

## **Planters May be Barking Up the Wrong Tree**

Current thinking here in the UK and in Europe is that planting trees (afforestation), on the whole, is "good for the environment" in terms of locking up carbon emissions as a forest sink. Policies are being promoted to advocate the efficacy of planting to mitigate the effects of climate change. The voluntary forest carbon market allows commercial companies to reduce their carbon "footprint" by offsetting some of their carbon emissions by investing in new planting projects.

However, as a forester it pains me to say that the efficacy of some afforestation schemes in boreal and temperate zones, and that includes the UK, may be a cause of some concern. Recent research published in the USA suggests that forests' ability in these zones to effectively sequester CO<sub>2</sub> may be reduced and even eliminated due to where the trees are planted, land-use change and the effects these factors can have on surface "albedo". The albedo of an object is the fraction of incident solar radiation it reflects. It is mostly determined by the colour and texture of a surface. A Dartmouth-led study in the US finds that some wooded areas may be more valuable without trees, allowing the cleared landscape to reflect rather than absorb the sun's energy. In other words, it's better to have snow-covered ground act as a natural mirror to cool the climate. There is a growing body of research that suggests climatic impacts of forests are not limited to atmospheric greenhouse gas concentrations alone. The premise is that because forests are generally darker than bare agricultural land, they absorb relatively more solar radiation, which may exert a local warming influence in certain regions. Replacing snow with a surface that absorbs more sunlight, such as evergreen spruce or pine canopy, warms the area at spatial scales of hundreds or even thousands of kilometers. One study in southern Europe suggests that the cooling effect of most of the carbon sequestered by planting trees is neutralized by the warming effect of albedo changes. Another suggests it is in tropical regions where afforestation efforts need to be directed, as it is here where there is a clear and conclusive environmental benefit due to evaporative cooling.

The albedo factor in forestry has not been fully researched here in the UK and foresters will need to consider planting location (high altitude temperate afforestation "should be avoided" in snowy regions) as well as biogeophysical factors, as part of any new planting strategy. There is a possibility of managing for the albedo effect in the UK via species selection and planting more deciduous trees in particular areas so as to provide a cooling benefit by increasing the area exposed to snow in winter. Other ways to manage and mitigate the effects of albedo could include silvicultural prescriptions such as Continuous Cover Forestry (CCF), shorter harvests and agroforestry. Ignoring albedo and biophysical interactions could result in millions of pounds being invested in some mitigation projects that provide little climate benefit or, worse still, could even be counter-productive.

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