CLIMIT

CLIMADAPT

The use of Ecological Site Classification in adapting forests and their management to climate change

PROJECT TEAM
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COMPLETION DATE
May 2009

OBJECTIVES
- Develop an Ecological Site Classification (ESC) system for Ireland to be used as a guide for species selection and the production of productivity maps based on soil, climatic and site specific data.
- Developing a knowledge-base of climate change adaptation strategies including species choice and silvicultural modifications, and climate change impact scenarios, such as change in the risk of pests and diseases.
- Validation of the ESC yield models for a limited number of species (possibly Sitka spruce, Norway spruce, Douglas fir, hybrid larch, oak, beech, sycamore) dependant on the availability and range of species included in the national inventory.
- Developing an internet-based end-user GIS system as a decision making tool for forest managers and policy makers.

PROGRESS
Productivity models
The suitability of forest species for specific sites and climatic conditions is based on knowledge based models. Using this information is the first step towards developing fine resolution productivity maps. A knowledge based species suitability model was developed following a Delphi group meeting, which discussed how to adapt the guidance in the COFORD publication *A Guide to Forest Tree Species Selection and Silviculture in Ireland*[*] (Horgan et al. 2004) for the CLIMADAPT Decision Support System (DSS). Climate information will be added to guidance in the book to provide a DSS tool for forest planning, based on future climate scenarios (Figure 1).

The project will also investigate the use of statistical and process based productivity models as input variables for the DSS. A COFORD-funded CLIMADAPT PhD, based at UCD, will test the hypothesis that the productivity and suitability of drought sensitive species such as Sitka spruce and beech have not been constrained by climatic factors in Ireland. The approach will examine stands on similar soil types across a summer moisture gradient from the west of Ireland to eastern England/Scotland.

The classification of forest soil types on an edatopic grid, using ESC soil moisture regimes (SMR) and soil nutrient regimes (SNR), was completed following discussion by the Delphi group. The robustness of the classification will be tested from a re-assessment of forest soil surveys. A method for coupling climatic moisture deficit and soil moisture regime has been completed.

Forests and Climate Change

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*   Horgan, T., Keane, M., McCarthy, R., Lally, M. and Thompson, D. 2004. *A guide to forest tree species selection and silviculture in Ireland.* COFORD, Dublin.
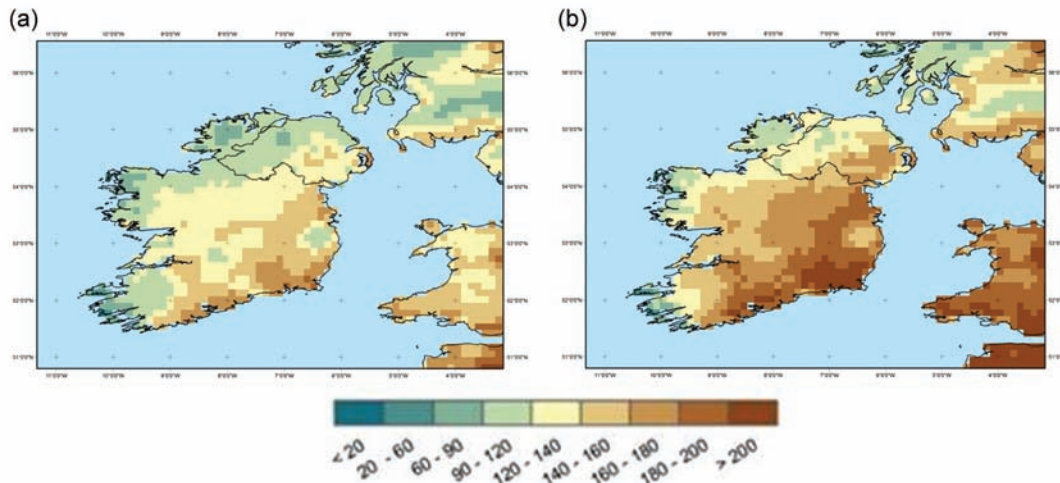
Figure 1: Average moisture deficit (mm) calculated for two 30-year climate periods from c4i regional climate model simulations, for a) the baseline period 1961-1990, and b) the period 2051-2080 for the medium-high carbon dioxide emissions scenario.

Climate change models

The spatial climate data have taken some time to compile. Since Met Éireann supplied gridded data in May 2007, the accumulated temperature index, and moisture deficit index for Ireland for the baseline period and for simulated climate change scenarios have been calculated. Major changes are expected in terms of warmth and summer drought; both factors are important for tree growth and survival. Figure 1 shows a comparison of the measured 30-year mean moisture deficit (MD - a droughtiness index) for the baseline period (1961-1990) and simulated for the period 2050-2080 for a medium-high carbon dioxide emissions scenario.

The impact on trees of frost, wind exposure and other factors needs further research. A wind exposure index calculation (DAMS) for Ireland was completed. The method must now be checked and validated, using daily point wind data from meteorological stations, from which wind speed distribution will be calculated.

ACTIVITIES PLANNED

- Completion and testing of the spatial climate data to be used.
- Description of the soil quality classification with the national soil map.
- Completion of the knowledge-based suitability and yield models.
- Completion of the functional and technical specification of CLIMADAPT for review.

OUTPUTS

Ray, D., Xenakis, G., Semmler, T. and Black, K. (in prep). *The impact of climate change on forests in Ireland and some options for adaptation.* Proceedings of the conference Forestry, carbon and climate change – local and international perspectives. 19 September 2007, Glenview Hotel, Co Wicklow, Ireland, COFORD.

Ray, D., Avery, R. and Xenakis, G. *Report of the expert workshop for tree species suitability in Ireland.* Held at University College Dublin, July 2007.

Ray, D. CLIMADAPT presentation to the CLI-MIT international review team at Glenview Hotel in September 2007.