



The Impact of Afforestation on the Carbon Stocks of Mineral Soils Across the Republic of Ireland.

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At the beginning of the twentieth century forests accounted for only 1% of the total Irish land cover (Pilcher & Mac an tSaoir, 1995). However, due to the efforts of successive governments there has been rapid afforestation since the 1960s resulting in a 10.0% forest land cover as of 2007 (The Department of Agriculture, Fisheries, and Food, 2007). A large proportion of this afforestation took place after the mid-1980s and was fueled by government grant incentive schemes targeted at private landowners (Renou & Farrell 2005). Consequently, 54% of forests are less than 20 years old (Byrne, 2006). This specific land use change provides an opportunity for Ireland to meet international obligations set forth by the United Nations Framework Convention on Climate Change (UNFCCC, 1992). These obligations include the limitation of greenhouse gas emissions to 13% above 1990 levels. In order to promote accountability for these commitments, the UNFCCC treaty and the Kyoto Protocol (Kyoto Protocol, 1997) mandate signatories to publish greenhouse gas (GHG) emissions inventories for both greenhouse gas sources and removals by sinks. Article 3.3 of the Kyoto Protocol allows changes in C stocks due to afforestation, reforestation, and deforestation since 1990 to be used to offset inventory emissions. Therefore, due to the rapid rate of afforestation and its increased carbon sequestration since 1990, Ireland has the potential to significantly offset GHG emissions.

There is little known as to the impacts of afforestation on the carbon stocks in soils over time, and even less known about the impact on Irish soils. The FORESTC project aims to analyse this impact by undertaking a nationwide study using a method similar to that of the paired plot method in Davis and Condron, 2002. The study will examine 42 forest sites across Ireland selected randomly from the National Forest Inventory (National Forest Inventory, 2007). These 42 sites will be grouped based on the forest type which includes conifer, broadleaf, and mixed (broadleaf and conifer) and soil type: brown earth, podzol, brown podzolic, gley and brown earth. The paired plot method involves selecting a second site that represents the same soil type and physical characteristics as the forest site. The only difference between the two sites should be the current land-use of the pair site, which should represent the pre-afforestation land-use of the forest site. Each forest site and its pair site will be sampled in the top 30 cm of soil for bulk density and organic carbon %, while litter and F/H layer samples will be taken and analysed for carbon. This data should provide an analysis of the carbon stocks of the soil and litter of both the forest site and its pair site allowing for comparison and thus the impact of afforestation on carbon stocks.

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