

# **SECTION 1**

## **Key activities & Results**



## **Key activities and results for 2001-2002**

### **Land Use Change and Forestry: The 2000 UK Greenhouse Gas Inventory and projections to 2020**

- The Removal of atmospheric CO<sub>2</sub> to Woody Biomass Stocks caused by expanding UK forests in 2000 was estimated to be 7157 Gg with an additional sink of 1151 Gg to forest products.
- For 2000 the Emission of CO<sub>2</sub> from soils due to land use change was estimated to be 11744 Gg compared to 14187 Gg in 1990.
- The Land Use Change and Forestry Sector of the UK is estimated in 2000 to have been an overall emitter of carbon dioxide of 3355 Gg due to Emissions of 15008 Gg offset by 11633 Gg of Removals.
- UK specific Sectoral Background Tables for the Land Use Change and Forestry Sector under the Common Reporting Format are presented.
- Projections of Removals and Emissions for the Land Use Change and Forestry Sector up to the year 2020 are presented.

### **Methodological developments for the UK LUCF GHG Inventory**

- Land use and land use change data from the Countryside Survey 2000 using Broad Habitat classification for 1984, 1990 and 1998 is compared with Land Use Survey and Monitoring Landscape Change data for 1930, 1947 and 1980. It is concluded that future estimates of the effect of land use change on soil carbon should be based on the Countryside Survey data with the Land Use survey as a past reference point.
- Results from measurements of carbon exchange along a chronosequence of conifer forests established on peatland have been used to provide alternative estimates for the net uptake of carbon by UK afforestation. Under the assumption that all conifer afforestation in the UK can be represented by the conditions for the chronosequence there is little net effect on losses of carbon from the previously undisturbed peatland. However if the soil organic matter generated by the new conifer forest is taken into account the net uptake of carbon by UK afforestation would be about 1.5 Mt a<sup>-1</sup> greater than is presently reported.

### **Field Measurements of Carbon Loss Due to Ploughing**

- Instrumentation installed at Poldean Farm but measurements delayed for one year due to Foot and Mouth Disease restrictions. Measurements began over unploughed field in March 2002.
- Initial vegetation and soil carbon samples have been obtained
- Preliminary flux measurements for the site are presented.
- The field will be ploughed imminently when soil and wether conditions are suitable.

### ***Linking Soil and Vegetation Carbon in Dynamic Models***

- RothC and Biota models have been compared for estimating soil carbon.
- Fair agreement for soil carbon at the Highfield and Doo Brae sites was achieved

- The methods for estimation of soil water used by the two models are highlighted as possible reasons for the differences between the calculated and field values for soil carbon.
- The results from the comparisons encourage further development of the Biota model as a tool suitable for carbon dynamics studies in a range of agricultural and other situations.

### **Mapping of carbon uptake in British woodlands and forests using EuroBiota and C-Flow**

- Estimates of carbon exchange for the woodland in each 20 km x 20 km grid cell of Great Britain are presented.
- Estimates from the C-Flow and EuroBiota models are compared.
- The total uptake of carbon by the woodland in 1990 calculated by summation of the C-Flow data from the individual cells compares well with estimates at the national scale as included in greenhouse gas inventories.
- Broadleaf woodland area estimated from annual Forestry Commission planting statistics is shown to under-represent standing area.
- Broadleaf woodland planted before 1920 and a significant proportion of that planted later is therefore excluded from existing inventory calculations.
- EuroBiota predicted that broadleaf woodland was a larger sink than conifer woodland in 1990 in contrast to the inverse result from C-Flow. Further investigation of the EuroBiota parameters is therefore required.

### **Deforestation rates in the United Kingdom**

- Independent estimates of the total GB forest area were obtained from the FC Woodland Census, the National Inventory of Woodland & Trees, and the Countryside Survey but a statistically significant deforestation rate was not detectable.
- Deforestation rate were also calculated as the sum of transitions from all forest classes to all non-forest classes in the repeated samples of the National Countryside Monitoring Scheme (NCMS) and the Countryside Survey. The NCMS data was scaled to give a GB deforestation rate of  $\sim 1000 \text{ ha y}^{-1}$ , whilst the Countryside Survey gave a value of  $\sim 20000 \text{ ha y}^{-1}$ .
- Further approaches to being taken to explain this large discrepancy are described.
- In the absence of better information, our best estimate of the GB deforestation rate is  $1000 \text{ ha y}^{-1}$ , based on the NCMS Scottish data.

### **Modelling the impact of climate change and nitrogen deposition on carbon sequestration of UK plantation forests.**

- Future climatic conditions,  $[\text{CO}_2]$  and nitrogen deposition rates will enhance both coniferous and deciduous forest productivity across the UK. Hence stimulating carbon sequestration rates.
- Mean YC values are predicted to increase from present day values by 65 % for conifer plantations to 78 % for broadleaves. The highest YC values in 2080 were 22 for conifers and 10 for broadleaves.
- Nearly 50 % of the increase in tree C content of coniferous forests can be attributed to increases in N deposition rates, while changes in soil C were primarily influenced by  $[\text{CO}_2]$ .

## **Forest Research Projects**

- ***Permanent mensuration sample plots***
  - The sample plot network has provided, and continues to provide, a national reserve of periodic growth and yield data for a wide range of species, sites, yield classes and management treatments which supports measurement, growth and yield studies.
  - Establishment of plots has been subject to constraints and there remains a number of gaps in data for particular tree species combinations or management practices.
- ***Evaluation and comparison of CFLOW and CARBINE models***
  - Cross comparison will be carried out of the structure and output of the two models applied to UK afforestation
  - Planned benchmarking against alternative methods using field data is also described

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