Paludiculture

Is it time for a new agricultural revolution?

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

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

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

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.

Taken from: *Peatlands and climate change*, developed by the FAO team of the Mitigation of Climate Change in Agriculture (MICCA) Programme.
• 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
- 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 not...
- The wet cultivation of peatland 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 N₂O and CO₂ emissions & provision of cool humid air
- Habitats for rare and threatened species
- Renewable fuels and raw materials
- Perspectives for agriculture and tourism
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.

Taken from: Peatlands and climate change, developed by the FAO team of the Mitigation of Climate Change in Agriculture (MICCA) Programme.
What are the main types of paludiculture products?

- Food
- Fodder
- Medicines & supplements
- Raw materials
- Biomass/energy
- Agricultural conditioners
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
There is an urgent need for new policies and adaptation of existing policy at government level, to enable and promote paludicultures in the UK. The time to act is now.

...the creation of and access to – as well as initial funding for a paludiculture market.

...Linking paludiculture to policy drivers - e.g. flood management / peatland restoration / climate targets - could provide finance for paludiculture.

Brexit is both an opportunity and a challenge.

...There is a need for practical advice and support for land managers to take them through a transition period to paludiculture:
- facilitation funds
- education and advice service
- machinery rings

“drainage causes multiple problems and is a potential for land use and loss of ecosystem services.

“There is an urgent need for new policies and adaptation of existing policy at government level, to enable and promote paludicultures in the UK. Climate change presents threats and restoration / re-wetting of peatlands to increase the ecosystem services of such land.

The tip of the iceberg now...

...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