Forests and Climate Change

CLI-MIT (Climate change mitigation and adaptation in Irish forests)

Programme leader: Dr Kevin Black

There is now convincing scientific evidence that global climate change is occurring rapidly as a result of human activities, such as fossil fuel burning and deforestation. Global and regional climate change will create many challenges and opportunities for Irish forestry. However, the development of an adaptive strategic climate change plan for the forestry sector is dependent on the delivery of recommendations from the national forests and climate change research programme - CLIMIT (2007 to 2012). The objectives of the programme are based on national policy requirements and Kyoto reporting commitments. The programme includes five different projects, broadly divided into two core activities:

Mitigation and carbon sequestration

Newly planted forests (post-1990), in particular, offer the potential to offset CO_2 emissions by taking up and storing carbon in forest biomass and soils. The sequestration potential of these forest sinks has been substantially enhanced by the afforestatation of more than 250,000 ha since 1990 on foot of state and EU funded grant and premium payments.

Under the Kyoto Protocol, Ireland is committed, over the period 2008-2012, to reducing greenhouse gas (GHG) emissions to a level of 13% above the 1990-base year level. Currently, GHG emission levels are 23% above the 1990 level. Assuming business-as-usual it is estimated that the contribution of afforestation since 1990 (Article 3.3) can offset ca. 16% of the required GHG emissions for the first commitment period between 2008 and 2012. Estimation of the extent to which forests will sequester carbon in the mid to long term is more uncertain due to spatial heterogeneity and temporal variability.

The Irish forest carbon reporting system (CARBWARE) was initially implemented in 2004 to meet reporting requirements to the United Nations Framework Convention on Climate Change (UNFCCC) on all national forest sources and sinks. While CARBWARE indicates the likely contribution of forests to national carbon sink potential, the system has relied on the use of generalised stand growth models to describe changes in forest carbon stocks. The availability of detailed national forest inventory (NFI) data and new research information now provide the opportunity to redesign CARBWARE to improve estimates of national forest carbon stock changes. Experimental and observational research information, obtained from the CARBiFOR II and FORESTSOILC projects, will provide additional updated information to support CARBWARE. A further project, WOODCARB, will investigate storage of carbon in harvested wood products.

Adaptation to climate change

Given the predicted change in the Irish climate over the next century and the relatively long period between forest establishment and final harvest, some species may not be fully suited to future climate that will arise within one or two rotations. Clearly therefore, the suitability of forest species under future climate regimes requires consideration now. The aim of the CLIMADAPT project is two-fold. First, to develop a GIS decision support system for species selection and productivity based on current climate, site attributes and soil types. This system will be further developed to assess the sustainability of current forest species and suggest the introduction of new species or management strategies under future climate change scenarios. The sequestration potential of forests under future climate change scenarios will also be investigated and incorporated with the CARBWARE model.

In addition to research activities, the CLIMIT programme will also provide on-line advice on forestry and climate change for the public and forestry stakeholders. This will include the provision of decision-making tools such as the CLIMADAPT species selection and productivity software for forest management, and educational support, such as a carbon sequestration calculator. The website will also have Frequently Asked Questions and Answers, such as 'how is carbon taken up and stored by forests?' or 'how much carbon does a tree take up in its lifetime?'

The CLIMIT programme comprises the following projects:

- **CARBiFOR II**: Carbon sequestration by Irish forest ecosystems.
- **CARBWARE**: Development of tools and systems for reporting on forest carbon stocks and stock change under the Kyoto Protocol and the UNFCCC.
- **CLIMADAPT**: The use of Ecological Site Classification for productivity and species suitability under future climate change scenarios.
- **FORESTSOILC**: Soil carbon stock changes and greenhouse gas fluxes in Irish forests.
- **WOODCARB**: Carbon stocks and carbon changes in harvested wood products.