

## **THE IMPLICATIONS OF WATER MANAGEMENT FOR PHYSICAL AND SOCIO-ECONOMIC SUSTAINABILITY OF PEATLANDS IN THE SOMERSET LEVELS AND MOORS**

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In Great Britain 77% of soil organic carbon stock is contained within peatlands, which constitute 12% of the total national soil resource. These soils are a unique and dwindling resource, requiring careful management if they are to be conserved.

The Somerset Levels and Moors is a major repository of peat soil in England, covering an area of 64,000ha and comprising of extensive grassland grazing systems with relatively low productivity but high environmental/conservation interest. Within this area sections of the West Sedgemoor site are subject to specific water management plans, used to improve wetland habitat.

Though the peat soils are highly degraded bulk density of the soil remains low ( $0.1 - 0.2 \text{ g cm}^3$ ). Soil water release characteristics show the soil is readily dewatered under high tension and that the soil has a high propensity for shrinkage (up to 40% at 15Bar). However, topographic survey at West Sedgemoor, as part of the EU EUROPEAT project, indicates little change in surface elevation over the last 10 years, implying the land use and water management strategy has mitigated against subsidence which elsewhere continues at 2-3cm p.a. Periodic flooding may allow alluvial material to suppress the mean rate of peat oxidation ( $0.04 \text{ mg CO}_2 \text{ g dry soil}^{-1} \text{ hr}^{-1}$  at 100C and 0.01Bar) when contrasted against oxidation under lower water tables ( $0.05 \text{ mg CO}_2 \text{ g dry soil}^{-1} \text{ hr}^{-1}$  at 100C and 0.05Bar).

The use of sub-surface irrigation has a significant effect on water table management, even within the areas subjected to more stringent 'raised water level' strategies. System design can dramatically alter mid field water table level; at 10m spacings the mid field water table mirrors that in surrounding ditches whilst at 40m spacing the mid field water table drops by 0.7m relative to the ditch water level in a dry summer.

Although landowners are financially recompensed for adopting such water management strategies and there are significant improvements in wetland habitat and reduced peat degradation, raised water levels can decrease the quality of surface vegetation for grazing animals; another important source of revenue for landowners. However, the farming community, represent but one group of land managers. There are many stakeholders, ranging from environmentalists to drainage engineers concerned with wetland water management plans. An investigation of all stakeholder opinions concerning socio-economic outcomes of various land and water management scenarios is underway, based on the functions, uses and values framework being developed and applied across Northern Europe. In this framework peatland functions are divided into production, regulation, carrier and information functions and refer to the goods and services these areas provide.

The use of peatlands is determined by and represents the interests of the stakeholders, with peatland values incorporating society's social, environmental and economic concerns. Elucidation of the links between the functions, uses and values, and determination of stakeholder interactions and interests is achieved through detailed case study analysis and will allow the impacts of different land use scenarios to be explored. With this understanding it will be possible to seek solutions that maintain the functional diversity and ecological integrity of peatland ecosystems whilst at the same time balancing the requirements of all stakeholders.