Paludiculture

Is it time for a new agricultural revolution?

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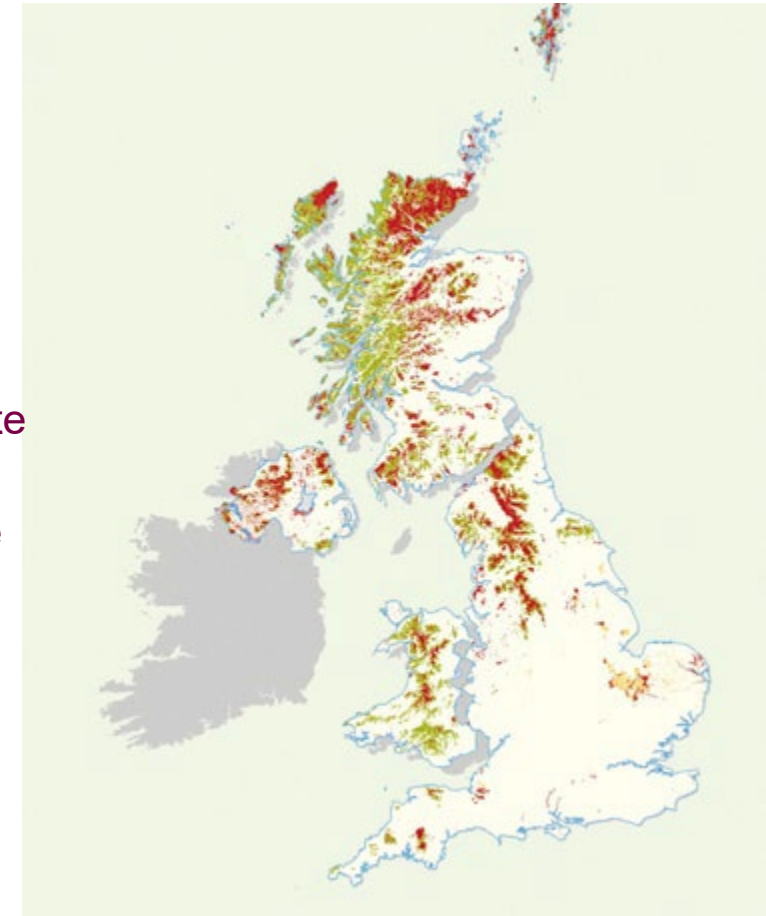
UK Peatlands

- Peatlands cover almost 10% of the UK
- 3 types
  - blanket bogs
  - raised bogs
  - Fens
- Over 80% are in a degraded state
- They represent the single most important terrestrial carbon store in UK



Peat and peaty soils of the United Kingdom (JNCC, 2011)

Ecosystem Services

Peatlands provide vital ecosystem services:

Store carbon
UK Peatlands contain over **3,200 megatons** of carbon

Regulate water flow
Peatlands **reduce the impact of flooding,** droughts and seawater intrusion

Conserve biodiversity
UK Peatlands are home to many **rare and unique species of flora and fauna**

Supply forest products
Peatlands are a source of **nutritious foods, medicinal plants** and construction materials

Provide a space for culture
UK Peatlands offer a natural haven for spiritual reflection, **leisure, recreation** and education

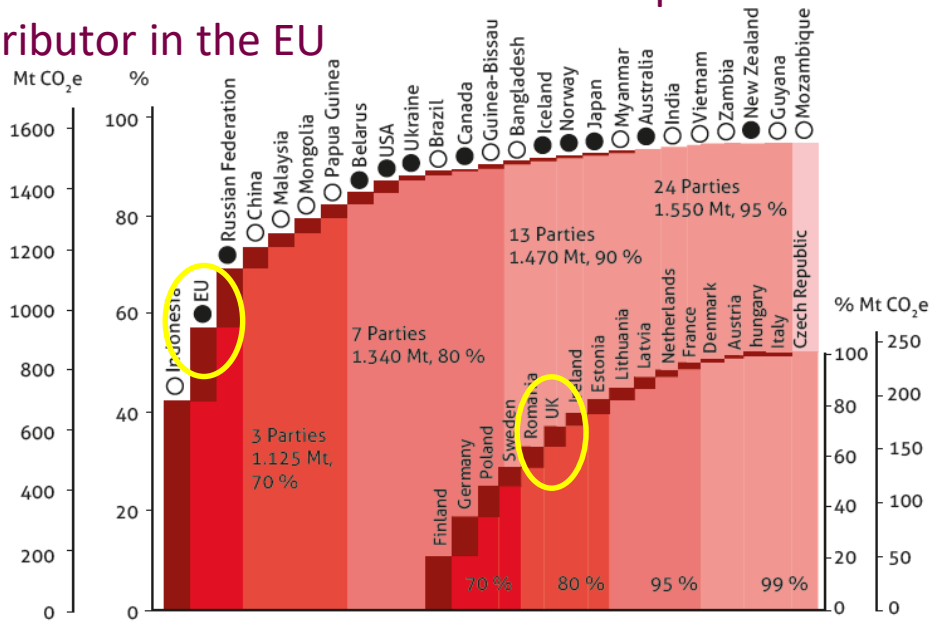
Taken from: **Peatlands and climate change,** developed by the FAO team of the Mitigation of Climate Change in Agriculture (MICCA) Programme

UK Peatland Emissions

Emissions from drained peatland

- Peatlands cover 0.4% land area in the world
- But they contribute 5% total global anthropogenic GHG emissions
- Drainage is principally from agriculture, forestry & extraction

- EU – second largest contributor of GHG from drained peatland
- UK – 6th largest contributor in the EU

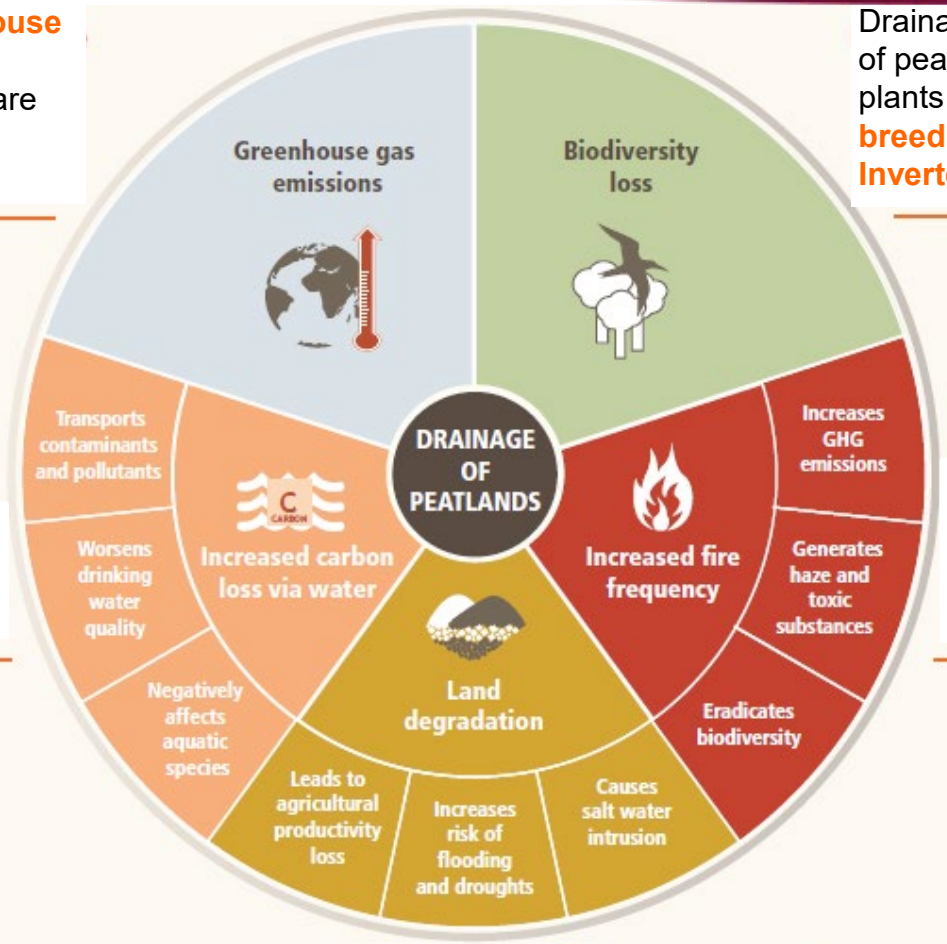


Key countries with annual emissions (without fires) from drained organic soils (peat). By Greifswald University

Peatland drainage

10% of the global greenhouse gas emissions from the agriculture land use sector are caused by the draining of peatlands

Drainage, cultivation and extraction of peatlands destroy the unique plants as well impact on the **breeding bird and Invertebrate assemblages**



When intact peatlands are drained **carbon losses via water increase by 50%**

Although less of an issue in the UK **fires can persist for months** releasing yet more carbon

The surface of the land **can decrease in height up to 2.5 metres** after 25 years of drainage

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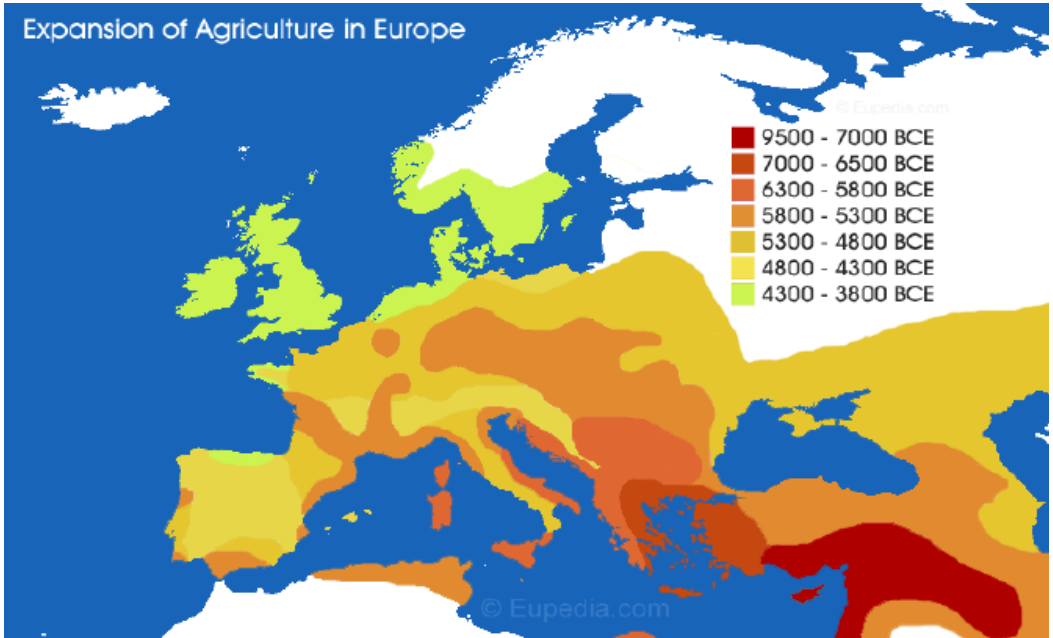
Agriculture on Peatlands (1)

- Western agriculture originated in the Middle East
- domesticated dryland plants now constitute our major crops
- ‘semi-desert’ agriculture requires productive land to be dry and soils continuously tilled.
- This paradigm was also applied to wet, organic soils
  - the intensive use of peatlands has always been associated with drainage



Agriculture on Peatlands (2)

- For example:
  - African desert plants, such as Aloe vera, are cultivated on deeply drained peat in Indonesia
  - Arid South American maize grown on deeply drained peat in Germany
  - strongly water-demanding East Asian sugar cane planted on deeply drained peat in Florida
- Current agricultural practises are not adapted to peat soils

What is Paludiculture?

What it is…

What it's not…

- That wet cultivation of peatland
- Paludiculture is not nature protection
- An innovative concept that allows rewetted peatlands to remain productively used
- Traditional uses such as growing reeds
- New processes that preserve the preservation of peat

What does Paludiculture offer?

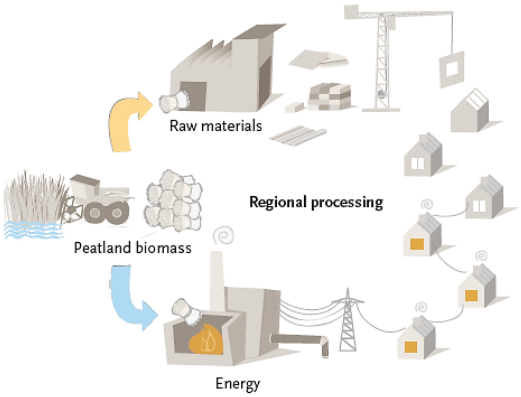
- Climate change mitigation
  - avoids N_2O and CO_2 emissions & provision of cool humid air
- Habitats for rare and threatened species
- Renewable fuels and raw materials
- Perspectives for agriculture and tourism

Developing Paludiculture

Identify suitable (preferably perennial) species, provenances and cultivars

Overcome technical challenges for harvesting on wet and inundated peatlands

Develop production lines adapted to new types of biomass



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What are the main types of paludiculture products?

Food

Fodder

Medicines & supplements

Raw materials

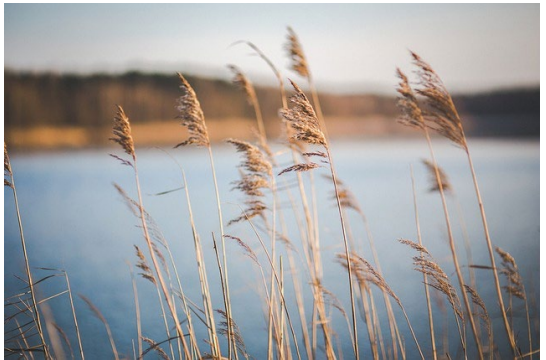
Biomass/ energy

Agricultural conditioners

Case Study (1)
Reed (*Phragmites australis*)

USES:

- **Production** is low cost and suitable for large areas, also suitable for nature conservation areas.
- **Frequent harvest**: Short rotation harvesting, for regular income – harvesting machinery exists commercially.
- **Ecosystem services**: Water purification potential (Phosphates and nitrates removal), Avoided C losses, biodiversity etc.
- **Sustainability**: Attractive Cradle-to-Cradle characteristics, strong biodiversity potential, rotation type harvesting possible.
- **Key product**: Reed for thatch– an estimated demand of 15 million bundles by 2025 in Europe (equivalent to around £40 million)



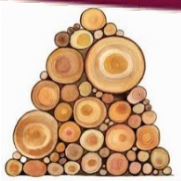
Case Study (2)
Cattail (*Typha spp.*)

USES:

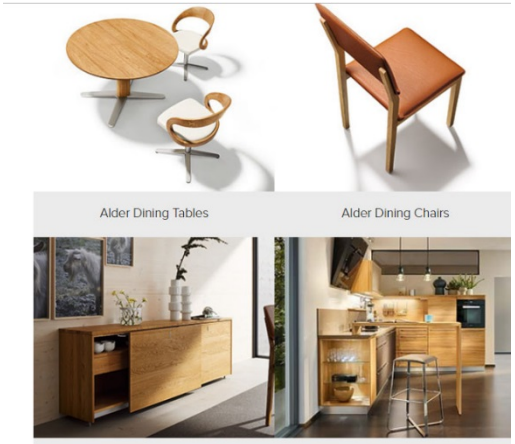
- **Production** is low cost and suitable for large areas, also suitable for nature conservation areas.
- **Frequent harvest**: Typha is harvested annually and therefore has a greater harvest volume per hectare than timber.
- **Ecosystem services**: Water purification potential (Phosphates and nitrates removal), Avoided C losses, biodiversity etc.
- **Sustainability**: attractive Cradle-to-Cradle characteristics.
- **Key product**: Typhaboard and Typha fill insulation – provides structural support and insulation in buildings.

Case Study (3)
Alder – (Alnus glutinosa)

USES:



- **Production** – grown on nutrient rich fen soils, as a wet woodland.
- **Harvest**: on long rotation, or shorter coppicing
- **Ecosystem services**: Biodiversity support, nutrient load reduction, Avoided C losses.
- **Sustainability**: can act as a net sink, but requires careful water table management.
- **Key product**: timber which can be used for a huge range of items such as furniture, biogas, combustion for energy, crafts etc.



Case Study (4)
Water buffalo (*Bubalus arnee*)

USES:

- Water Buffalo are hardy – and are suitable for wet waterlogged sites
- Permanent or temporary grazing can be used – ideal for extensive grazing
- Will eat almost any riparian vegetation
- Livestock density of 1.4 animals per ha for best balance of welfare and soil protection

Case Study (5)
Sphagnum moss

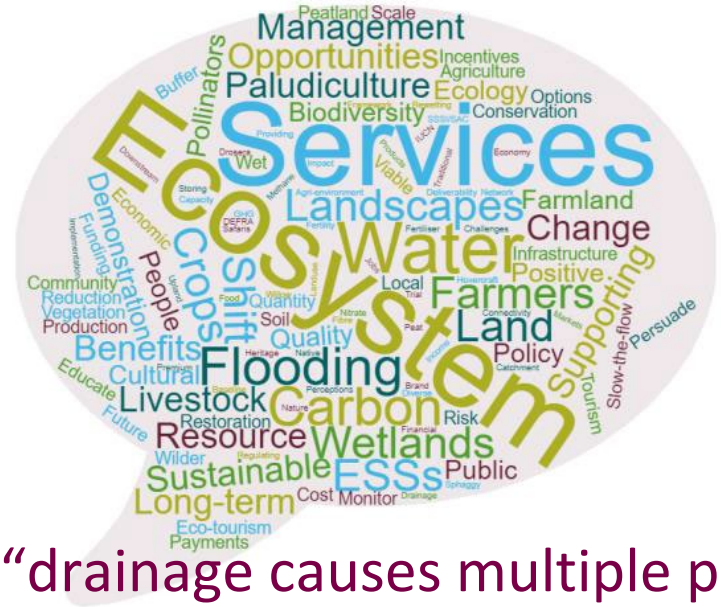
USES:

- **Production**: The most efficient way is under research, but progress in Germany, Holland, Canada and now the UK is promising!
- **Long term harvest**: rotation harvesting on longer time scales (2-3 years?) – method to be established.
- **Ecosystem services**: Avoided C losses, biodiversity, spin off products.
- **Sustainability**: can reduce nutrient flows,
- **Key product**: Sphagnum moss can be processed for growing media, or used as is for reptile and snake trade, orchid growing etc.

Move from wild harvest

To efficient cultivation

UK Paludiculture Conference November 2017



“drainage causes multiple problems which impact on ecosystem services”

“There is an urgent need for new policies and practises on wet or re-wetted land.

Paludiculture can provide opportunities to enable and promote paludicultures in the UK.

…Brexit is both an opportunity and a challenge“

Conclusions & food for thought?

- Paludiculture can prevent the loss of ecosystem services, and restore them on damaged wetland soils
- There are a large range of crops which can be used across a wide range of applications
- There are many challenges, but many opportunities for innovation
- It will not be easy – it will require a complete land use change to work
- If developed properly it can save money, benefit farmers and society as a whole