

SECTION 9
**Review of data sources for estimation of
deforestation rates in the United Kingdom.**

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SUMMARY

A commitment by the United Kingdom to the Kyoto Protocol or any related accounting procedure will involve the periodic reporting of national statistics for emissions by sources and removals by sinks arising from afforestation, reforestation and deforestation. The objectives of this study were to review available estimates of the current rate of deforestation in the UK and assess their reliability, to evaluate data sources that might provide alternative or improved estimates, and to make recommendations for revision or improvement of estimates as appropriate. Estimates of deforestation rates are available directly or implicitly in publications based on the Countryside Survey and Forestry Commission records. Estimates for Britain or the UK covering periods within the interval 1984 to 1998 that can be derived from readily accessible published reports range from 2,800 ha y⁻¹ to 14,500 ha y⁻¹. Although the range of estimates is clearly higher than an initially postulated rate of deforestation of 500 ha y⁻¹, it is difficult to justify revising this estimate at this stage, given the apparent disagreement between sources, known limitations in some aspects of the analysis and wide confidence intervals on some estimates. Prior to commissioning new research, discrepancies between Countryside Survey 2000 data and National Inventory of Woodland data should be fully explored, and, if they cannot be resolved, further research should be considered. Options for alternative approaches are limited, though satellite-derived data coupled with extensive validation on the ground offer a possible approach.

INTRODUCTION

A commitment by the United Kingdom to the Kyoto Protocol (UNFCCC, 1998) or any related accounting procedure will involve the periodic reporting of national statistics for emissions by sources and removals by sinks of greenhouse gases arising from forestry activities, notably afforestation, reforestation and deforestation (ARD). This will require underpinning data on past and current rates of ARD. The British Forestry Commission maintains data on creation of new forest areas and restocking of existing forest areas. Records for the last 10 years suggest that presently new forests are being created at a rate of about 17,000 ha y⁻¹ for the period 1990 to 2000. Records of restocking rates help to confirm that the forest area is being maintained. There must also be some loss of forest areas to other land-uses such as housing or restoration of non-wooded habitats. The presumption is that deforestation is occurring at a near-negligible rate when compared to the rate of afforestation, and an estimate of the order of 500 ha y⁻¹ has been postulated.

The objectives of this short study were:

- To review available estimates of the current rate of deforestation in the UK and assess their reliability.
- To evaluate data sources that might provide alternative or improved estimates.
- Make recommendations for revision or improvement of estimates as appropriate.

REVIEW OF AVAILABLE ESTIMATES

Countryside Survey

The DETR Countryside Survey is carried out by the University of Nottingham and the Centre for Ecology and Hydrology and includes a detailed survey of land cover for a statistical sample of 1 km grid squares in Britain. Surveys have been carried out in the years 1978, 1984, 1990 and 2000, with results from the latest survey published very recently (Haines-Young *et al.*, 2000). Land cover recorded in 381 grid squares surveyed in both 1984 and 1990 have been compared and upscaled to infer changes in land cover including ARD (Haines-Young *et al.*, 1995). Summary statistics for the period 1984 to 1990 suggest an annual increase in forest area (defined in the survey as coniferous woodland, mixed woodland and broadleaved woodland) of 17,500 ha y⁻¹, an estimate in line with Forestry Commission records of new planting. However underlying this net value are estimates for afforestation and deforestation rates of 32,000 ha y⁻¹ and 14,500 ha y⁻¹ respectively, both of which appear implausibly high when compared to Forestry Commission records of new planting. Reported standard errors associated with estimates of afforestation and deforestation rates can be relatively large and for some individual elements indicate that wide confidence intervals should be attached to these estimates. As an example, crude approximation from these standard errors of a lower confidence interval estimate of deforestation for the three categories of woodland described above suggests a value of 5,500 ha y⁻¹. Discrepancies between Countryside Survey 2000 estimates of forest area and Forestry Commission statistics from the National Inventory of Woodlands (see below) are acknowledged and differences in survey methodologies and definitions are suggested as potential causes (Haines-Young *et al.*, 2000). As for Countryside Survey 1990, the 2000 Survey reports higher estimates of turnover of woodland areas than is recorded by the Forestry Commission.

Forestry Facts and Figures

Forestry Facts and Figures is an annual publication of the Forestry Commission that reports statistics on forest areas for a stated year and annual records of new planting. Annual net changes in forest area can be inferred by comparing statistics from published values of forest area for successive years. When these are combined with reported values for annual new planting, a theoretical rate of deforestation can be calculated. Values calculated for individual years show considerable variability, for example calculations based on values reported in the interval 1991 to 1998 suggest annual deforestation rates ranging from 0 to 9000 ha y⁻¹, with a mean for the interval of 5,100 ha y⁻¹ and median of 3,500 ha y⁻¹. Separate estimates can be calculated for England, Wales and Scotland and, with some modelling of the switching of areas of broadleaved and conifer woodland, separate estimates could be derived for these two woodland types, however the accuracy of these records does not justify such elaboration.

The published Facts and Figures are derived from administrative records added to the baseline of the previous National Inventory and subject to considerable inaccuracy. It is known that the area statistics are not fully consistent with new planting statistics and that these estimates are not always compiled in the same way. In particular attempts to incorporate estimates of deforestation rates in Forestry Facts and Figures statistics have not been carried out consistently and may in some cases be based on subjective assessments.

Temperate and Boreal Forest Resources Assessment

The Temperate and Boreal Forest Resources Assessment (TBFRA) is carried out at 10 year intervals as part of a global assessment of forest resources (UNECE, 2000). TBFRA-2000 has been published quite recently and is based on data submitted by countries in 1998, revised or amended in 1999. The UK data in TBFRA-2000 is mostly for the year 1995. TBFRA-2000 does not include explicit estimates of deforestation, but these can be estimated crudely using the calculation method described for statistics from Forestry Facts and Figures. For the UK, TBFRA-2000 shows average annual new planting of 22,800 ha y⁻¹ for the period 1985 to 1995, and average annual change in area for the period 1980 to 1995 of 20,000 ha y⁻¹, giving a difference and implied annual deforestation rate of 2,800 ha y⁻¹. If this calculation is repeated using a common reporting period of 1985 to 1995 this estimate of implied deforestation rate changes to 3,600 ha y⁻¹ indicating the sensitivity of the calculation. The methods used to compile TBFRA statistics are likely to be similar to those used for Forestry Facts and Figures and subject to similar inaccuracies..

Summary of estimates and discussion

Estimates of deforestation rates covering periods within the interval 1984 to 1998 that can be derived from readily accessible published reports range from 2,800 ha y⁻¹ to 14,500 ha y⁻¹. There are known to be limitations in the data and analysis underpinning these values.. To some extent the disagreement between estimates from the Countryside Survey and from Forestry Facts and Figures or TBFRA-2000 can be explained in terms of differences in the definitions used for land cover types, in particular forest types, however this may go only part of the way to resolving the apparent discrepancies. Although the range of estimates is clearly higher than the initially postulated rate of deforestation of 500 ha y⁻¹, it would be difficult to justify revising this estimate at this stage, given the apparent disagreement between sources and wide confidence intervals on some estimates.

EVALUATION OF DATA SOURCES

Forestry Commission Census of Woodlands

The Forestry Commission has carried out a full census of woodlands in Britain in the years 1924, 1949, 1967 and 1982. Each census adopted improved survey and statistical techniques, with the results that forest areas in the three censuses cannot be compared. Attempts have been made to project forest areas to intermediate years and these are reported in Forestry Facts and Figures as described above. Currently the Forestry Commission has made significant progress on a new National Inventory of Woodland. This represents the most thorough census of woodland in Britain so far, with the results

being compiled as digital maps. When complete, the National Inventory will be updated on a rolling basis and, ultimately, might be expected to provide reliable estimates of changes in forest area.

Forestry Commission felling licence records

Any records maintained by the Forestry Commission of licences to fell trees are likely to be incomplete and unrepresentative because a significant proportion of felling does not fall within the control of the Forestry Commission.

Ordnance Survey maps

Updating of forest areas marked on ordnance survey maps is likely to be partial, non-systematic and inconsistent.

Satellite data

Satellite imagery of UK land cover has been available in some form for about 20 years. Data derived from such sources could form the basis of a historical analysis of land cover changes. Interpretation of satellite-derived data can be problematic – comparison of land cover statistics from the Countryside Survey with satellite-derived statistics has identified a number of discrepancies, not least for estimates of forest cover (Barr *et al.*, 1993). Potentially such problems may be overcome by setting clear objectives for the analysis, adopting an appropriate system for classifying land cover types and carrying out thorough validation, including substantial verification on the ground. Satellite imaging may have difficulty in distinguishing between certain woodland and non-woodland land cover types.

CONCLUSIONS

As noted above, currently it is difficult to justify revising postulated values for deforestation. Prior to commissioning new research, discrepancies between Countryside Survey 2000 data and National Inventory of Woodland data should be fully explored in and if they cannot be resolved, further research should be undertaken. Options for alternative approaches are quite limited. One potential method is:

- Establishment of an agreed standard set of definitions for land cover types within the UK.
- Analysis of changes in land cover based on satellite-derived data.
- Extensive validation on the ground, possibly based on the Forestry Commission National Inventory of Woodlands.

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