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PEATLAND RESTORATION EFFORTS MUST EVOLVE

NEW INSIGHT FROM RESEARCH

REWETTING DOES NOT ACHIEVE COMPLETE RESTORATION

Recent research in Estonia[1] compared undisturbed peatlands to those at various stages of restoration following rewetting. They found that restored peatlands:

- continue emitting CO_2 for up to a decade
- do not recover their original plant community after 35 years

Healthy peatlands are one of Europe's most valuable resources in the fight against climate change because they can pull CO_2 down from the air and store it in soil for thousands of years. However, the **slow recovery of peatlands following rewetting**[1] may hinder efforts to reach net-zero emissions by 2050[2]. This may also have economic consequences as failed restoration attempts could limit landowner access to the government subsidies which pay for the provision of ecosystem services, such as removing CO_2 from the air[3].

THE FULL RECOVERY OF NATURAL PEATLAND PLANTS IS ESSENTIAL

Peatlands provide many benefits to society, including **climate mitigation** and **water purification**[4]. Recently, scientists have found that different types of peatland plants have unique characteristics and roles that work together to produce a healthy peatland. This Estonian research reveals that important plants such as **evergreen shrubs and key mosses have not recovered 35 years after rewetting**[1]. These missing plants negatively impact peatland health, in the same way that a cake would be ruined if a key ingredient was removed.

Although **some rewetted peatlands can remove more CO_2** from the air than natural peatlands, these missing plants mean that CO_2 removal is highly **inconsistent** and **vulnerable** to stressful situations such as drought[1]. With this insight, successful and timely peatland restoration **requires more than simple rewetting techniques**. Swift restoration of natural peatland plant communities can be achieved through **revegetation**, which artificially transplants these missing plants into the restoration site[1,5].

STAGES OF RECOVERY


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NEXT: EXPLORING PEATLAND DEGRADATION AND HOW YOU CAN ENHANCE RESTORATION

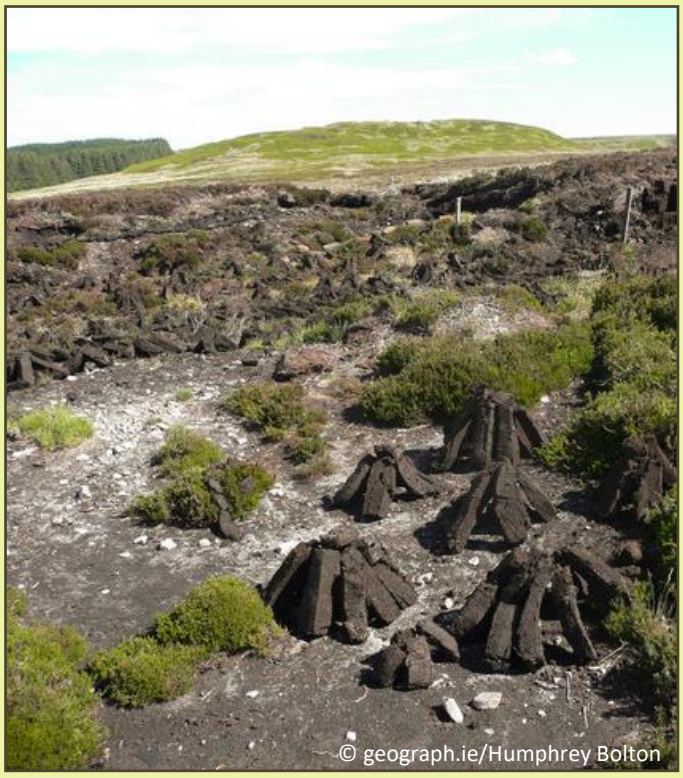
HOW HAVE PEATLANDS BEEN DEGRADED OVER TIME?

European peatlands have been heavily exploited throughout history for agriculture, energy production and gardening. **Peat milling** is a popular technique adopted in the 1950s and includes the following management techniques[1]:

1. Water table drainage
2. Plant removal
3. Removal of top peat layers

This peat is commonly used for gardening because the carbon-rich soil makes for efficient fertiliser, but others may burn it for energy. These practices produce a **dry environment** which **releases CO_2** and reduces the ability of natural peatland plants to survive in this soil[1].

Rewetting attempts to restore the water table to reverse the damage, but research shows that rewetting alone is **slow** and **plant communities do not fully recover**[1].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WHAT ARE THE BENEFITS OF A HEALTHY PEATLAND?

Restoration not only improves the **aesthetic value** of degraded peatlands, but it also kick-starts key processes within peatlands which deliver **vital services to humans.**

Combatting Climate Change[4]

Peatlands are **climate champions** which can **counter** some of the damage from human **greenhouse gas emissions** by pulling CO_2 down from the air. Peatlands are also a **hostile environment for polluting bacteria** which would otherwise release carbon again as CO_2, allowing for **long-term carbon storage**. This relies on the soil being full of water and little nutrients so that these bacteria cannot survive. However, practices such as drainage and soil removal expose a dry, food-rich soil layer in which these bacteria thrive and release lots of CO_2. Restoring peatlands not only **slows natural CO_2 emissions**, but also allows the soil to continue **absorbing human CO_2 emissions.**

Improving Water Resources[4]

Healthy peatlands soak up lots of water during periods of heavy rainfall which slows water flow into rivers, **decreasing the risk of major floods**. This service is already preventing damage to buildings and roads but will only become more important as weather extremes increase with climate change. This sponge-like behaviour also helps to clean the water that passes through peatlands, **delivering high quality water** to homes.

Governments are beginning to recognise the value of these services and are introducing monetary **incentives** which contribute to the costs of restoration and **pay landowners for these continued services**[3]. Not only will proper restoration reduce the burden of unproductive land, but it will benefit society and the economy.

NEXT: PEATLAND RESTORATION AND THE ROLE OF KEY PLANTS

WHAT ARE THE ROLES OF DIFFERENT PLANTS IN PEATLANDS?

SPHAGNUM MOSS

Mosses are most important for pulling carbon from the air **year-round**[1,6]. They are **difficult for bacteria to digest** and soak up **8-times their weight in water**[7], **locking away carbon** and **keeping polluting bacteria at bay**. *Sphagnum* which are adapted to grow on small hills can tolerate dry conditions whereas *Sphagnum* growing in ditches cannot. Rewetted peatlands only contain these ditch mosses, meaning that this key plant group is **more sensitive to drought in rewetted peatlands**[1].

GRASSES

Grasses tend to be the **first plants to return** to a degraded peatland after rewetting. These are highly **active during summer** and **suck lots of CO_2 from the air**, but they also **promote more natural greenhouse gas emissions** of CO_2 and methane compared to other peatland plants[1,6].

Images: Siobhan Merrifield

SHRUBS

Shrubs are also highly **active in summer** when they pull the most CO_2 from the air[1,6]. They **thrive in dry conditions** which means they can **support sensitive *Sphagnum* mosses during an intense drought**[1,8]. Unlike grasses, many **evergreen** shrubs do not help bacteria to grow and therefore these plants **do not greatly increase natural CO_2 emissions**.

WHAT DOES THIS MEAN FOR YOUR RESTORATION PROJECT?

Greenhouse gas emissions fluctuate more in rewetted peatlands following changes in weather, making them **less useful tools for climate change**. This weather sensitivity can be reduced if more peatland plants are recovered earlier into the restoration project. ***Sphagnum* is the most important plant for fighting climate change** and **transplanting techniques** lead to the faster recovery of peatland moss[1,9]. Drought sensitivity is a major concern but **transplanting hill-adapted *Sphagnum*** and **supportive shrubs** could **stabilise peatland health**. Evergreen shrubs are the ideal choice as they do not encourage the growth of bacteria that produce greenhouse gases. Managing peatlands through **combined rewetting and replanting** will enhance their ability to fight climate change, **maximising the benefits** to society and landowners alike.

TIME FOR ACTION: CONTACT YOUR LOCAL REVEGETATION ORGANISATION FOR ASSISTANCE

ADDITIONAL RESOURCES

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