Opportunity mapping the Fens

Balancing food production, greenhouse gas emissions and water management in the Fens is a microcosm of the challenges for a land use framework. *CPM* attended the Fenland SOIL conference to find out more.

By Mike Abram

Nowhere perhaps typifies the complex challenges the government's recently announced Land Use Framework consultation has to balance more than the Fens.

Around 89% of agricultural land in the region is classified as either Grade 1 or 2 – the most productive for food production. In fact, its 3700 farms produce 7% of England's crops including a third of the country's fresh produce, generating £3.1Bn towards the UK's economy.

However, draining the peat soils that predominate within the Fens for agricultural use has led to significant climate and environmental concerns. This is because while peatlands are highly efficient carbon storage systems when wet, draining exposes those soils to air, leading to decomposition of organic matter and the release of carbon dioxide.

A 2022 report 'Aligning the Peatland Code with the UK Peatland Inventory' estimated average emissions of 27tCO_2e/ha/yr from drained peat

Members organisation

Fenland SOIL is a members organisation that aims to inform and develop 'whole farm' land use policies for climate mitigation and biodiversity enhancement in the Fens, explained Megan Hudson.

Photo: Beanstalk Global.

Value creation in water management

Multi-functional storage of water and creating value from it could hold the key to delivering and funding some of the changes required in the Fens

Water isn't a waste product yet we pump it away when we could capture, store and use it, stressed south Lincolnshire farmer, Robert Cauldwell, who also chairs the Lowland Agricultural Peat Task Force and the Association of Drainage Authorities.

Most farmers, he believes, have been dealing with too much water during the past 18 months, but drought is equally a problem in the Fens. "How are we going to deal with the challenge of not having enough water to maintain water level management – we can only do that if we have enough water in the system. Storage and how we manage water is going to be critical."

He pointed to the Po Valley in Italy, which much like the Fens, produces a large proportion of vegetables. "There are 10,000 small reservoirs to capture all of the excess so it can be moved back into the river to maintain flow, and make sure it's available for irrigation, for people and for the environment.

"We could do something like that. We could capture the water as it flows through the Fens and do something better with it. It's not about affordability; I'm getting increasingly grumpy that people tell me we can't do that.

"And it's not just Italy – right across Europe countries are grasping the demand for multi-functional water management," he said.

Doing so would require lower regulatory burdens on farmers building reservoirs, as pointed out by Fenland SOIL director Matthew Bullock, from the conference floor. He commented that the Environment Agency must understand there's an inherent value in water being held in the system, rather than just dealing with extremes.

"The EA has no interest in business-as-usual water, but ignoring the value of what's held or could be held results in an economic desert as far as the Fen is concerned and its management of water," he said.

According to Matthew, the EA controls all of the value of water by restricting how it's moved around, only worrying about drought and flooding risks that encompass 10% of the water in the system, he said.

"Changing that emphasis would create an active market and the tax and investments would follow – the profusion of storage Robert suggests could be built by the private sector," he concluded.

Water in the system
Fenland SOIL director Matthew Bullock said the Environment Agency must understand there's an inherent value in water being held in the system, rather than just dealing with extremes.
Photo: Beanstalk Global.

soils, while the Cambridgeshire and Peterborough Independent Commission on Climate Change reported in October 2021 that 40% of Cambridgeshire's emissions come from agricultural lowland peat.

It was the latter report which sparked the formation of Fenland SOIL – a not-for-profit members organisation that aims to inform and develop 'whole farm' land use policies to achieve climate mitigation and biodiversity enhancement in the Fens, explained Megan Hudson during an introduction to the Fenland SOIL conference.

"We believe those figures are an overestimate so are working to collect more data to enable a more accurate figure," she said.

Initial observations, for example, show emissions from skirt fen – organo-mineral soils that are no longer peat but still contain a lot of carbon – are around 8-12tCO_2e/ha/yr, rising to 22-24tCO_2e/ha/yr from deeper peat soils.

That makes understanding peat soil composition and condition crucial to getting a better handle on emissions, particularly with peat maps largely out of date – a task which Fenland SOIL has taken on, she added.

DEPLETION

"In 1987 we had around 24,000ha of peat left with a greater extent of peaty soils. Now we're not sure how much is left, but we know it's a lot less than that," highlighted Megan.

Working with Liz Stockdale from Niab, Megan employed a concept used extensively around the world but less so in the UK, for understanding land use that capitalises on local knowledge. "Liz found most farms have detailed records of their soils plus long family memories of what's changed over time."

That led to in-depth discussions with 11 growers initially, to create terminology around how each farm describes its soils, and to map their area. The project has described 37 different soil types from deep peat soils over different subsoils to shallower and degraded peats and various types of mineral soils.

Using that framework, farmers have coloured in field-scale maps identifying where different soil types lie on their farms, which Liz has translated back into soil scientist terminology to generate new peat maps.

"That's allowed us to get a better estimate of what different soils we have where in terms of peat across various drainage boards," explained Megan.

In addition, each farm scored every field for productivity on a 1-5 scale using a guidance key, plus its hydrology, to understand whether water could be managed differently.

> ***"My conclusion is it's not a viable alternative to use a paludiculture system for growing commercial veg, and reliably and cost-effectively supply customers."***

"That gives us three different layers to look at the interactions and provide a management opportunity map."

According to Megan, such opportunity maps help to identify areas where, for example, there's potential for peat restoration or alternative management practices, or whether business as usual might provide the best outcome.

"It's generating a mosaic of different land management practices and opportunities for the land but using the knowledge of the farmers to develop it," she said.

"That might include areas of conventional agriculture with regenerative practices mixed in, areas where we're managing water tables – either wetter farming or paludiculture. There could also be areas that are very unproductive or difficult to manage where we look at different approaches such as wetland creation."

Investigating whether such mitigations or land uses are viable is another key priority for Fenland SOIL, with various farms testing such approaches either within projects or off their own backs.

Raising the water table is seen as a key option in potentially reducing greenhouse gas emissions from lowland peat, with research indicating its depth is a driving factor in carbon emissions. This is because rewetting peat inhibits the aerobic microbial activity responsible for the decomposition of organic matter, reducing the rate of carbon loss.

Biodiversity net gain

Sarah Taylor has taken around 21ha of marginal land out of production at Cambridgeshire farm Oxwillow, converting to habitats which can attract biodiversity net gain payments. *Photo: Beanstalk Global.*

Using Natural England's Paludiculture Exploration Fund, Fenland SOIL ran a trial at G S Shropshire & Sons near Downham Market. Part of G's Growers, the farm specialises in romaine and iceberg lettuces, celery, Chinese leaf and radishes.

Its land is laser-levelled enabling the operation of a sub-irrigation system, reducing water requirements by 50% compared with an overhead system. Land drains are closer spaced than traditional at 9m compared with 20m, while field sizes are small.

Those factors help the farm to accurately control its water table depth, making it perfect to test holding it to 10-30cm from the soil surface within two trial test crops – Chinese leaf and celery – a practice potentially worth £1409/ha in Countryside Stewardship payments.

To compare as a control, water tables were held at the farm's usual depth of 50-60cm in the celery field and 75cm in the Chinese leaf field, explained managing director, Peter Sargeant.

REDUCING EMISSIONS

The trial results indicate holding the water table at the trial depth (10-30cm) reduces measured CO_2 emissions while methane emissions, which potentially could increase in anaerobic situations, remained similar in both comparisons.

Peter highlighted that both crops grew well at an early age and looked in good condition. "But as we neared maturity, we started to see signs of yellowing coming into both celery and Chinese leaf that by harvest had quite a significant effect on marketable yield."

In the Chinese leaf crop, packing quality reduced from 65% in the control to 50% for the trial, while the impact on celery was even larger, with only 40% reaching packing quality compared with 85% for the control. That would have significant impact financially and on land requirements, if repeated across the entire farm's production, he said.

There were also operational challenges, particularly with mechanical hoeing and harvesting with existing equipment. "That's not insurmountable when planning this type of system," acknowledged Peter.

"But physically walking the field at harvest was difficult, while there were also concerns about how to manage significant rain events in such a system.

Paludiculture field trial

Peter Sargeant ran a paludiculture trial at G S Shropshire & Sons which compared water table depths when growing Chinese leaf and celery. *Photo: Beanstalk Global.*

My conclusion is that it's not a viable alternative to use a paludiculture system for growing commercial veg, and reliably and cost effectively supply our customers," he said.

Another land use option being made into reality by Pymoor-based farm Oxwillow, is converting land to sell for biodiversity net gain. Sarah and Craig Taylor have initially taken around 21ha of marginal land out of production to convert into habitats which can attract biodiversity net gain payments. "It's been a labour of love – I sometimes think it makes growing potatoes easy," said Sarah.

She explained that wildflower mixes have taken well with 16 of 18 sown species recorded in year one, despite higher nutrient levels than ideal for flowers. Six ponds have also been established.

In addition, Oxwillow is working alongside RSPB and other partners to create wet grassland habitat for a Landscape Recovery pilot project on and next to the Ouse Washes. "The project has the potential to provide a lifeline for the wildlife affected by the extreme flooding events on the Washes, and also for graziers displaced and looking to rear livestock," explained Sarah.

"It's not lost on me the risks of taking Grade 1 land out of mainstream food production," she admitted. "But it shouldn't be food versus nature – it should be both. That includes carbon reduction, a haven for wildlife, cleaning of water through natural processes, and better access to wild spaces for those who live locally." ●