Better peatland management could cut half a billion tons of carbon

May 27 2021

Credit: CC0 Public Domain

Half a billion tonnes of carbon emissions could be cut from Earth's atmosphere by improved management of peatlands, according to research partly undertaken at the University of Leicester.

A team of scientists, led by the UK Centre for Ecology and Hydrology

(UKCEH), estimated the potential reduction of around 500 million tonnes in greenhouse gas (GHG) emissions by restoring all global agricultural peatlands.

Peatlands—a type of wetland, where dead vegetation is stopped from fully breaking down—cover just 3% of the global land surface, but store around 650 billion tonnes of carbon, around 100 billion tonnes more than all of the world's vegetation combined.

Dr. Jörg Kaduk and Professor Sue Page, both from the University of Leicester's School of Geography, Geology and the Environment, are co-authors of the study published in *Nature*.

Professor Page said: "Our results present a challenge but also a great opportunity. Better water management in peatlands offers a potential 'win-win' - lower greenhouse gas emissions, improved soil health, extended agricultural lifetimes and reduced flood risk.

"For agricultural peatlands, the balance is between climate security, and livelihood and food security. Our study indicates that raising peatland water levels could allow peatland farmers to both reduce the climate impact of their activities and extend the usage of these very fertile organic soils through modified land management.

"However, this will not be possible in all locations, and will need to be considered alongside other options, including complete rewetting and ecosystem restoration."

In their natural state, peatlands can mitigate climate change by continuously removing the GHG carbon dioxide (CO_2) from the atmosphere and storing it securely under waterlogged conditions. But many peatland areas have been substantially modified by human activity, including drainage for agriculture and forest plantations.

This results in the release of around 1.5 billion tonnes of CO2 into the atmosphere each year—which equates to three per cent of all global GHG emissions caused by human activities.

However, because large populations rely on these peatlands for their livelihoods, it may not be realistic to expect all agricultural peatlands to be fully returned to their natural condition in the near future.

The team therefore also analysed the impact of halving current drainage depths in croplands and grasslands on peat—which cover over 250,000km2 globally—and showed that this could still bring significant, realistic benefits for climate change mitigation. The study estimates this could cut emissions by around 500 million tonnes of CO2 a year, which equates to one per cent of all global GHG emissions caused by human activities.

Professor Chris Evans of UKCEH, who led the research, said: "Widespread peatland degradation will need to be addressed if the UK and other countries are to achieve their goal of net zero greenhouse gas emissions by 2050, as part of their contribution to the Paris climate agreement targets.

"Concerns over the economic and social consequences of rewetting agricultural peatlands have prevented large-scale restoration, but our study shows the development of locally appropriate mitigation measures could still deliver substantial reductions in emissions."

The scientists say potential reductions in GHG emissions from halving the drainage depth in agricultural peatlands are likely to be greater than estimated, given they did not include changes in emissions of the potent GHG nitrous oxide (N2O) which, like levels of CO2, are also likely to be higher in deep-drained agricultural peatlands.

The University of Leicester plays a prominent role in peatland research, as policy-makers look to make better use of this highly efficient resource. The Department for Environment, Food and Rural Affairs this month published the England Peat Action Plan, which sets out the government's long-term vision for the management, protection and restoration of peatland. The plan utilises information derived from several research projects to which University of Leicester has made key contributions, particularly on the scale of GHG emissions from peatlands in eastern England.

Dr. Kaduk and Professor Page are also working with the Department for Business, Energy and Industrial Strategy in order to better understand the role that agricultural management of peatlands plays in releasing N2O, as well as examining the long-term effects of agricultural use of peatlands.

Dr. Kaduk added: "This study is just the first step towards fully exploring the emission reductions achievable through a whole range of differentiated local mitigation measures. For example, together with our farming partners we are determining the effects of farming practices on greenhouse gas emissions."

And earlier this month, Professor Page addressed the Climate Exp0 conference on Leicester's peatland work ahead of COP26, the 2021 UN Climate Change Conference due to be held in Glasgow this November, of which the University is part.

The study in *Nature*, 'Overriding water table control on managed peatland greenhouse gas emissions', involved authors from UKCEH, the Swedish University of Agricultural Sciences, the University of Leeds, The James Hutton Institute, Bangor University, Durham University, Queen Mary University of London, University of Birmingham, University of Leicester, Rothamsted Research and Frankfurt University.

More information: C. D. Evans et al, Overriding water table control on managed peatland greenhouse gas emissions, *Nature* (2021). DOI: 10.1038/s41586-021-03523-1

Provided by University of Leicester