

Opening statement for the public session of the Joint Committee on Environment and Climate Action on the subject of 'sequestration and land management / nature restoration'. 22nd November 2022.

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Introduction

Before I begin, I would like to thank the Joint Committee for the opportunity to speak on the subject of 'sequestration and land management / nature restoration'.

Carbon Balance of Peatland Forests

The area of forest in Ireland is approximately 770,000 ha (11% of the total land area) [1]. Most of these forests have been established during the last century. Coniferous species cover 71.2% of the forest area and broadleaves the remaining 28.8%. In addition to sequestering atmospheric carbon Irish forests can contribute to climate change mitigation through the provision of wood products which can displace energy intensive materials in construction and energy generation [2].

Due to Ireland's relatively high rainfall and moderate temperatures our soils are very favourable to the accumulation of organic matter [3] and, consequently, carbon. Peatlands cover between 20% [4] and 25% [5] of the Irish landscape and contain two thirds of national soil carbon stocks [6]. Pristine or undrained peatlands are long-term carbon sinks [7] and sources of methane [8]. This is altered dramatically by drainage and land use change which lowers the water table and transforms a peatland from a carbon sink to a source. The amount of emissions from peat soils following drainage depends on several factors including peat type, nutritional status, hydrology and previous land use history. Afforestation has been a major driver of drainage and land use change on Irish peatlands and peat is the dominant soil type in Irish forests accounting for 38.7% of the total area [1].

When assessing the role of these forests in carbon sequestration, a key question is whether the losses of soil carbon from peatland drainage are compensated by carbon sequestration by the growing forest. Despite the prominence of peatland forests in our national forest estate, very few studies have investigated the carbon cycle in these forests. The first study of forests on blanket peatlands found that such soils emitted 0.59 tC/ha/yr [9]. Recent research has concluded that forested blanket peatlands emit 1.68 tC/ha/yr [10]. By tripling the estimated loss of soil carbon from forested peatland, this study has altered our understanding of the carbon sequestration potential of these forests.

The losses of soil carbon may be partially or wholly compensated through carbon uptake by the growing trees. The compensatory capacity will be less for low productivity compared to high productivity forests. In a recent study of Coillte forests [11] the climate impacts of rewetting 8,000 ha of low productivity peatland forests over a 50 year period was assessed. This found that such a rewetting programme would have little short-term benefit in terms of climate mitigation. Furthermore, when emissions due to deforestation are included, emissions from rewetting are 2 to 5 times greater

than the reduction in soil emissions. These findings suggest that the short-term benefits of rewetting are negative. When considered in terms of Global Warming Potential (GWP) over the full time series of the study (2021 to 2100) there is no climate mitigation benefit. This is due to the greater warming potential of methane, which is the dominant greenhouse gas emission from rewetted peatland. However, it should be emphasised that there have been very few studies of the effect of rewetting on greenhouse gas exchange in forested peatlands in Ireland [12]. Furthermore, it may take several years for the emissions reduction benefit of rewetting to occur [13]. There are also likely to be forested peatland sites, where rewetting is desirable from a climate perspective, but technically difficult to achieve due to site specific factors such as drainage, slope, hydrology or land use in adjacent areas. In such cases there is a need to develop alternative management systems such as semi-natural woodland, however research and field based assessment of such management systems is required.

Conclusion

The joint roles of forests in mitigating climate change i.e. sequestering carbon through changes in management and reduced harvest on one hand, and also providing renewable material and energy on the other [14] are, at first consideration, competing aims that are frequently investigated separately. A focus on sequestration at the cost of wood use ignores the relationship between these interlinked roles. Focusing on the management of forests to produce long-term and large-scale carbon sinks ignores (i) the risk of some forests becoming unstable as they mature [15] and thereby become carbon sources and (ii) the post-harvest role of forests in climate mitigation. Sustainable forest management can balance both of these roles. As far back as 1730 Von Carlowitz [16, cited by 14] defined sustainable forest management as 'harvest should balance growth'. This can be extended to include social and environmental roles and with regard to carbon, management of forests so that harvest removals can be made while maintaining a net carbon sink. In Ireland, this is complicated further by so-called legacy issues such as a low afforestation rate, uneven age-class distribution and a large proportion of forests on peat soils. There is a need to address these and other issues by diversifying the forest estate through a range of measures including rewetting of peat soils, semi-natural woodland on peat soils, forest management such as rotation length, diversifying species composition, and adopting new silvicultural systems such as continuous cover forestry. However, such changes should be informed, not just by investigation of the carbon balance of Irish forests, but also by interdisciplinary research that facilitates understanding of the impact of such changes on the full suite of economic, social and environmental services of our forests. This is essential if we are to harness the climate mitigation potential of our forests not just in sequestering carbon in forest ecosystems but also in providing renewable material for construction and energy.

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