

# WEAG recommendation No 10: Increasing the integration of farming and forestry in Scotland: a summary of recent research

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## 1. Introduction

ClimateXChange<sup>1</sup> (CXC) is funded to provide robust, independent analysis and evidence to support the process of Scottish Government policy-making and implementation. One strand of CXC's planned work programme has involved analyses of the potential and limitations for woodland expansion on agricultural land. This paper has not been specifically requested by a Scottish Government policy team, but presents policy-relevant interim findings from this ongoing research programme. This brief presents a summary of research findings and is intended to provide policymakers with a better understanding of how farmers in Scotland may be further encouraged to undertake tree planting on agricultural land.

## 2. Key Points

- Integration of farming and forestry is highly desirable if woodland planting aspirations are to be achieved.
- There is evident reluctance of farmers to plant trees both in Scotland and in the rest of the UK and Ireland.
- Two main interpretations have been offered for this farmer reluctance to plant trees: behaviour and economics.
- Two recent studies undertaken by the James Hutton Institute explore farmer reluctance to plant trees. Different types of farmer are motivated to undertake different types of forestry. In Scotland amenity woodland creation was the strongest motivation.
- Customised messages to different farmer groups will help encourage tree planting.

## 3. Background

One of the main drivers of the policy for increased forest and woodland cover in Scotland is the considerable climate change mitigation potential of trees. Although there are a number of other land management interventions that can reduce carbon emissions or sequester carbon (e.g. better animal health, better feeding; or soil sequestration in permanent pasture), the per hectare volume of carbon that can be annually sequestered in woodland exceeds any mainstream and widely applicable alternative way of improving the carbon balance on land based businesses<sup>2</sup>. Other land use changes such as bioenergy production with energy crops or short rotation coppice can induce carbon savings in the energy sector by displacing fossil carbon use, but different types of woodland creation comprise a reliable and recognised way of reducing emissions, mostly by above ground carbon sequestration, but also as a result of reduced emissions from livestock or arable production systems displaced by tree planting. Only on high carbon soils does woodland creation become less attractive because of the significant loss of soil carbon.

Planting rates in Scotland over the last decade have fallen well below the targets and aspirations established by the Scottish Government, which are for 100,000 hectares of new woodland over the period 2012-22. The European Commission has argued that 20% of the spending in the new Rural Development Programme should relate to climate change mitigation and adaptation. The expansion of woodlands could form a significant part of Scotland's efforts to achieve this target.

<sup>1</sup> [climatexchange.org.uk](http://climatexchange.org.uk)

<sup>2</sup> European Commission, (Undated) European Climate Change Programme (ECCP) Working Group: Sinks Related to Agricultural Soils, Final Report.

As the major land user in Scotland, farmers might be anticipated to be primary agents in this land use change. However, evidence suggests that there is reluctance amongst farmers to undertake tree planting.

Both the Forestry Commission Scotland and Defra have recently commissioned research to explore what might stimulate higher rates of tree planting by farmers. This brief summarises the findings of each of these studies, providing insight into how farmers may be better engaged and encouraged to undertake woodland planting and/or management.

#### 4. Climate Change Mitigation Potential of Woodland Planting

The technical capacity for forestry-based climate change mitigation rests on the capacity for trees to sequester carbon in their biomass and potentially increase soil carbon storage. The net sequestration rate depends on (a) the carbon costs of establishing forests – for example, drainage of peatlands or peaty soils to plant trees is known to release significant amounts of CO<sub>2</sub>; (b) the growth rate of the trees planted and their sequestration potential; (c) the impact of woodland planting on soil carbon storage; and (d) any carbon loss and other emissions during extraction and distribution and the use to which any wood raw material is put. Of course, where wood raw material is used for biomass-based heating systems, the likely displacement of non-renewable oil and gas by woody biomass means that there are substantial net savings of carbon as the growing cycle is repeated, with emissions savings on every cycle, as long as non-renewable carbon or hydrocarbon provided the alternative fuel source. The climate mitigation potential will necessarily vary from one type of forestry to another. Some new planting schemes of slow-growing native species will sequester carbon very slowly, but will release little carbon for a long period of time. In contrast, short rotation coppice will release CO<sub>2</sub> in regular pulses but will then re-sequester carbon in the next growth period relatively rapidly. If that biomass production system is replacing non-renewable carbon and hydrocarbons in heating systems or electricity production, the reduction in net GHG emissions may be significant (Matthews et al 2014)<sup>3</sup>.

#### 5. Barriers to Woodland Planting by Farmers

Increasing woodland cover on farms has proved controversial with some in the UK farming community. Many farmers are reluctant to plant trees on what is perceived as 'good farmland'. There are two rather different interpretations of the slow planting rate by farmers which appears to differentiate UK and Irish farmers from many continental European counterparts. One group of researchers attributes this negative approach to trees to deeply embedded farmer attitudes and values, possibly partly influenced by the historic role of trees under a landlord-tenant system, where trees and woodland on a farm were landlord's property. It is argued by such '*behaviourists*' that this still shapes the attitudes of many farmers who may now be owner occupiers but whose fathers or grandfathers may well have been tenants. A second school of thought argues that the economic incentives to plant and manage trees are simply insufficient to justify farmers' interest. Here, the clear implication of the '*economists*' is that increased farm woodland activity is contingent either on price changes which favour woodland or on policy measures which alter the balance of benefits in favour of forestry. Of course, attitudes and economics may well interact to shape individual decisions and the weighting will almost certainly vary greatly from farmer to farmer.

#### 6. Research Findings

##### 6.1 – Introduction

The first study was conducted for Forestry Commission Scotland and relates only to Scottish farmers. It was based on 12 in-depth case studies with the information derived from an interview survey with farmers who were identified by key public sector informants as having engaged with farm-scale tree planting. The second study relates exclusively to English farmers and other land managers and is included because it approaches the same issue of reluctance to plant trees by a very different methodological pathway: a large-scale sample survey of all rural land use holdings, using segmentation techniques to identify land managers who might plant trees.

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<sup>3</sup> Matthews R et al. (2014) Carbon impacts of using biomass in bioenergy and other sectors: forests, DECC project TRN 242/08/2011 Final report: Parts a and b.

## 6.2 - Forestry Commission Scotland

The Forestry Commission Scotland commissioned the James Hutton Institute and others to explore barriers to woodland planting and the economics of farm woodland management using a case study approach.

The project<sup>4</sup> focussed on case studies representing different styles of forestry: four were explored and a fifth was identified as meriting further investigation. These comprised:

- Production forestry (normally with conifers)
- Amenity forestry (mixed woodland or broadleaf dominated)
- Shelter belts (mixed species but often commercial conifers)
- Agroforestry/silvopastoral systems (highly varied but mostly broadleaves)
- Short rotation coppice (mostly willow)

The survey to gather information for the case studies elicited information on motivations, economic effects and future intentions. Motivations included profit-seeking new enterprise creation, taking responsibility for reducing greenhouse gas emissions, providing local energy systems, and enhanced amenity, with the latter being the most common. Benefits were seen in increased income and enhanced capital values, but also in terms of a sense of wellbeing. Some farmers were engaging with tree planting primarily for environmental reasons but almost a third of the case study farmers were growing to supply their biomass heating systems.

## 6.3 - Defra

The James Hutton Institute has also carried out research for Defra<sup>5</sup>. This study used a large survey of English farmers and a segmentation approach to identifying those who are more interested in tree planting. The study focussed on segmentation of farmers with respect to their attitudes and propensity to plant trees.

Based on quantitative analysis, five groups were identified: 'Pragmatic planters'; 'Willing woodland owners'; 'Casual farmers'; 'Business-oriented farmers'; and 'Farmers first'. Each segment comprised between 17 and 23% of the total, so are all of a similar size. The regional distribution of types showed no marked variation but the biggest number of 'willing woodland owners' were in London and the South East, the West Midlands and the North East of England. Dairy farmers and pig farmers were seen as the least likely to plant trees and livestock farmers as most likely.

An important finding of this research was that, in order to encourage tree planting, each segment should be targeted with relevant support and advice that relates to their motivations.

## 7. Conclusions

These two studies and a review of the wider literature show that there are both attitudinal and economic barriers to additional woodland planting by farmers. The attitudinal barriers are likely to be less for non-mainstream farmers and for farmers who have consciously restructured businesses to create more resilient, multifunctional, and often less intensive, land based enterprises. In such cases, the opportunity costs of woodland planting are often low as farming is often less intensive. Among such land managers, there is also often less behavioural reluctance, a less fixed mind-set and a willingness to develop land uses which meet land management aspirations that extend beyond farming. Where farmers have used new policy means, such as the Renewable Heat Incentive (RHI), this has dramatically improved the economics of woodland management and incentivised a more productive woodland management, with self-evident carbon savings. The recent introduction of the

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<sup>4</sup> Slee, B, Kyle C and Polson, R., (2013) Technical Advice on WEAG Recommendation 10: Integrating woodland management and farming, Report to the Forestry Commission, Scotland.

<sup>5</sup> Quick, T., Smith, S., Johnson, M., Eves, C., Langley, E., Jenner, M., Richardson, W., Glynn, M., Anable, J., Crabtree, B., White, C., Black, J., MacDonald, C., and Slee, B. (2013). *Analysis of the potential effects of various influences and interventions on woodland management and creation decisions, using a segmentation model to categorise sub-groups - Volume 4: Woodland creation segmentation and assessment of interventions*. Draft report Defra, London.

domestic RHI will offer significant financial incentives to engage with woodland management and may trigger new interest in planting trees as a bioenergy source. More effective promotion of RHI might encourage further and faster adoption by rural land managers, who are often well placed to exploit its opportunities.

The Scottish research identifies farmers who are interested in and have engaged in woodland planting and management. They are exemplars of good practice and it is hoped that by illustrating their different approaches others will be stimulated to engage in woodland creation. The English research, which is based on a much larger sample of farmers, shows that there are some large segments of the rural land managing community which are currently reluctant and are likely to remain reluctant to plant trees. They may be more responsive to financial motivation than behavioural nudge.

Recent planting rates have fallen well below the planting aspirations identified in the WEAG study. Should there be a desire to increase the rate of woodland planting above current levels, there is almost certainly a case for better matching the message to the particular segment or sub-set of land managers, and of allocating scarce resources of support to those most likely to respond. In other policy areas, formal rewards for avoiding pollution and/or penalties for heavy emitters have been fundamental principles of European environmental policy, on the basis of the polluter-pays and provider-paid principles, so policies that reward sequestration could be considered for woodland planting. The Europe 2020 targets and the imperatives identified in the new 2014-20 Rural Development Programme flag the need for the rural land use sector to help meet climate change objectives, so the case for developing new policy possibilities in the Scottish Rural Development programme is strong. Tradable emissions reductions to ensure that any such reduction takes place in the most cost-effective way could also be considered. This would prompt engagement by rural land managers whose opportunity costs were lowest and could provide an opportunity for brokerage for bodies such as SAOS or machinery rings who have been instrumental in supporting wood energy initiatives.