4.8 Fire Disturbance

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Along with fossil-fuel burning and agriculture, vegetation fires are one of the largest contributors globally to human-caused greenhouse gas emissions. When associated with deforestation they cause significant ecosystem disturbance and also reduce the potential of vegetation to act as a carbon store. Most fires are due to human causes, whether deliberate or unintentional. In Ireland fires are often set to clear gorse but can spread to adjacent forest areas. Occasional incidences of bog fires which release carbon from peat also occur.

Photo: © Peadar McMahon

Measurements

The area of vegetation burned each year in Ireland is not surveyed explicitly. Estimates of forest-burned area for reporting to the UNFCCC are based on replantation premiums provided to fire-affected landowners by the Forest Service. Data on other vegetation fires are not compiled centrally. Satellite data are used internationally to make regional and global estimates of fire disturbance and their impact on the atmosphere. Frequent cloud cover and the small size of the burnt area in Ireland limits the usefulness of satellite imagery. Daily fire risk is assessed by Met Éireann using meteorological variables.

‘Using information on replantation premiums provided by the Forest Service, it is estimated that since 1990 on average 340 Ha of forest burns in Ireland each year.’

Time-series and Trends

Figure 4.14 shows forest burned area, based on the number of hectares of forest for which replantation grants were provided by the Forest Service. The amount of land under forest has been steadily increasing due to the government's afforestation policy and fires occur more frequently in younger rather than mature forest.

Met Éireann forecasts daily fire danger at some of its synoptic stations using a model which incorporates the most recent meteorological observations. Figure 4.15 shows the number of days per year since 1971, during the fire season, when danger of fire was considered very high or extreme based on Dublin and Shannon synoptic data. There is no long-term trend evident in this data.

Smoke plumes from a number of large fires can be seen on the image from 2 May, 2011 illustrated in Fig. 4.16. The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's *TERRA* satellite acquired the image, and the fires the sensor detected are highlighted
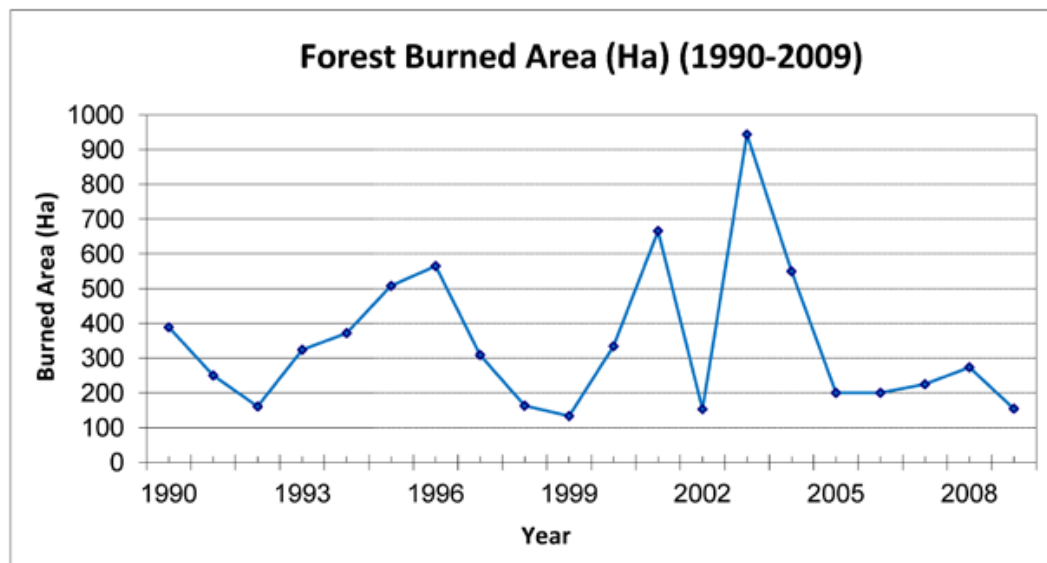

Figure 4.14. Forest burned area estimates based on hectares of forest for which replantation grants were provided by the Forest Service (1990–2009).
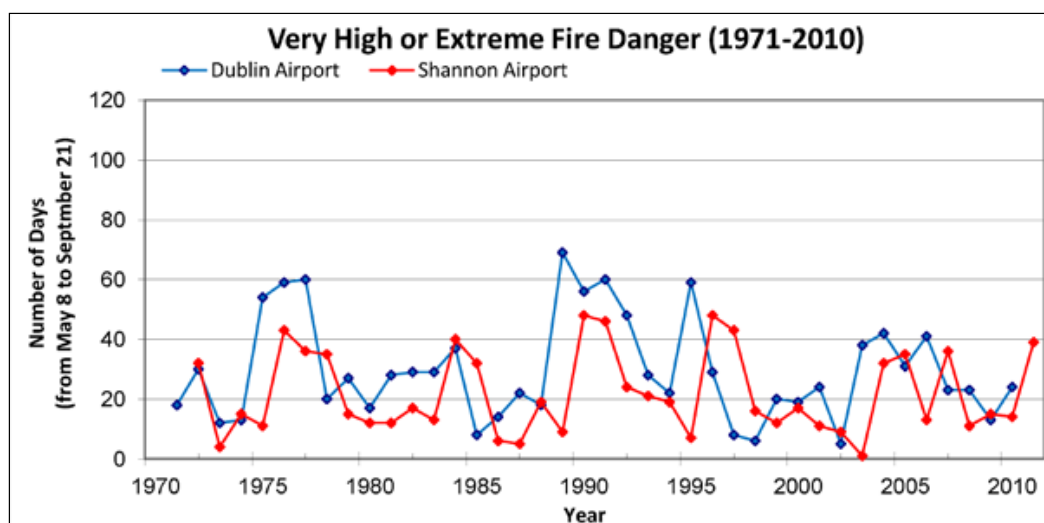

Figure 4.15. Number of days on which the fire index was very high or extreme as calculated using data from Dublin airport and Shannon airport synoptic stations (1971–2010).

Figure 4.16. A *MODIS TERRA* satellite image from 2 May 2011 shows smoke plumes from a number of vegetation fires. Fire locations are highlighted in red.

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in red.[23] Dry, windy weather during early May allowed numerous fires, many of which had been set deliberately, probably with the intentions of burning gorse, to spread rapidly.

> 'It would be useful to record and collate the location and extent of forest fires and if possible other vegetation fires.'

Maintaining the Observations

Met Éireann calculates daily fire risk as part of its operational procedures. The Forest Service and Coillte maintain a record of area burned for replantation grants. It would be useful to record and collate the location and extent of forest fires and if possible other vegetation fires. Research into the potential of using remotely sensed imagery to map burned areas would be valuable. Further analysis of the historical fire risk data should be carried out.

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23 NASA image courtesy Jeff Schmaltz, MODIS Rapid Response Team at NASA GSFC.

Further Information and Data Sources

Davies, D., Kumar, S. and Descloitres, J. (2004) Global fire monitoring using MODIS near-real-time satellite data*, GIM International,* Vol. 18, No. 4, pp. 41–3.

Giglio, L., Descloitres, J., Justice, C. O. and Kaufman, Y.J. (2003) An enhanced contextual fire detection algorithm for MODIS, *Remote Sensing of Environment,* Vol. 87, pp. 273–82.

Holden, N. M., Hochstrasser, T., Schulte, R. P. O., Walsh, S. (eds.) *2007 Making Science Work on the Farm. A Workshop on Decision Support Systems for Irish Agriculture,* Published by Joint Working Group in Applied Agricultural Meteorology: http://www.ucd.ie/agmet/Agment_workshop_online_version.pdf

MODIS Rapid Response System: http://rapidfire.sci.gsfc.nasa.gov/

MODIS images of fires in Ireland and Scotland in May 2011: http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=50468

ATSR World Fire Atlas: http://due.esrin.esa.int/wfa/

Ireland's Greenhouse Gas Inventory (including forest burned area as reported to the UNFCCC): http://erc.epa.ie/ghg/crfdownloads.jsp