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Brief Report

How Can Replanting Productive Conifers on Shallow Peat Soils Affect Carbon Sequestration?

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BRIEF REPORT

A new study exposes the effects of forestry management on carbon sequestration in a Sitka spruce forest, as well as the influence of the 2018 drought. Forests in the United Kingdom are expected to have taken in 18 million tonnes of carbon dioxide in 2018. Coniferous trees, such as pines, spruces, and firs, make up almost half of the UK's forests, with fast-growing Sitka spruce being produced and harvested for a variety of timber products. These forests are mostly managed as single-species, even-aged plantations, with harvesting done by 'patch clear-felling and a growth cycle of fewer than 50 years.

This rigorous management has an impact on the forest carbon cycle by altering CO_2 uptake by trees and the release of CO_2 and other greenhouse gases from the soil, and it may help decide the size of carbon sink forests. The impact of the clear-felling and replanting management strategy on a typical upland Sitka spruce plantation on shallow peat soils is quantified by researchers. Over a four-year period, the researchers compared the carbon balance of a mature stand and a clear-felled site. The drought's effects on the forest and felled regions were revealed by the year's low rainfall.

According to the findings, clear-felling resulted in a substantial initial CO_2 release in the year following felling, which was quantitatively similar to the mature stand's net yearly CO_2 uptake, which was a powerful sink. In succeeding years, however, the establishment of regenerated seedlings and ground vegetation lowered the net CO_2 output from the clear-felled land. Notably, the clear-fell site declined to be only a weak net emitter of CO_2 in the third year following felling, the year of replanting. We infer that clear-felling and replanting for productive Sitka spruce stand on similar shallow peat soils will likely begin to recreate a carbon sink within 5 years of felling.

However, in the fourth year following falling, the drought of 2018 increased net CO_2 losses at the clear-felled site by 28%, reducing the carbon sink recovery. The drought also lowered the mature Sitka spruce stand's yearly net CO_2 uptake by 30% compared to the preceding three years, despite the fact that it remained a significant carbon sink. The conifer timber production cycle on shallow peat soils can contribute to net-zero emissions targets, according to this study. Droughts may lower our forests' contribution to these goals, therefore understanding drought sensitivity is critical for controlling climate change risk.

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