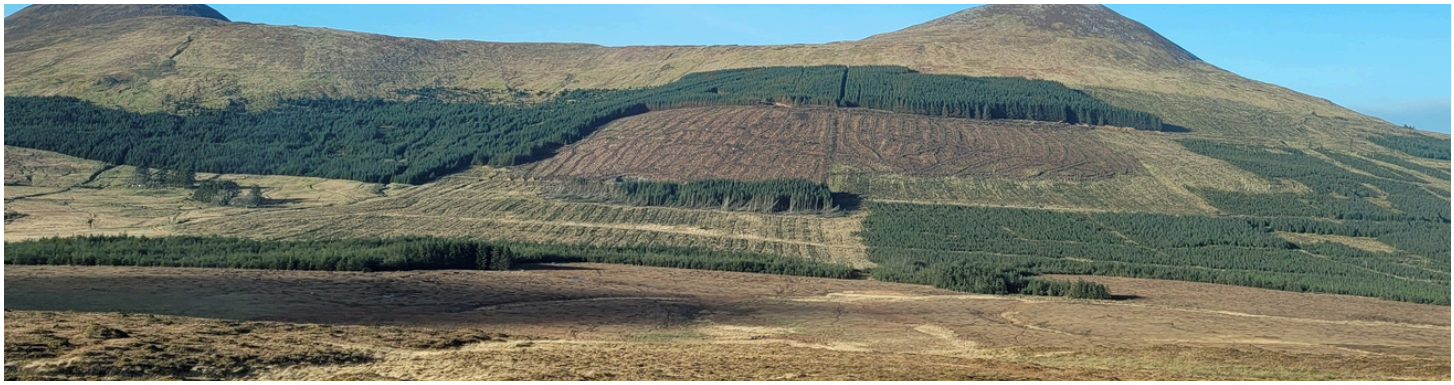
PEATLAND MANAGEMENT
FORESTRY

Introduction

For centuries, Irish peatlands have been utilised and managed for a wide range of uses. Historically, these included light grazing (by livestock) and extraction of peat for heating (by hand) but, more recently, peatlands have been subject to extensive use for forestry, grassland and peat extraction, as well as for infrastructure (wind farms).

Irish peatlands are naturally **tree-less** due to climate and peat soil development. **Afforested peatlands** cover approximately **458,900 ha** of peat soils in Ireland (NIR, 2023). In an effort to increase the forest cover in Ireland, considerable areas of peatlands, especially blanket bogs, were afforested by the State over the second half of the 20th century, which changed the Irish landscape introducing **coniferous** species, such as Sitka spruce, lodgepole pine and Norway spruce (723). Afforestation of peatlands declined at the start of the 21st century (59).

Policy and nature conservation initiatives are now paving the way to restore blanket bogs previously afforested or re-designing peatland forests. However, management practices and planning hurdles require more robust stakeholder consultation and scientific monitoring.



Afforested blanket bog in Co. Donegal with multi-age conifer plantations.

Key Research Findings

- While the majority of the national forest estate is found on peat soils, the status of peatland forestry in Ireland remains marginal and its **national economic significance has yet to be fully evaluated** (723).

- Findings have shown that **plantation forestry can have a profound impact on the water quality** of small peatland lakes, especially at the clearfell stage (245). Lakes with afforested catchments display high concentrations of plant nutrients, dissolved organic carbon and heavy metals; the highest concentrations recorded from clearfelled lakes (244).

- **Significant effects** of clearfelling of a 39-year-old lodgepole pine and Sitka spruce forestry in an upland peat catchment have been shown **on water temperature, flows, dissolved oxygen** and **stream metabolic (photosynthesis, respiration) rates** (645). Clearfelling of forests has been shown to lead to **increased dissolved reactive phosphorus**, likely caused by leaching from degrading brash mats (293, 646, 749).

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- **Mitigation practices employed on clear-felled forest site are not effective** in phosphorus retention (294). Using grass seeding and mini-buffer practices to immobilise nitrogen on-site could effectively reduce phosphorus and nitrogen runoff from harvested peatland forests, protecting nearby watercourses and their associated species, such as **salmonids and freshwater pearl mussel** (17, 647).
- Inorganic fertilisers applied at the start of the forest cycle, decay of the underlying peat soil, accumulated surface tree litter and leachate from felled trees are likely sources of elevated concentrations of plant nutrients, dissolved organic carbon, heavy metals and major ions, with **excessive peat soil disturbance during clearfelling likely exacerbating runoff into lakes** (245).
- **Fluctuations in the water table also affect greenhouse gas emissions** as **clearfelling** of the forest produces significant increases in carbon dioxide and methane emissions, but a decrease in nitrous oxide emissions (295).
- **Ammonium-nitrogen concentrations in drains increase with clearfelling**, and temporarily decrease in larger streams, while nitrate increases in some cases (191).

Clearfelling of conifer plantation on blanket bog, Co. Mayo.

How can we ensure that forestry management actions are incorporated into the sustainable management of Irish peatlands?

- Afforestation and re-afforestation of peat soils has been shown to be highly problematic for a range of environmental reasons and should be phased out. Afforestation of degraded peatlands is not beneficial, except in specific cases where rewetting is not technically feasible.
- A code of good practices for the sustainable management of forested peatlands should be produced and applied systematically to those in state-ownership.
- Rewetting and restoring of previously afforested bogs, as well as support for continuous cover forestry and replanting with native species, require strong policy backing and industry commitments.

PEATLAND MANAGEMENT

Agriculture

Introduction

Peatlands have been utilised for agriculture use for centuries. The reclamation of raw peat soils or cutover peatlands for grassland was the direct result of population pressures in the 19th century, which intensified in the 20th century due to national **Drainage Acts** and agricultural schemes (287). Nowadays, some **339,300 ha of peat soils are under grassland** (NIR, 2023), with negligible areas cultivated for crops (236).

Grasslands on peat soils are diverse across Ireland due to the **type of peat and local management practices** but they are managed for feeding domestic herbivores, mostly through direct grazing with only minimum areas (reclaimed grassland on fen peat in the Midlands) used for forage production (hay or silage).

Improved grasslands (species poor and intensively drained and fertilised) are most widespread in the Midlands. In the west of Ireland and in the uplands, unimproved ("rough") grassland can be found, which can be deep or shallow drained depending on the slope, and which have retained some bog-type vegetation (with patches of improved grassland) and usually receive organic fertiliser only through animal dung (734).

Variety of grasslands over peat soils depending on drainage, management and location.

Key Research Findings

- Heavy **grazing pressure** has been implicated in a decline of the condition of blanket bogs (731). This was mostly due to conflicting EU policies that led to an upsurge in sheep numbers in the 1980s and early 1990s.

- Tracking sheep in upland blanket bogs in the west of Ireland showed that flock distribution is typically **uneven** (0 to 160 sheep/ha). Moderately damaged areas and grid squares containing extensive (improved) grazing lawns were consistently selected the most. **Recommendations for stock levels must be site specific** (911).

- Habitats with higher conservation importance and lower carrying capacities (**wet heath and blanket bog**) were most selected in **winter**, therefore, it is recommended that grazers are removed from areas of semi-natural hill vegetation during this period (910). This could be done using **virtual fencing** (collars, see photo below).

- Many hill sites in western Ireland lack suitable land for improved grassland or livestock housing. In these cases, selling sheep in winter and buying replacements in spring may be the only viable solution to meet conservation goals but this should not undermine the financial viability of hill farming, and farmers should be compensated for any additional costs involved (910).

Key Research Findings (continued)

Climate impacts

- Farmed drained peat soils emit **carbon dioxide and nitrous oxide** but this depends on (1) the composition of the vegetation, (2) the drainage status, and (3) the nutrient status of the peat. Nutrient rich peat (fen type) are the highest emitters, while shallow drained nutrient poor farmed peat soils in the west of Ireland are very low emitters unless they are deep drained (water table below 25 cm) (734). Farmers should be supported and compensated to keep these nutrient poor sites wet with low input-output systems (727).
- **Nutrient-rich organic soils** under grasslands (Midlands) produce much **higher greenhouse emissions** and also represent hotspots by emitting more **carbon and ammonia to the water**. Therefore, these soils should be targeted for water table management (increased to a level that does not reduce their yield) as a strategy to mitigate carbon emissions and deliver cleaner water (734).
- Rewetting of farmed peat soils and "**paludiculture**" or "wet agriculture", which refers to the cultivation of commercial plants or trees under water saturated soil conditions could restore some of the peat soil ecosystem services, including the carbon store and carbon sequestration (1023).

Water and biodiversity

High Nature Value (NHV) farmland refers to areas where agriculture is the dominant land use and supports high species and habitat diversity or includes species of European conservation concern, or both. The management of **HNV farmland for biodiversity** involves areas of peatlands and has the potential to provide co-benefits for water quality and quantity, such as the regulation of flooding and maintaining base flow, as well as increased biodiversity. However, many of these areas are under threat from abandonment, intensification and land use change (575).

Virtual fencing in grazed upland bogs in Inishowen.

How can we ensure that agricultural management actions are incorporated into the sustainable management of Irish peatlands?

- In the context of farmed peat soils, the perspective on sustainable resource management varies significantly depending on the scale at which it is viewed (national, regiona, farm, field).
- Farmers need to know their peat soil properties (nutrient and water table levels) and their value within the overall catchment.
- Managing the water table and the seasonal grazing can bring about synergetic benefits for climate, water and biodiversity.

Database

This factsheet is part of a series produced by Peat Hub Ireland (PHI). The reference numbers in brackets refer to individual publications in the PHI database which link to the original source of evidence. Use the QR codes to access the database or view research projects associated with the themes. All factsheets in the series are available on the PHI website.

Research Projects