

Intensive Long term Monitoring of Irish Forest Ecosystems

Irish Forest Ecosystems (Overview July 2010)

Background

Ireland has been involved in one of the world's largest bio-monitoring networks for more than 20 years. This pan-European network (ICP Forests*) was established in the early 1980's in response to concerns raised over the health of European forests, evident from an observed deterioration in the condition of trees across many regions of Europe.

In tandem, several forest health policy driving processes were initiated, most significantly, the Ministerial Conference for the protection of Forests in Europe (MCPFE), Convention on Long-range Transboundary Air-Pollution (CLRTAP), and the Kyoto Protocol.

Data collected through the pan-European forest monitoring network is used by key policy makers to aid policy formulation in the areas of clean air, nature conservation, biodiversity, sustainable forest management, the protection of freshwater resources, and climate change.

Ireland has made a commitment, at a Ministerial level along with other Member States and signatory nations, to supply to the EU annual forest data which it obtains from the Irish network.

Monitoring network

Currently, there are 40 plots in the Irish network comprising of two components; representative surveys (Level I network), and intensive monitoring (Level II network).

Representative surveys (Level I)

Representative surveys provide information on the current state and changes taking place in the forests over extensive areas. Central to this work is the annual *Crown Condition Survey*. This survey utilises tree crown density as a measure of tree response to environmental change.

Presently, 37 Level I plots are surveyed each year in Ireland. These plots were selected using a systematic grid of 16km X 16km covering Ireland. Trees are assessed on the basis of defoliation, discolouration, mortality, and damage causes. Data from Ireland as well as 38 participating countries (6,000 plots) is submitted to EU/ICP forests annually.

Results collected in 2008 classify 21% of EU trees as damaged. Of the species monitored, European oak and sessile oak have consistently shown the highest levels of damage. Beech, which had been significantly damaged by extreme heat and drought occurring in central Europe in 2003, has been shown to have recovered in subsequent years. There have been slight overall improvements in the condition of Scots pine and Norway spruce since the late 1990s. Insects, pests, fungi, drought, snow, and storms are among the most frequent causes of direct damage to trees; damage which is exacerbated by air pollution and changes in climate (Fischer et al, 2009).

In Ireland of the three species assessed in 2008, Norway spruce showed the highest level of damage (15.7%), followed by lodgepole pine (13%), and Sitka spruce (6.9%). These levels do not vary significantly from those recorded in 2006 and 2007. Exposure continued to be the greatest single cause of damage to trees in the Irish environment.

Intensive monitoring (Level II network)

* ICP Forests- International Co-operative Programme on Assessment and Monitoring of Air Pollution effects on Forests. <http://www.icp-forests.org>

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Intensive monitoring investigates the ecological processes and cause-effect relationships within forest ecosystems. In Ireland we have three intensively monitored plots; Ballinastoe (Co Wicklow), Cloosh (Co Galway), and Brackloon (Co Mayo). While these plots are central to the detection of changes in forest growth, they also, importantly, provide the means to explain observed changes.

Table 1

List of measurements and timing frequencies made on Level II Intensively managed plots

Measurement	Frequency	Comments
Tree growth	Every 5 years	
Crown density	Annually	
Foliar chemistry	Every 2 years	
Soil (Chemistry and description)	Every 10 years	Last in 2006
Litterfall	Monthly	
Deposition	Weekly	
Air quality	Monthly	
Soil solution	Every 2 weeks	
Meteorology	Daily	From 2010
Phenology	Weekly	During vital growth phases
Ground vegetation	Every 3 years	
Leaf Area Index	Annually	



Figure 1

Level II Intensively managed plot at Cloosh Co. Galway

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Figure 2
Ambient air quality sampling at
Ballinastoe Level II plot



Figure 3
Deposition sampling at
Ballinastoe Level II plot

Monitoring Objectives

- Understand the fate of atmospheric pollutants in a range of managed forest ecosystems (i.e. their accumulation, distribution, release and patterns of release and leaching).
- Identify the cause-effect relationships which explain the extent to which air pollution and other abiotic (e.g. varying climate conditions, storms, and fire) and biotic (e.g. parasites, invasive species, livestock, and newly emerging diseases) stress factors are responsible for observed changes in the conditions of our forests.
- Determine critical levels/loads of atmospheric pollutants (SO_2 , NO_2 , NH_3 and heavy metals such as Cu, Cr, Zn, Cd, Ni and Pb) for managed Irish forests under existing and predicted climate conditions.
- Develop and test indicators that can be used to assess biodiversity changes and the long-term sustainability of forest ecosystems.

Funding

The programme has historically been funded by the Irish Forest Service, Department of Agriculture, Fisheries and Food, with various periods of EU contributions.



The current programme (2009-2010) is funded jointly through the LIFE+ Futmon project LIFE07 ENV/D/000218:

<http://www.futmon.org/>

Reports and other publications related to FutMon are available at:

* ICP Forests- International Co-operative Programme on Assessment and Monitoring of Air Pollution effects on Forests. <http://www.icp-forests.org>

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<http://www.futmon.org/Results.htm>

The FutMon project is currently implemented by Coillte in partnership with UCD.

The logo for Coillte, consisting of the word "coillte" in a stylized, green, lowercase font.

Previous funding programmes:

- 2007-2008 The Forest Service was the sole funding agency in the absence of EU funding.
- 2003-2006 Regulation (EC) 2152/2003 (Forest Focus) joint funding from Forest Service and EU.
- 1986-2002 Regulation (EEC) 3528/86 joint funding from Forest Service and EU.