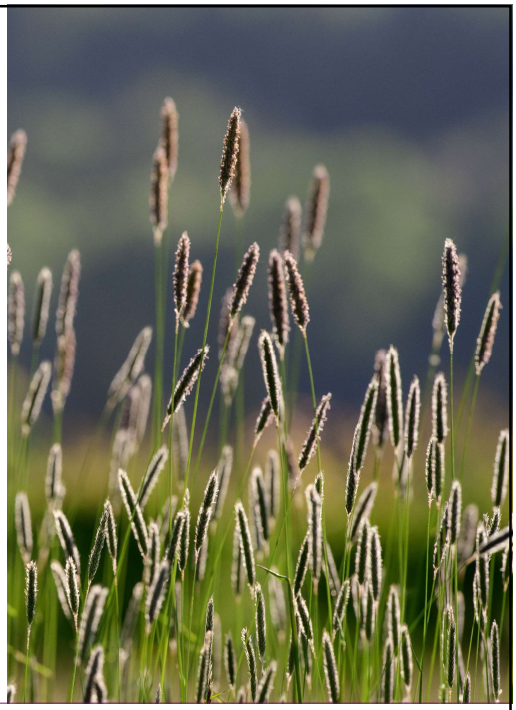
Comparisons are hampered by differences in sampling depth, calculation methods & grouping of habitats or management

Carbon Accounting: Comparing Apples and Oranges

60% of grassland soil Carbon is stored below 30cm[i]

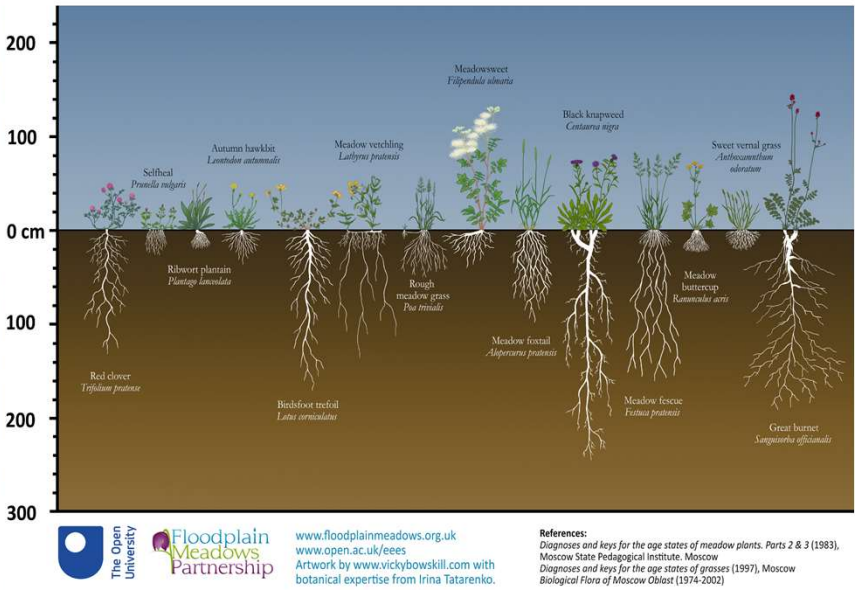
Studies focusing on topsoil hugely underestimate total Carbon stocks

UK grasslands are estimated to store **2 billion tonnes** of Carbon to 1m depth[i]



[i]Ward *et al* (2016) Legacy effects of grassland management on soil carbon to depth

Species-rich Grasslands store more Carbon



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www.floodplainmeadows.org.uk
www.open.ac.uk/eees
Artwork by www.vickybowskill.com with botanical expertise from Irina Tatarenko.

References:
Diagnoses and keys for the age states of meadow plants. Parts 2 & 3 (1983), Moscow State Pedagogical Institute. Moscow
Diagnoses and keys for the age states of grasses (1997), Moscow
Biological Flora of Moscow Oblast (1974-2002)

Greater variety & depth of plant roots foster good soil structure and lay down Carbon more efficiently and deeper in the soil profile
+
High plant diversity & low inputs increases fungal, microbial, and soil invertebrate activity, associated with more stable carbon compounds (MAOM)
+
Slower growing species promote slower decomposition of organic matter
=
Higher Carbon stocks and sequestration

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The special case of Floodplain Meadows

Broad Habitat	Mean C density (t ha^{-1})
Arable & horticulture	47.3
Improved grassland	67.2
Broadleaved, mixed and yew woodland	73.0
Neutral grassland	68.7

Species-rich floodplain meadow

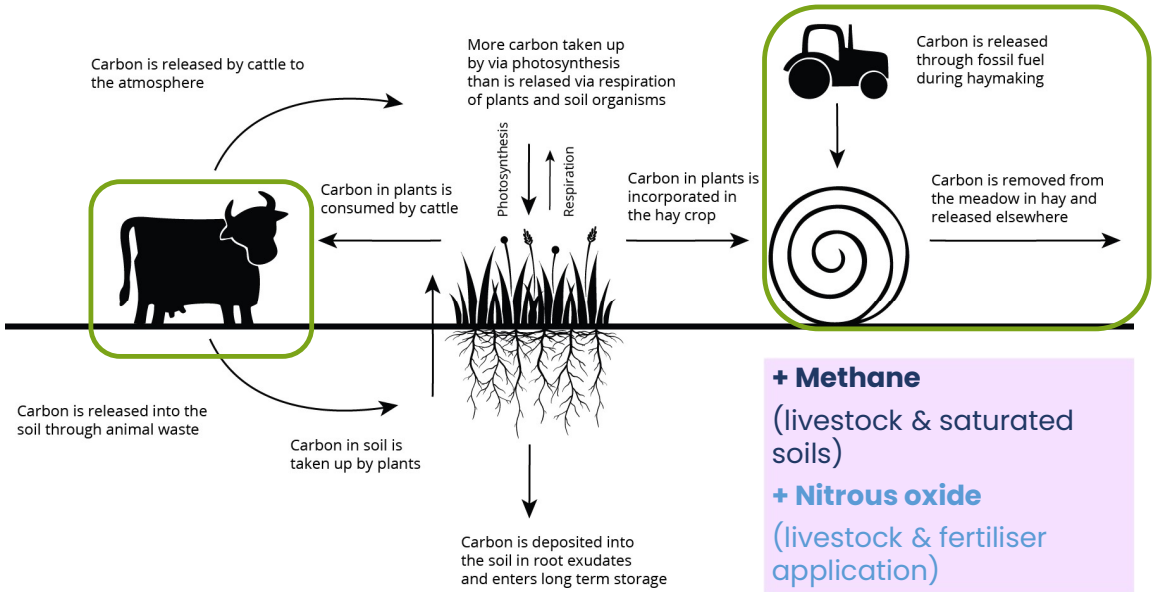
(0 – 10 cm) n = 75
82.6 t C ha^{-1}

(0 – 50 cm) n = 75
207.9 t C ha^{-1}

FMP unpublished data

Topsoil (0-15 cm) carbon density Countryside Survey 2007

The Whole Picture: The Full GHG Budget of Grasslands

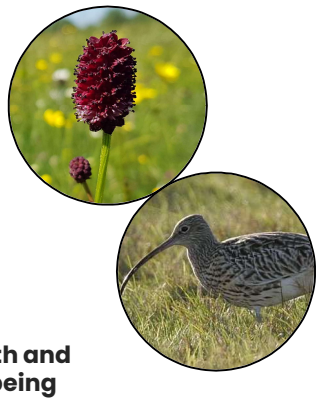


+ Methane
(livestock & saturated soils)

+ Nitrous oxide
(livestock & fertiliser application)

The Whole Picture: a balance of ecosystem services

Biodiversity & pollination
High plant species diversity and associated fauna

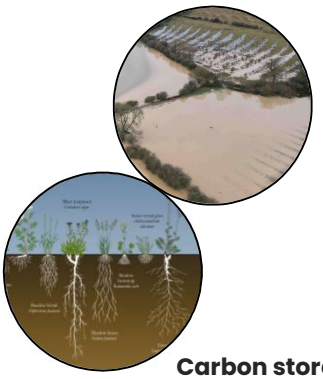


Health and wellbeing
Time in nature can significantly improve health and wellbeing

Food production
Contribute to sustainable food production and security

Culture & heritage
Hay meadows have been part of our agricultural landscape for over 1,000 years

Flood mitigation & improved water quality
Store & filter water, trap sediment & remove nutrients



Carbon storage
Rapid sequestration & secure underground storage

Beyond the Trees: Challenging the Woodland-Centric View of Carbon Sequestration

Key considerations:

- Depth of Carbon storage
- Rate of sequestration
- Whole GHG budgets
- Area and scale
- Balance of ecosystem services **including food production & security**

Trees VS grassland? More of everything please!

The climate and biodiversity crises need urgent action, we need to use **all the tools in the toolbox** to deliver a balance of ecosystem services in the short, medium and long term.

Protecting, creating and restoring a diverse mosaic of interconnected habitats at scale, tailored to specific site conditions, offers a more effective and resilient strategy for addressing the climate and biodiversity crises than focusing on a single habitat.

Check out our technical handbook

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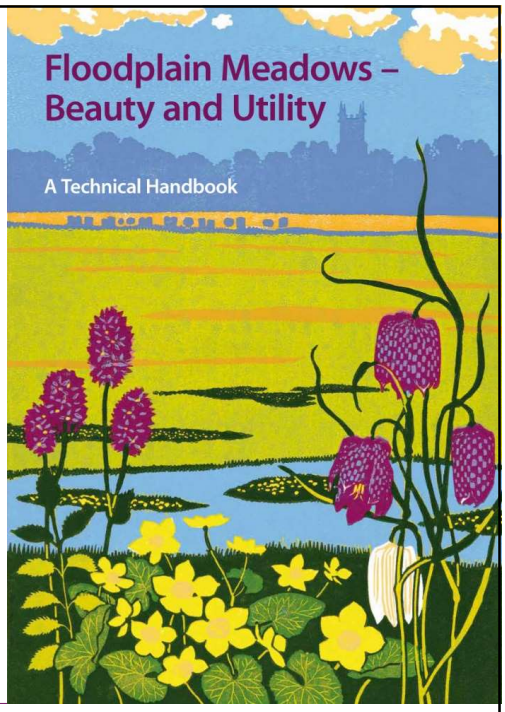

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