

**CENTRE FOR ECOLOGY AND HYDROLOGY
NATURAL ENVIRONMENT RESEARCH COUNCIL**

Drivers of Countryside Change Final Report

Roy Haines-Young and Sandra McNally

In association with:

Susanne Seymour (University of Nottingham)

Charles Watkins (University of Nottingham)

Caroline Kiddle (University of Cambridge)

Clive Potter (Imperial College)

Mat Lobley (University of Plymouth)

Michael Winter (CCRU)

Graham Smith (RAC)

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**Centre for
Ecology & Hydrology**

NATURAL ENVIRONMENT RESEARCH COUNCIL

Centre for Ecology and Hydrology
CEH Monks Wood
Abbots Ripton,
Huntingdon, Cambs. UK

Tel: **44 (0)1487 772400

Fax: **44 (0)1487 773467

Drivers of Countryside Change

Final Report

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Drivers of Countryside Change: Final Report

Executive Summary

Introduction

1. An understanding of the drivers of countryside change is essential if we are to interpret the growing body of information that is becoming available about the rural environment. In this study we focus on Countryside Survey 2000 (CS2000), and explore what it can contribute to our understanding of the social and economic factors that have influenced the character of the wider countryside during the 1990s. We also look to the future and ask what kinds of data and analysis might be relevant for understanding current trends and policy directions.
2. This work has been commissioned at a time when the data collection phase of CS2000 has been completed. These data are now being analysed and the first results of the survey will be published in November 2000. This project seeks to assist and extend these activities.
3. The specific aims of the project are to:
 - i Support the presentation of the first outputs from Countryside Survey 2000 with a detailed review and analysis of the social, economic and policy drivers relevant to understanding the patterns of change detected since the earlier surveys; and,
 - ii Shape DETR's long term research strategy in relation to the social, economic and policy drivers of countryside change, so that more effective and integrated policies for achieving sustainable development can be achieved.
4. As these aims indicate, the initial focus of the work is on the immediate outputs from CS2000. However, as recommended in the CS2000 Scoping Study, work such as this is needed to look at Countryside Survey in the wider context of countryside policy. In order to realise the value of these data we need to understand not only what they can tell us directly, but also how we can link them to other sources of information to gain a wider view of changes in rural areas.

Work Programme

5. This study is made up of three substantive modules. The first concerns the general issues of Rural Change and Sustainability. This element of the work develops a conceptual framework in which the general socio-economic trends and pressures in rural areas can be understood. The outputs provide information on the changing policy context in which the outputs of CS2000 must be set, and make

recommendations on how these data can be used in relation to DETR's broader research needs.

6. The other two modules, which focus on agriculture and forestry, have been designed to examine some of the general themes covered in the first module in greater depth. By reviewing changes in each of these sectors the work explores how we might pick up the consequences of these drivers in the outputs from CS2000. In the long term, the goal is to focus on how other research or other data on agriculture and forestry can be used alongside CS2000 to develop and broaden its policy relevance.
7. The scope of this study was confined to the agriculture and forestry because of the limited time available for this work. Although these two drivers are amongst the most important in terms of understanding countryside change, it must be recognised that there are other issues that also need to be considered in the long term. The relationship between socio-economic and policy processes and changing pollution loads on terrestrial habitats and freshwater ecosystems, for example, must be an important area of future work.
8. In order to test the robustness of our findings, we presented the results of our reviews and some of our initial ideas for further work at a seminar attended by policy advisors, researchers and academics. They were invited on the basis of their interest in the socio-economic and policy issues that are relevant to understanding countryside change. Their comments and ideas have helped to shape the outcome of this study.

Rural Sustainability and Countryside Change

9. A key policy driver to emerge during the 1990s has been that of sustainability. This study traces the uptake and development of the concept at both EU and UK levels during the last decade. The analysis suggests that while the concept has been a major factor shaping environmental and other economic and social policies that are relevant to the countryside, the extent to which the concept has resulted in major changes in character of our rural areas is more limited. In the context of this study, the degree to which such policies have impacted on patterns of land cover and the stock and quality of habitats in the wider countryside is unclear. A major factor was that many of the institutional changes that arose in relation to the sustainability debate took place too late in the decade for any widespread effects to be detectable.
10. Our review suggests, however, that with the evolution of more holistic, socially based thinking about rural sustainability, and the development of new institutional structures within the UK, there is a need to broaden our approach to monitoring countryside change. **While CS2000 currently provides an insight into ecological change, we suggest that in the future such work must be better integrated with other sources of information about the structure and dynamics of rural communities if we are to gain an understanding of the broader drivers of change.**

11. The review of rural sustainability and countryside change traces several key, inter-linked developments that suggest that we need to rethink the role of studies such as CS2000:
 - A shift away from a paradigm in which policies towards farming are seen the main vehicle for rural development, to one in which the countryside is seen as a ‘rural as opposed to an agricultural space’.
 - Growing emphasis on the importance of ‘locality’, and recognition of the need to target specific problems in specific areas rather than focusing effort on individual sectors.
 - The need to promote bottom-up, community-based, voluntary approaches to rural development, rather than the imposition of ‘solutions’ from outside.
12. Detailed consideration of how the impact of policies towards agriculture and forestry can be explored using CS2000 data are considered separately in later sections of this Report. In the context of testing more general ideas about rural development using these data the specific recommendation that arose from the review of rural sustainability was **that a much better understanding of the rural context of the individual CS2000 survey squares is required.**
13. If we are to gain an insight into the causes of change recorded by CS2000 and any future surveys of its kind, then we need to understand the position of the survey squares in both ‘environmental’ *and* ‘rural’ space. It is suggested, therefore, that further work is needed to characterise the survey squares in relation to different dimensions of rurality.
14. Such work would potentially enable CS2000 data to be stratified in ways other than that involving the Land Class System, so that the character and dynamics of the landscape mosaic could be described in relation to a wide range of models of rural development. It is suggested that social and demographic information about the local area in which the sample square occurs could be used for this work.
15. The availability of the 2001 Census will provide an important opportunity for a long-term study of social and demographic change to be made. Earlier census information can be used to characterise change up to 1990. The work could also draw upon other rural information, such as DETRs Land Use Change Statistics in England, to characterise the dynamics of the land cover in and around the survey squares.
16. The CS field survey squares were selected in relation to an environmental stratification of GB and so they may not be representative of the range of social and economic conditions associated with the wider countryside. Such work will however, place the survey data in context and enable the relationships between environmental change and these other drivers to be better understood. It may also enable new indicators of sustainability to be developed.
17. **It is further recommended that such work is developed in relation to any follow-up socio-economic survey of farm enterprises within the survey**

squares (see below) so that a more complete picture can be established of the rural community and its economy in the areas covered by Countryside Survey.

Agriculture as a Driver of Countryside Change

18. The work within this project that focused on agriculture as a driver of countryside change consisted of a number of elements, namely:
- i To include all the primary data collected during the *Processes of Countryside Change Study* in the CS2000 database;
 - ii To review *Processes of Countryside Change Study* and the possibilities for further analysing these data in the context of CS2000.
 - iii To review the changing structure of agriculture 1990-98 and the possible impacts on the stock and condition of the different land cover and habitat types in the wider countryside;
 - iv To review the use of MAFF June Census at the Local Authority and District level and Farm Business Survey (FBS) data, and consider how they might help with the detailed interpretation of CS2000 results; and,
 - v To develop recommendations in relation to the agricultural driver, both in the context of CS2000 and DETR's wider research programme.
19. Following the recommendations of the CS2000 Scoping Study, it was proposed that the data acquired by Potter and Lobley (1996), as part of their *Processes of Countryside Change Study*, be integrated with other information being brought together in the CS2000 database, and that CEH become their custodians. We considered such work to be important because it provided the basis for further analysis of the survey data collected in 1998. **The data from Potter and Lobley's survey are now part of the CS2000 database.**
20. In order to develop a programme for further work in relation to the agricultural driver, analyses of information from the June Census and Farm Business Survey (FBS) were made. This work formed the basis of our recommendations in this area.
21. Some commentators have described the general changes that occurred in the structure of British agriculture during the 1980s as one of geographical 'polarisation'. Although the term is often used imprecisely, it involves the idea that we observed during this period the increasing regional specialisation of farming activities. In part the process was manifested by reduction in area and number of mixed farms and the increasing dominance of intensive arable farming in those areas of the east and south east of England, where the economic returns from such activities were most profitable. The structure of farming in such areas is contrasted with that of the west and north, where mixed farming gave way to more exclusively pasture-based systems. We asked: *To what extent has such polarisation been maintained and continued during the 1990s?*

22. In the analysis presented it is argued that the pattern of spatial differentiation of farming activities has been maintained, but the processes of polarisation that typified the 1980s had been overlain in England¹ at least, by those of :
- **Consolidation**, that is the tendency towards fewer, larger farms.
 - **Specialisation**, that is the tendency for farms to concentrate on a narrower range of activities so that labour requirements and other inputs may be easier to predict and control.
 - **Diversification**, that is the tendency for farm enterprises to develop other sources of income from on-farm, non-agricultural activities and off-farm sources.
23. It is suggested that although these changes indicate some restructuring in the agricultural industry, there is little evidence that they have been associated with any significant lessening in **management intensity**. Indeed, there are some signs that the consolidation and specialisation processes have combined to concentrate such management pressures in some areas, despite the development of policies to encourage better **environmental practice** in farming.
24. The material we present in this report provides useful contextual information in which the initial results of CS2000 can be reported. Table 1 sets out our recommendations for further more detailed analysis that can be made in relation to this important driver of countryside change. **These recommendations allow the hypotheses about the processes of ‘polarisation’, ‘consolidation’, ‘specialisation’, ‘diversification’, ‘management intensity’ and ‘environmental practice’ to be tested more rigorously and their environmental consequences explored in detail using data from CS2000.**
25. The Table identifies work that could be undertaken in the short-term, that is once CS2000 have been launched in November 2000. **We recommend that such work be taken forward as part of any post-launch research programme, such as that which followed CS1990.**
26. Table 1 also identified work of a more long-term nature. Our review, and feedback from the workshop held to comment on the outputs from this study suggests that there is considerable justification and support for a socio-economic survey within the CS2000 sample squares. This work would clearly build on Potter and Lobley’s *Processes of Countryside Change Study*. **However, we recommend that its scope be extended to include a wider range of factors affecting rural areas.** In Table 1 we describe only those issues related to agriculture. In the next section we consider how such a survey could be developed to take better account of forestry.

¹ Because of the limited time available for this desk study, analysis was confined to June Census and FBS data for England, because the former were available at a disaggregated, district level from another project. National level information about Scotland and Wales was included, where relevant. Clearly, the detailed regional analysis provided for England could be extended to these other country units in any follow-up work.

Table 1: Summary of recommendations for further work on analysis of agricultural drivers using CS2000 data.

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	CS2000 'short term'	CS2000 'long term'
<p>Consolidation: <i>What effects does the trend towards fewer, larger farms have for the environment?</i></p>	<p>Extend analysis of district level June Census data (1988-97) for holding number, size and mean size to Wales and Scotland.</p>	<p>Determine loss of farm area to non-agricultural cover types by SSR², PCC³ typology and CSEZ⁴.</p> <p><i>To what extent do patterns of loss of agricultural land recorded by CS2000 match June Census data?</i></p> <p><i>What geographical contrasts exist in the conversion of agricultural land to other uses?</i></p>	<p>Use follow-up to PCC³ to determine extent of consolidation by PCC typology.</p> <p><i>What is the relationship between of quantitative and qualitative cover change to consolidation process?</i></p> <p><i>How do patterns of land cover change relate to changing patterns of ownership or tenancy?</i></p>
	<p>Extend analysis of district level June Census data (1988-97) for labour inputs and use of contractors to Wales and Scotland. Refine FBS analysis for labour inputs.</p>		<p>Use follow-up to PCC to determine extent of changing labour inputs and use of contractors by PCC typology.</p> <p><i>Is there any relationship between cover change and changing labour inputs on farms by region and zone?</i></p>
<p>Polarisation and Specialisation: <i>To what extent are the regional/zonal patterns in farming observed during the 1980s being maintained and what are the environmental consequences?</i></p>	<p>Extend analysis of district level June Census data to cover both Scotland and Wales and the period 1984-90 in each country.</p> <p><i>Are regional/zonal contrasts in farm structure being maintained, reducing or increasing in 1990s?</i></p>	<p>The analysis in the shifts between major agricultural cover types and changes in diversity of cover and vegetation types within the farmed landscape by SSR and CSEZ using CS1990 and CS2000.</p> <p><i>Is the structure of the farmed landscape becoming more or less similar between regions and CSEZ post 1990?</i></p> <p><i>How does environmental stock change by 1993 PCC typology?</i></p>	<p>Use follow-up to PCC to determine extent of changes in structure of farm enterprise in relation to EC Farm Type⁵ and PCC typology.</p> <p><i>Are regional and zonal contrasts maintained or increasing?</i></p> <p><i>To what extent are farm enterprises becoming more specialised in terms of the range of activities?</i></p> <p><i>How do changes in farm structure relate to 1993 PCC farm types?</i></p>

/cont.

² SSR= Standard Statistical Region

³ PCC=Processes of Countryside Change Study; PCC Typology = Typology of farmers defined by Potter and Lobley (1996).

⁴ CSEZ = Countryside Survey 2000 environmental zone.

⁵ Categorisation of farm types used in June Census and FBS

Table 1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	CS2000 'short term'	CS2000 'long term'
<i>Diversification</i>	Analysis of recent census data on diversification by SSR and CSEZ. Extend analysis of 'local economy' by using data such as <i>EC Farm Structures Survey, Annual Employment Survey, Labour Force Survey, and ONS classification of local authority districts.</i>		Use follow-up to PCC to determine extent of off-farm diversification by PCC typology and EU Farm Type. <i>How have different types of enterprise responded to changed economic circumstances via diversification? What role does off-farm income have in triggering/preventing land cover change?</i> <i>What is the impact of part-time working on levels of 'environmental management'?</i>
<i>Management Intensity</i> <i>Fertiliser and pesticides</i>	Extend FBS analysis of <i>fertiliser and pesticide</i> inputs using other data sources (e.g. Survey of Fertiliser Use). Attempt regional disaggregation and use levels by farm type	Expectation: little change in impacts of fertiliser and pesticide use. Analysis of the relationship between changes in relevant IBDs within the farmed landscape by SSR and CSEZ. Extend CS2000 IBD system to formally include measures of biological condition of freshwaters. Disaggregate by SSR and CSEZ to examine response in relation to character of farmed landscape.	Use follow-up to PCC to determine changing use of fertilisers and pesticides.
<i>Grazing intensity</i>		Expectation: Little overall change, but developing regional contrasts. Analysis of the relationship between changes in relevant IBD scores by SSR, CSEZ and especially LFA/non-LFA areas.	Use follow-up to PCC to examine changes in intensity of pasture management
<i>Other aspects of farm management</i>	There are other aspects of farm management not captured by JC and FBS – direct analysis using CS2000?	Extend CS2000 system of IBDs to develop composite agricultural intensification index; disaggregate by SSR and CSEZ. Index should include information on level and quality of environmental stock.	Use PCC follow-up to assess how farm types have responded generally to economic changes via intensification of on-farm operations.

/cont.

Table 1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	CS2000 'short term'	CS2000 'long term'
<i>Environmental practice/policy</i>	Extend regional analysis JC data for LFA/non-LFA districts to include ESA/non-ESA districts.	Comparison of stock and quality change in 'policy-on' vs 'policy off' situations. Will require access to MAFF Countryside Stewardship and ESA monitoring data. Exploitation of CS2000 as contextual data for agri-environmental monitoring	Use PCC follow-up to look at take up of environmental advice/information, levels of environmental awareness and response agri-environmental schemes by farm types.
		Use CS2000 results to define environmental potential and/or targets for farmed landscape.	Use PCC follow-up to develop 'sustainability profiles' of farm managers and farm enterprises and relationships between profiles and 1993 PCC farm typology and change 1990-98.

Forestry as a Driver of Countryside Change

27. Throughout the 1990s it was the policy of successive governments to support the extension of the woodland area. The initial aim was to afforest 33,000 ha a year, including 12,000 ha a year under the Farm Woodland Scheme. These have been expressed in terms of longer-term targets by the subsequent Rural White Papers.
28. An important driver of this policy shift was the problem of surplus agricultural land in Europe. The 2nd Report of the Agriculture Committee of the House of Commons reported that there could be anything from one million to five million hectares of surplus agricultural land by 2015 (House of Commons 1990). It went on to suggest that "the most significant alternative land use in the next twenty years is likely to be forestry" and that there was now "the scope, if not the necessity, for a far greater emphasis on the role of woodlands and forestry in the process of rural development" (House of Commons 1990 xv). The process of change is, however, likely to vary regionally with, for example, conversion in Wales being limited by the need to retain the small area of high quality agricultural land found here.
29. These ideas about the perceived surplus of agricultural land meant that one of the principal locational factors affecting forestry throughout the twentieth century, that afforestation should only take place on 'unimproved land' of low agricultural value, was no longer of paramount importance. This change underlay many of the detailed policy changes that took place through the 1990s.

Table 2: Expected trends and potential analyses using CS2000 for the forestry driver

Woodland type & context	<i>Expected trend</i>	CS2000 Analysis
Coniferous afforestation of semi-natural habitat	<i>This declined through the 1990's. There were considerable regional variations with most taking place in upland Scotland and to a lesser extent, Wales. Virtually non-existent in upland England. Negligible in the lowlands on heaths and semi-natural grassland. Particular attention should be paid to measuring the success of policies designed to encourage native Scottish pine woodland.</i>	Change in stock of Coniferous Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Coniferous afforestation of 'improved' habitat	<i>Although policies were designed to encourage this type of afforestation, relatively little took place in the decade because the level of grants did not outweigh the decline in the capital value of farmland upon planting. Small patches of this afforestation occurred in the lowlands. There may be a concentration in areas designated as Community Forests.</i>	
Broadleaved/mixed afforestation of semi-natural habitat	<i>There may well have been an increase in this type of afforestation in response to special schemes designed to encourage the establishment of native mixtures of broadleaves, such as upland birch woodlands in Scotland. Many new small farm woods may have been established on remaining fragments of semi-natural grassland.</i>	Change in stock of Broad-leaved Mixed and Yew Woodland Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Broadleaved/mixed afforestation of 'improved' habitat	<i>If policies have been successful, one would expect a considerable increase in the establishment of new broadleaved mixed woodland on improved land. This is likely to consist of many new small farm woodlands, used primarily for game or landscape purposes. These may well be concentrated in areas where game shooting is particularly important (i.e. parts of East Anglia; Gloucestershire). There may also be concentrations in specially designated areas such as Community Forests and the National Forest.</i>	
Natural regeneration of woodland on semi-natural habitat	<i>This will occur in relatively small patches across the UK. It is particularly likely on ungrazed, steeply sloping valley sides in the uplands of Scotland, Wales and northern England; on lowland ungrazed heaths and commons; and on ungrazed patches of semi-natural grassland such as steep slopes in the Downs and Cotswolds.</i>	Separate analysis of shrub category within Broad-leaved Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which regeneration has occurred.
Natural regeneration of woodland on 'improved' habitat	<i>Generally very small-scale. There will be a tendency for some areas of managed natural regeneration to be found adjoining existing semi-natural woodland if policies designed to increase the size of such woods are working.</i>	
Loss of woodland to improved agriculture	<i>This is likely to be rare in England, with the conversion of woodland to arable land virtually halted. It is most likely to take place in heavily grazed parts of the uplands.</i>	Use flow accounts to identify types of land on which deforestation has occurred.
Loss of woodland to semi natural habitat	<i>This will have taken place frequently, but usually on a small scale. It is most likely to occur where there are specific conservation schemes to remove plantations and natural regeneration in order to restore lowland heaths, chalk grassland, sand dunes and other valued habitats.</i>	
Woods showing little change	<i>Many areas of woodland will show little change over the decade. This may be because of the stage in the rotation, i.e. even-aged plantations may show little discernible change from pole stage onwards until perhaps a major thinning. Some mixed broadleaved woods that are carefully managed under say a continuous cover system, will show little change even though valuable timber may have been removed. Other woods may show no change because they are unmanaged. With the move to more subtle forms of woodland management there is a strong likelihood that woods which are managed, but which show no discernible change, will be increasing in number.</i>	Analysis of CS2000 Indicators of Biodiversity for woodland broad-habitat, with linked analysis to structural information provided by NIWT.
Conversion of coniferous woodland to broadleaved woodland	<i>This should be taking place on a fairly extensive scale as formerly mixed plantations made up to the 1970's have their coniferous element removed. This is particularly likely on woods on traditional landed estates where mixed plantations have been very popular. It will also take place in mixed plantations made on ancient woodland sites.</i>	Use flow accounts to identify pattern of exchange of stock between Broad-leaved and Conifer Broad Habitats. Change in frequency of CVS classes.
Conversion of broadleaved/ mixed woodland to coniferous woodland	<i>This should be a rare occurrence especially in England. It is most likely to take place in larger upland plantations where extensive restructuring is taking place at the end of the first rotation.</i>	

30. In the 1980s there had been there had been a resurgence of interest in the management of broadleaved woodland. This renewed interest continued through the 1990s, which moreover saw an increased emphasis on the management of all types of woodland in the interests of nature conservation, landscape, recreation, shooting and the provision of public access. The shift in aims of management reflected changing demands of the public and was reinforced by a range of new and modified policies introduced by the Forestry Commission, English Nature, the Countryside Commission and their successor organisations. This shift has affected, to differing degrees, all types of woodland owner from large commercial forestry concerns through to the owners of small woodlands.
31. The physical manifestations of this general shift in management aims included subtle changes to the size and shape of individual woodland stands; changes in the mixtures of species established; changes in establishment techniques, with a move away from plantations towards the use of natural regeneration; and changes in thinning regimes. **We consider that several of these changes could be explored using CS2000 data, and in Table 2 we set out our recommendations for further work using these data.**
32. In addition to the analytical opportunities set out in Table 2, we also recommended that the analysis of CS2000 data be undertaken in conjunction with the analysis of the Forestry Commission's *National Inventory of Woodland Trees* (NIWT). The latter is a particularly useful source of information on the structural properties of woodland and their use, which can be used alongside CS2000 to make a more complete analysis of the qualitative characteristics of the woodlands at national and regional scales.
33. Finally, we considered how the analysis of woodland characteristics within the CS sample squares might be improved. It was noted that over the decade there has been a marked trend for woodland ownership to become increasingly distinct from farm ownership. More woodland areas are in the possession of specialist organisations such as the Woodland Trust, wildlife and other conservation trusts, as well as small private owners. **It was recommended therefore that, if a follow up study to the *Processes of Countryside Change* study is undertaken, then its scope should be extended to include interviews with all woodland owners in a survey square, as well as farmers.** This would enable changes within farm woodlands to be separated from those taking place in other types of woodland, and a better understanding of the factors shaping woodlands to be developed.

Next Steps

34. Countryside Survey 2000 has not been designed to look explicitly at the *causes* of change. Rather, its purpose is to *describe* change in terms of a large number of important ecological features associated with the wider countryside. The survey data can, nevertheless, give us some important insights into some of the drivers of change, particularly where it can be combined with other information.
35. This study focused mainly on socio-economic and policy issues relevant to the agricultural and forestry sectors. Although other types of driver have to be considered, it is clear that even taking these two areas alone, there is scope for further, more detailed analysis of CS2000 information.

36. In the short term it would be valuable to explore how the key trends in agriculture and forestry agricultural and forestry that occurred during the 1990s are picked up in the results of CS2000. The extent to which one may make a 'read-across' with other information sources such as the June Census, the Farm Business Study and the National Woodland Inventory, for example, would clearly be helpful for the CS2000 user community. Not only would such work inform users about the types of change detected by the Survey. It would also help us define a wider range of indicators that could be used to describe the condition of the wider countryside that would be useful for policy purposes. **We recommend that such work can be taken forward in the short to medium term, once CS2000 has been launched in November 2000.**
37. In the longer term it is also clear that there is a strong justification for undertaking a follow-up to the socio-economic survey carried out in the CS sample squares in 1993. Although an important element would be to collect information about the farm enterprises within the survey squares, we have argued that any further work should taken in a wider range of issues that those affecting agriculture. **We recommend that *all* types landowners and managers are interviewed. The goal should be to build up a much better understanding of the rural context of the CS sample squares, and hence the socio-economic and policy factors likely to shape change within them.**
38. CS2000 is the fourth of its kind. With each successive survey the scope of the work programme has been enlarged and its concepts refined, to ensure that the outputs are relevant to current science and policy needs. This study has shown that the framework in which we seek to understand countryside change is evolving rapidly. Previous Countryside Surveys have been based on a rigorous understanding of the environmental setting in which the survey data have been collected. As we look to the future, it is clear that we also need to understand more completely the social and economic situation in which that change is occurring.
39. Agriculture and forestry will remain important drivers of countryside change. Current trends suggest, however, that many other factors, including the growth of rural industry, social and demographic change, and the relationship between town and country, will control the stock and quality of the habitats and associated landscape features that make up the wider countryside. This study, and the work we suggest should follow from it, will provide the foundation for helping us define our future monitoring needs. Ultimately, it may help us gain a better insight into the environmental consequences of these other, important socio-economic drivers of countryside change.

Chapter 1. Introduction

Background

- 1.1 An understanding of the drivers of countryside change is essential if we are to interpret the growing body of information that is becoming available about the rural environment. In this study we focus, in particular, on Countryside Survey 2000 (CS2000), and explore what it can contribute to our understanding of the social and economic factors that have influenced the character of the wider countryside during the 1990s. We also look to the future and ask what kinds of data and analysis might be relevant for understanding current trends and policy directions.
- 1.2 Countryside Survey will provide a rich body information about the rural environments of Britain⁶. It builds on earlier surveys undertaken by the Institute of Terrestrial Ecology⁷ in 1990, 1984 and 1978 (see Barr *et al.* 1993), and will, for example, provide information on the current stock and recent changes in the extent of the broad terrestrial and freshwater habitats that make up the countryside. It will also allow us to say something about the changing quality of these habitats by reference to some of the species that we find within them.
- 1.3 In designing CS2000, it was always recognised that the problem of understanding the drivers of countryside is a key policy issue (Haines-Young and Swanwick, 2000). Following the 1990 Survey, the ECOFACT Programme was set up to begin to examine the ecological processes that underlay the previous changes detected. For CS2000, it was suggested that this type of analysis should be extended to include the major social, economic and policy drivers of change.
- 1.4 In order to understand how to take this work on the drivers of countryside change forward, DETR has let a contract to a consortium lead by CEH. This work will review what CS2000 can tell us in terms of understanding the underlying social, economic and policy factors that initiate countryside change. The consortium includes social scientists in CEH, the Universities of Nottingham and Cambridge, Wye College, and the Countryside and Community Research Unit (CCRU) at Cheltenham and Gloucester College of Higher Education.

Project Aims and Work Programme

- 1.5 This work has been commissioned at a time when the data collection phase of CS2000 has been completed. At the present time these data are now being analysed and the first results of the survey will be published in November 2000. This project seeks to assist and extend these activities.

⁶ See <http://www.cs2000.org.uk>

⁷ Now Centre for Ecology and Hydrology (CEH)

- 1.6 The specific aims of the project are to:
- i Support the presentation of the first outputs from Countryside Survey 2000 with a detailed review and analysis of the social, economic and policy drivers relevant to understanding the patterns of change detected since the earlier surveys; and,
 - ii Shape DETR's long term research strategy in relation to the social, economic and policy drivers of countryside change, so that more effective and integrated policies for achieving sustainable development can be achieved.
- 1.7 As these aims indicate, the initial focus of the work is on the immediate outputs from CS2000. However, as recommended in the CS2000 Scoping Study, work such as this is needed to look at Countryside Survey in the wider context of countryside policy. In order to realise the value of these data we need to understand not only what they can tell us directly, but also how we can link them to other sources of information to gain a wider view of changes in rural areas. Moreover, the scope and character of information being collected needs to be reviewed periodically to ensure that it continues to be relevant to current research and policy agendas.

Work Programme

- 1.8 In designing this project we have sought to strike a balance between the short-term review and analysis requirements, that will inform the initial phase of CS2000 reporting, and the more strategic aspects of DETR's research agenda.
- 1.9 The work programme is made up of three elements. The first concerns the general issues of Rural Change and Sustainability. This element of the study will develop a conceptual framework in which the general socio-economic trends and pressures in rural areas can be understood. The outputs will provide information on the changing policy context in which the outputs of CS2000 can be set, and make recommendations on how these data can be used in relation to DETR's broader research needs.
- 1.10 The other two modules, which focus on agriculture and forestry, have been designed to examine some of the general themes covered in the first module in greater depth. By reviewing changes in each of these sectors the work will explore how we might pick up the consequences of the changing social, economic and policy drivers in the outputs from CS2000. In the long term, the goal is to focus on how other research or other data can be used alongside CS2000 to develop and broaden its policy relevance.
- 1.11 In addition to the three substantive modules, there is a fourth covering the management and co-ordination of the project. An important aspect of this module was a workshop held in May 2000, that reviewed the first outputs from the study. The results of the workshop have been used to help prepare this Report. The discussions were valuable because they allowed the outputs

from the study to be subject to peer evaluation and thus ensure that the conclusions we draw are robust.

- 1.12 In addition to the formal consultation built into the work programme, this study draws upon the wider set of consultations that have been undertaken as part of the CS2000 reporting process. This has included input from members of the CS2000 Advisory Group, and the Policy Liaison activities undertaken as part of the CS2000 Work Programme (Module 16). A particularly valuable source of information from the latter has been the results of the consultations undertaken by Briggs (Briggs, 2000).
- 1.13 This Report also draws on the wider literature relating to countryside change. A key document in the context of this study is Firbank *et al.*, (2000), which sets out an analysis of the potential causes countryside change in relation to Countryside Survey 1990 (CS1990). Clearly an investigation of the factors that have shaped patterns of change during the 1990s must consider how the key drivers may have changed over time. Firbank *et al.* (2000) provide a useful summary of a range of issues.
- 1.14 The focus of the study by Firbank *et al.* (2000) was on the extent to which the 'Indicators of Biodiversity' (IBDs) developed for the analysis of CS vegetation data could be used to explore the impacts of the various drivers of countryside change. The present study partly develops and extends this work, in that the focus of this study has been on the analysis of changes in the post 1990 period. This study also goes more widely, however, in that it considers what types of analysis of the drivers might be attempted using both vegetation *and* habitat information.

Scope and Constraints of the Study

- 1.15 Analysis of the factors that have shaped the countryside during the last decade is complex. The issues that need to be considered clearly go much wider than those that are relevant to understanding the outputs from CS2000 itself. The dilemma to be resolved in a study such as this, is just where to set the boundaries of the work.
- 1.16 In order to constrain the work to that which might practically be achieved in the time available, the specification for project specifically excluded consideration of biophysical drivers such as pollution loads, even though they may have been modified by policy measures during the 1990s. It was felt that these issues could be more effectively dealt with as part of other work. Instead, it was decided to focus initially on understanding the social, economic and policy factors affecting agriculture and forestry since 1990 and therefore the types of change that might be detected by CS2000. In order to broaden the perspective, however, it was proposed that these drivers should be looked at in the context of the ideas about rural sustainability that had developed over the last decade.
- 1.17 Even though our study was constrained by considering what can be understood about the drivers of change using CS2000 data, it must be recognised that the analysis is problematic in several respects. As the

CS2000 Scoping Study emphasised (see Haines-Young and Swanwick, 2000, Chapter 7) three main factors combine to make the analysis the drivers of change complex:

- (i) The various Countryside Surveys have not been designed to look at the *causes* of change, but to *describe* change in terms of a number of important features of the wider countryside. CS2000 is no exception. Although ideas about causation have been implicit in its design, much of the information that we would need to make a full causal analysis is not available from the Survey itself. Instead, if we are to build up a picture of the major drivers of change, we will often have to link CS2000 data with other sources of information to develop an understanding of causal mechanisms.
- (ii) The Survey was not designed to look at *all aspects* of the wider countryside, so that it may only be possible to gain a partial insight into the causes of change. The effects of some drivers may be undetectable, and others may only be covered in a partial way.
- (iii) The changes detected by CS2000 may be the result of the *combined* impact of several drivers so that it may not be possible to attribute change unambiguously to any one factor. As a result, although we may seek an understanding of the causes of the changes detected by CS2000, outputs from any analysis may at best only be 'indicative'. Certainly any results will require the application of considerable judgement before they can be used in a policy context.

1.18 Given these difficulties, three key questions of increasing generality formed the core of our investigation. The analytical strategy adopted was to consider first, what relationships might be established between the data collected by CS2000 and the socio-economic drivers affecting agricultural, forestry and the wider rural economy. The next step was to consider what insights might be developed by linking these data to other sources of information about the countryside. Finally, we asked to what extent CS2000 and these other data sources were adequate given current research and policy concerns.

1.19 These three questions provide the framework for this Report. In Chapter 2 we consider CS2000 in the context of ideas about rural sustainability. In Chapters 3 and 4 we make a more detailed investigation in relation to the agricultural and forestry drivers. In the final part of this report we consider possible directions for a wider research programme on the drivers of countryside that could be supported by DETR and its partners.

Chapter 2. Rural Sustainability and Countryside Change

Introduction

- 2.1 A key theme of environmental debates in the 1990s is that of 'sustainability'. In this chapter we trace both the way the concept has shaped rural policy and what impacts these policies might have had in the context of understanding the drivers of countryside change.
- 2.2 The review brings together the material provided by the commissioned study of Seymour (Appendix 1) with other sources. We will argue that while the concept has been a major factor shaping environmental, economic and social policies that are relevant to the countryside, the extent to which these policies have resulted in major changes in the character of rural areas is probably limited. This situation reflects the fact that major policy initiatives involving sustainability were not introduced until quite late in the decade, and that it will take some time for their effects to be observed. The chapter will conclude by making recommendations on how CS2000 information can be used in the context of present policies towards sustainability, and what might be done in the future in terms of additional data analysis and data collection.

Evolving Policy Frameworks

- 2.3 Our review of rural sustainability and countryside change suggests that there are three key issues that need to be considered if one is to understand the current policy and organisational contexts of CS2000. These are institutional change, the evolution of the sustainability paradigm itself, and the need to measure sustainability. Each is considered below. The discussion provides a framework in which the role of CS2000 can be explored.

Institutional change

- 2.4 As the review of Seymour (Appendix 1) suggests, in the 1990s uptake of the principle of sustainability into EU and UK policy was slow. As a result, it may be too soon to see the effects of policies in terms of real changes 'on the ground'.
- 2.5 At the European level, for example, the Single European Market Act of 1987 only 'urged' member states to incorporate environmental considerations into all aspects of policy. It was not until 1992, with the Maastricht Treaty, that this principle was amended so that states were 'required' to do so. Although the Fifth Action Plan for the environment was entitled 'Towards Sustainability', only in 1997 with the Amsterdam Treaty, did the EU finally commit itself institutionally to the principle of sustainable development.
- 2.6 In the UK, although the uptake of the sustainability concept proceeded a little faster than elsewhere, a similar situation prevails to that at the European level. The White Paper *This Common Inheritance*, which set out Britain's environmental strategy up to 2000 in preparation for the Rio Conference in 1992, was published in 1990. It was followed in 1994 by the publication of

Sustainable Development: The UK Strategy, which presented a policy framework on sustainability to fulfil part of the UK's commitment to reporting progress with Rio initiatives. However, while it accepted the demand management concept, established a land fill tax, and set up new institutions outside government departments to promote both the policy and its application, it lacked targets and budgetary commitments. It also relied heavily upon voluntary adoption of environmental best practice rather than legally based regulation. Local Agenda 21 responsibilities were, for example, given to local authorities but no extra funding was provided from Central Government. The voluntary approach to the implementation of sustainability was confirmed in the review of the *Strategy* in 1996.

- 2.7 Given the pace and scale of change resulting from the acceptance of the sustainability during the 1990s, it is hardly surprising that some commentators have argued that progress has been limited. The situation in the UK is summed up by Voisey and O'Riordan (1997) who suggest that by 1996 the White Paper process had had 'little real effect in terms of integrating environmental considerations into other policy areas, and even less with regard to sustainable development'.
- 2.8 Although it may be too soon to see the effects of recent policy changes, the developments that have occurred during the 1990s are important for studies such as Countryside Survey. For, as Voisey and O'Riordan, (1997 p.29) also note, the White Paper process established a 'significant institutional structure for the implementation of sustainable development in the future'. **Thus, as we look towards the analysis and publication of CS2000 results, it seems clear that while we may not detect the effects of present policy, these data are likely to be an important base-line against which future change can be judged.**
- 2.9 A detailed account of the institutional changes that took place in the UK as a result of Governments' commitment to sustainability is provided by Seymour (Appendix 1). If we consider the role of CS2000 in this new institutional environment, three issues are significant:
- (iv) **The number and range of organisations with an interest in environmental and/or rural issues has grown.** For example, a notable feature of the institutional changes that took place during the 1990s was the break-up of national organisations such as the Nature Conservancy Council into separate country level organisations. The process of devolution was formalised at the end of the decade with the creation of the Scottish Parliament, the Welsh Assembly and the establishment of Regional Development Agencies in the English regions. *Thus the diversity of the potential 'user community' for Countryside Survey data has grown, as has the range of requirements and expectations.*
 - (v) **There has been an increased attention to local and regional character.** The importance of addressing policy issues at regional scales has clearly been recognised formally through the devolution process. However, even within the separate country units there is

growing recognition that local distinctiveness has to be considered in the development of countryside policy. In England, for example, we have seen the publication of the *Character Areas* Map, by the Countryside Agency and English Nature. The Map seeks to divide the country into ‘coherent landscapes types, that pick out associated patterns of wildlife, natural features, land use, human history and other cultural values *that are important to people.*’ (Countryside Commission & English Nature, 1996). Elsewhere we see the importance of regional character being emphasised through the delivery of the Biodiversity Action Plan through a series of local action plans and through the implementation of Local Agenda 21. ***The implication of such developments for a national exercise like CS2000 is that in the short term, these data must be presented in such a way that their local relevance can be understood. For the future, it may well be that the ability of the survey to provide information at local scales will have to be improved if such national scale surveys are to maintain their wider policy relevance.***

- (vi) **There is a growing emphasis on the integration of policy across institutions and issues.** Some of the institutional changes that occurred during the 1990s were explicitly designed to provide a more holistic approach to the resolution of environmental issues. In 1996, for example, the National Rivers Authority was incorporated into the Environment Agency along with Her Majesty’s Inspectorate of Pollution (HMIP), the Waste Regulatory Authorities and some small units from the DoE. This new cross-source agency was a major institutional step in facilitating government goals of integrated pollution control. Other key institutional changes that sought to promote more integrated approaches included the merger of the Countryside Commission and the Rural Development Commission to form the Countryside Agency in 1999. ***The implication of ‘joined up government’ for an exercise such as CS2000 is that, if these data are to be relevant to current policy concerns, then they must be capable of being linked to other sources of information so that effective integration can be achieved.***

Environmental, Economic and Social Sustainability

- 2.10 In parallel to the institutional changes that took place during the 1990s we also saw an evolution of the concept of sustainability itself. This conceptual change was just as fundamental as that involving our organisations, and like these institutional changes they force us to rethink the role of studies such as CS2000.
- 2.11 As Seymour (Appendix 1) suggests the UK interpretation of ‘sustainable development’ was strongly influenced in the late 1980s and early 1990s by neo-classical environmental economics approaches to reconciling environmental and economic concerns. The paradigm recast of parts of nature as ‘natural assets’ and suggested market-led mechanisms for giving them a price. The most prominent example was *Blueprint for a Green Economy* (Pearce, *et al* 1989).

This helped establish a strong trend of playing down the social aspects of sustainability.

- 2.12 Voisey and O’Riordan (1997) concur in this analysis. From their review of the situation prevailing in the mid-1990s they conclude that in the UK sustainable development was ‘defined narrowly with little recognition of the implications for wider society and individual behaviour, and the radical agenda of equity, democracy and empowerment’ (Voisey and O’Riordan 1997, p.27).
- 2.13 The situation at the end of the decade is however, quite different, as is illustrated by the approach set out in the Government’s most recent statement of the UK strategy for sustainable development *A Better Quality of Life* (DETR, 1999a). The latter describes the new set of guiding principles and approaches to be applied in the UK, which reflect both the key themes from the *Rio Declaration on Environment and Development* and the wider debates that took place during the 1990s. The framework gives ‘full weight’ to economic, environmental *and* social aspects of sustainable development, stressing the need to maintain economic, environmental and social capital. It argues that ‘people must be placed at the centre’.
- 2.14 The development of a stronger social dimension to policies for sustainable development can, in fact, be seen in the evolution of rural policy over the last decade. The 1990s also saw, for example, major changes in the Common Agricultural Policy (CAP) and the way it was used to promote rural development.
- 2.15 Until the 1980s, the Community had regarded the CAP as the main vehicle for promoting rural development strategies. Thinking was based on an ‘exogenous model’ of rural development and the idea that agriculture lies at the heart of the rural economy. Problems of rural development were to be addressed principally through agricultural industrialisation and specialisation and the encouragement of labour and capital movement from urban to rural areas.
- 2.16 From 1979 there was some modification of this approach through the pursuit of Integrated Development Programmes in Less Favoured Areas. However, by the late 1980s it was recognised that employment in agriculture and other primary industries was in widespread decline in rural Europe, and that new industrial and service sector jobs were increasing. This, together with mounting pressures to reform the CAP in the face of food mountains, emerging environmental criticisms and the Single European Act, led to a major new statement on rural policy in *The Future of Rural Society* in 1988.
- 2.17 *The Future of Rural Society* laid out the basis of EU rural policy for the 1990s. The statement highlighted the need to target specific problems in specific areas rather than focusing on individual economic sectors. The emphasis was strongly upon the locality and bottom-up development:

‘Local rural development does not mean merely working along existing lines. It means making the most of all the advantages that a particular local area has: space and

landscape beauty, high-quality agricultural and forestry products specific to the area, gastronomic specialities, cultural and craft traditions, architectural and artistic heritage, innovatory ideas, availability of labour, industries and services already existing, all to be exploited with regional capital and human resources, with what is lacking in the way of capital and co-ordination, consultancy and planning services brought in from outside' (Commission of the European Communities, 1988:48).

2.18 The major vehicle of this new rural regional development emphasis was a reformed and expanded European Structural Funds package and the introduction of some smaller Community Initiatives. The first round of Objective 5b funding in 1988 led to the designation of four areas: Dyfed-Gwynedd-Powys in Wales; the Scottish Highlands and Islands; Dumfries and Galloway; and parts of Devon and Cornwall. In 1994 the designations were extended to create 11 Objective 5b areas in the UK. In addition, the Scottish Highlands and Islands were redesignated as an Objective 1 region (Seymour Appendix 1). The growing emphasis on rural as opposed to explicitly agricultural, development was most recently reaffirmed in by the EU in the 1996 Cork Declaration, *Rural Europe - Future Perspectives*. Furthermore, the latest *Agenda 2000* reforms to the CAP have introduced a Rural Development Regulation and compulsory Rural Development Plans.

2.19 In the UK, the need for a strong social focus in rural policy has been most recently seen in the consultations leading up to the next Rural White Paper for England (DETR, 1999 b & c). The five main elements of the approach proposed by Government on which they sought comment are summarised in Table 2.1. Environment is seen as but one component. As the summary of responses showed (DETR 1999c) this vision was largely confirmed, although it was noted that opinions varied as to what the priorities should be. Views included the assertions that:

- Agriculture should have more prominence;
- Protection and enhancement of the countryside, conservation of protected landscapes and biodiversity should be the priority;
- Economic regeneration, community involvement, job creation, transport and access to services should be key elements.

Table 2.1: The framework for consultations leading up to a Rural White Paper for England (after, *Rural England: A Discussion Document*, DETR 1999b)

The five elements of the 'vision for the countryside' on which the Government sought comment were:

- *The Government believes in a **living countryside**, with thriving rural communities in which all residents are included, and in which there is access to services, such as healthcare, schools and shops.*
- *It should also be a **working countryside**, contributing to national prosperity as part of a competitive economy, with a balanced mix of businesses (including land-based industries) jobs and homes, reducing the need to commute long distances.*
- *At the same time, the Government recognises **the interdependence of town and country**, and wishes to strengthen the relationships between the two.*
- *The Government also wants a countryside in which the **environment** is properly protected and its qualities enhanced in a way which sustains the lives of those who live and work there or visit it.*
- *Finally, it should be a **countryside for all**, where there is plentiful access so that the character of the countryside can be enjoyed widely.*

- 2.20 At the time of this Report, the Government has not published the Rural White paper for England. Nor is the future shape of rural policy in Scotland and Wales clear, for their legislatures had yet to make decisions in this area. However, what does seem certain is that, notwithstanding differences in opinion about where the emphasis should lie, policy will have to take a more balanced approach to social, economic and environmental issues in rural areas. Although agriculture remains an important driver of countryside change, the contribution that this sector makes to the 'rural economy' is small and declining. For example, the Countryside Agency have reported that by 1991, rural areas in England had a 'similar mix of employment sectors' as the country as a whole (Countryside Agency, 1999; see also, Doyle, 2000). As Seymour (Appendix 1) points out, the dynamics of other drivers, such as the growth of rural industries and socio-demographic change are just as significant in shaping the character, if not the physical characteristics, of rural areas (Table 2.2).
- 2.21 The material provided in Table 2.2 and the more detailed discussion in Appendix 1, clearly points to some analyses that can be undertaken in the short term, once CS2000 results are available. In the main these would involve making regional comparisons in addition to those currently proposed for analysis of these data based on environmental zones. **In the longer term, however, it would seem worthwhile to explore how the rural context of the survey squares could be understood, so that more powerful statistical stratifications of the survey data could be attempted.**
- 2.22 The CS field survey squares have been selected in relation to an environmental stratification of GB and so they may not be representative of the full range of social and economic conditions associated with the wider countryside. **We recommend that a future study be undertaken to determine just what part of the 'rural spectrum' Countryside Survey actually samples.** Such work would be valuable because it would place the survey data in its wider rural context and enable the relationships between environmental change and other drivers of change to be better understood. It is suggested that the analysis of social, economic and demographic information about the local area in which the sample square occurs could be used for this work.
- 2.23 The work could build on the early typologies of rural areas devised by Cloke (1977), Cloke and Edwards (1988) and others (eg Webber and Craig, 1977, Dunn et al 1981). These studies used factors such as population density, distance from an urban centre and socio-demographic attributes to derive measures or indices of 'rurality'. However, given the time that has elapsed since this work was published, it seems clear that some revision of the approach would be necessary. In the design of future work, two aspects need to be considered.
- 2.24 First, the availability of the 2001 Census will provide an important opportunity for a long-term study of social and demographic change to be made. Clearly these data should be used in the construction of any typology that might form the framework for the analysis of CS2000 data. Earlier census information can be used to characterise developments up to 1990 and

Table 2.2: Summary of trends in population and land use within rural areas (After Seymour, Appendix 1)

Driver	Trend
Population	<p>Strong counter-urbanisation trends observed in 1970s are dampened in the 1980s, but size of the rural population relative to urban areas continues to grow in the 1980s and 1990s; significant regional and local differences:</p> <ul style="list-style-type: none"> ➤ <i>Most of this rural growth was confined to areas south of the Wash, in a belt extending from East Anglia through Northamptonshire and Oxfordshire to Wiltshire, Dorset and Hampshire.</i> ➤ <i>Outliers of significant rural growth found in parts of the South West, mid-Wales and the Welsh Marches.</i> ➤ <i>In Scotland similar patterns of higher growth in rural areas in 1990s, due to urban-rural migration in central belt. Such growth appears to reverse long-term trend of depopulation.</i>
Land use	<p>By 1996, there were nearly 4 million dwellings in rural England. This constitutes a fifth of the country's total housing stock:</p> <ul style="list-style-type: none"> ➤ <i>Five per cent of this stock was built between 1991 and 1996.</i> ➤ <i>Regional variations in house building are strong. For example major development has occurred in the South East (excluding London).</i> ➤ <i>The percentage of land for new residential development taken from rural land uses fell from about 53% in 1985 to 43% in 1997 (of this 37% was from agriculture, with the remaining 6% from a mix of other rural land uses).</i> ➤ <i>In terms of residential development in urban and rural areas in 1997, however, 54% of the land used had not been previously developed, but strong regional contrasts. In 1995 the figures ranges from 81% in London and 54% in the North West to 37% in the East Midlands and 32% in the South West.</i> ➤ <i>Evidence of a slowing trend of land moving from rural to urban land use classes; greater emphasis on re-use of land in planning guidance.</i> ➤ <i>Between 1985-94, agriculture was the greatest loser in terms of transfers of land from rural to urban uses. The largest loss was to residential use followed by transport and utilities, industry and commerce, and community services.</i> ➤ <i>A decline in traditional land-based rural industries and a growth in service industries in rural areas. Whereas nationally there has been a decline in manufacturing employment, rural England has experienced significant growth.</i> ➤ <i>Expansion of tourism in rural areas</i> <p>In Scotland:</p> <ul style="list-style-type: none"> ➤ <i>Demand for housing in more peripheral areas has mainly been met through the sale of vacant agricultural dwellings or the upgrading or conversion of older rural properties.</i> ➤ <i>However, in areas closer to the central belt, the stock of such buildings is limited and the greater rates of in-migration have resulted in increasing house prices and the need for increased provision of social housing.</i> ➤ <i>An increase of 36000 jobs in schools, hospitals and social services and of 5000 jobs in business services (excluding hotels and catering), and that evidence points to the continuation of these trends in the 1990s.</i> ➤ <i>Expansion of tourism</i>

Table 2.3: Driver-State-Response Indicator Model (After OECD, 1994)

Driving force indicators	State indicators	Response indicators
Describe what is causing environmental, economic or social conditions to change	Measure the quality of the environment in agriculture, the stock and quality of natural resources available to it and the wealth and welfare that agricultural businesses generate	Report the actions being taken by policy makers and farmers to respond to these driving forces

the changes that have taken place since the time of the last census. The work could also draw upon other rural information, such as DETRs Land Use Change Statistics in England, to characterise the dynamics of the land cover in and around the survey squares.

- 2.25 Second, the work should be undertaken in the context of any response to the Performance and Innovation Unit's (PIU) recent report on *Rural Economies*. This drew attention to 'the lack of a consistent definition of rural areas' and recommended that the Countryside Agency, ONS, DETR and MAFF 'agree a small set of rural definitions', which they will adopt themselves and promote to other organisations. At the time of this Report no definitions have been agreed, but preliminary consultations suggest that a typology could be constructed that would enable the classification of administrative areas, such as parishes, wards, local authority districts, Census enumeration districts, and post-code areas. **Such work would also provide the basis for the analysis of structured sample surveys, such as CS2000, and allow the socio-economic context of the Survey to be better understood.**

Measuring sustainability

- 2.26 A third key feature of the recent evolution of policy in the area of rural sustainability has been the development of indicators. As is noted in the document *A Better Quality of Life* (DETR 1999a), sustainable development objectives are very broad, and to deliver them society must focus on specific issues and themes. It is argued that one way to do this is through finding ways of measuring sustainability that 'help identify areas for action and the connections between them (DETR, 1999a, p13.). Thus, in the UK in the 1990s, we have seen the development of a suite of indicators that can be used to characterise progress towards sustainability, both in general and within particular economic or environmental sectors.
- 2.27 The conceptual basis for the development of indicators in the UK and the EU has been the OECD's Driver-State-Response (DSR) Model (see Table 2.3, and OECD 1994, DETR 1998 and MAFF, 2000 for more detailed discussion). The most recent suite of general indicators at the national scale was that contained in *Indicators of Sustainable Development for the UK 1996* (HMSO, 1996), and the further refinement of the approach involving the identification of 15 overview or 'headline indicators' in 1998 (DETR, 1998). In the rural sector, more specific indicators have been developed through the

Table 2.4: Indicators of Sustainable Agriculture (After MAFF, 2000)

<i>Indicator</i>	Driving force	State	Response
1 Agricultural assets and liabilities		●	
2 Age of farmers		●	
3 Percentage of tenanted land		●	○
4 EU Producer Support Estimate (PSE)	●	○	
5 Payments to farmers for agri-environment purposes			●
6 Total income from farming	○	●	
7 Average earnings of agricultural workers	○	●	
8 Agricultural productivity			●
9 Agricultural employment		○	●
10 Adoption of alternative farm management systems			●
11 Area converted to organic farming			●
12 Knowledge of Codes of Good Agricultural Practice		●	
13 Pesticides in rivers		●	
14 Pesticides in groundwater		●	
15 Quantity of pesticide active ingredients used	●		
16 Spray area treated with pesticides	●		
17 Pesticide residues in food		●	
18 Nitrate and phosphorus losses from agriculture	●		
19 Phosphorus levels of agricultural topsoils	●		
20 Manure management			●
21 Ammonia emissions from agriculture	●		
22 Emissions of methane and nitrous oxide from agriculture	●		
23 Direct energy consumption by farms	●		
24 Trends in indirect energy inputs to agriculture	●		
25 Use of water for irrigation	●		
26 Organic matter content of agricultural topsoils		●	
27 Accumulation of heavy metals in agricultural topsoils		●	
28 Area of agricultural land		●	
29 Change in land use from agriculture to hard development	●		
30 Planting of non-food crops			●
31 Area of agricultural land under commitment to environmental conservation			●
32 Characteristic features of farmland		●	
33 Area of cereal field margins under environmental management			●
34 Area of semi-natural grassland		●	
35 Populations of key farmland birds		●	
●:Primary type of indicator ○: Secondary type of indicator			

work of MAFF, in the context of policies on sustainable agriculture (MAFF, 2000), and by the Countryside Agency in their assessment of the state of the wider rural environment (Countryside Agency 2000). Table 2.4 shows how the MAFF set of pilot indicators for sustainable agriculture have been grouped according to the DSR Model.

2.28 The selection of indicators has tended to be driven as much by the availability of data as by their theoretical significance, and it is in this context that studies such as the Countryside Survey are often considered particularly useful. Two of the current *Quality of Life Counts* (QLC) indicators, for

example, have been derived from Countryside Survey data, namely plant diversity (species richness) and landscape features (hedges, stonewalls and ponds).

- 2.29 With the publication of CS2000 data, these QLC indicators will be updated. Moreover, as ideas about how progress towards sustainability can be measured are developed, it may well be that CS can also be used to design new indicators of, for example, countryside quality. However, in the long term, if such measures are to be used effectively for the development and evaluation of countryside policy, the work must go beyond simply describing the state of countryside in ecological terms.
- 2.30 The DSR model, and its application by DETR, MAFF and others, clearly provides a useful framework in which we can begin to identify some of the factors causing change in the wider countryside. However, while certain drivers are highlighted as significant, there is usually no implication that the set of such indicators is exhaustive. Moreover, the so-called drivers often record only the ‘immediate’ causes of environmental change rather the underlying or ‘ultimate’ factors that lead to the modification of environmental quality (cf. Haines-Young and Swanwick, 2000). As a result, the characterisation of the drivers of change using the DSR Model is often quite shallow.
- 2.31 If a richer theoretical understanding of the drivers of change is to be achieved, we will have to find ways of linking CS2000 and any future surveys of its kind, to other sources of information about the structure and dynamics of the rural economy and society. **We recommend therefore, that such work be undertaken as part of DETR’s longer-term research programme.** This work will not only provide the basis for developing new rural indicators, and facilitate modelling the environmental impacts of rural change. It will also ensure that CS2000 data can be considered in relation to the more holistic conception of rural sustainability that is shaping current policy agendas.

Conclusions and Implications

- 2.32 Our review of rural sustainability and countryside change traces several key, inter-linked developments that suggest we need to rethink the role of studies such as CS2000:
- (i) A shift away from a paradigm in which policies towards farming are seen the main vehicle for rural development, to one in which the countryside is seen as a ‘rural as opposed to an agricultural space’.
 - (ii) Growing emphasis on the importance of ‘locality’, and recognition of the need to target specific problems in specific areas rather than focusing effort on individual sectors.
 - (iii) The need to promote bottom-up, community-based, voluntary approaches to rural development, rather than the imposition of ‘solutions’ from outside.

- 2.33 With the evolution of more holistic, socially based thinking about rural sustainability, and the development of new institutional structures in the UK, there is a need to broaden our approach to monitoring countryside change. **While CS2000 currently provides an insight into ecological change, we suggest that in the future such work must be better integrated with other sources of information about the structure and dynamics of rural communities if we are to gain an understanding of the broader drivers of change.**
- 2.34 In the context of testing more general ideas about rural development using these data the specific recommendation that arose from the review of rural sustainability was that a much better understanding of the *rural context* of the individual CS2000 survey squares is required. If we are to gain an insight into the causes of change recorded by CS2000 and any future surveys of its kind, then we need to understand the position of the survey squares in both 'environmental' *and* 'rural' space. **Further work is therefore needed to characterise the CS sample squares in relation to different dimensions of rurality, so that a more refined analysis of the socio-economic drivers of countryside change can be attempted.** Detailed consideration of agriculture and forestry as drivers of countryside change and CS2000 is made in the next two chapters of this Report.

Chapter 3. Agriculture as a Driver of Countryside Change

Introduction

- 3.1 The work within this project that focused on agriculture as a driver of countryside change, consisted of a number of elements (Table 2.1), namely:
- To include all the primary data collected during the *Processes of Countryside Change* Study (Potter and Lobley, 1996) in the CS2000 database;
 - To review *Processes of Countryside Change* Study and the possibilities for further analysing these data in the context of CS2000.
 - To review of changing structure of agriculture 1990-98 and their possible impact on the stock and condition of the different land cover and habitat types in the wider countryside;
 - To review the use of MAFF June Census at the Local Authority and District level and Farm Business Survey (FBS) data and consider how they might help with the detailed interpretation of CS2000 results; and,
 - To develop recommendations in relation to the agricultural driver, both in the context of CS2000 and DETR's wider research programme.
- 3.2 In this chapter we describe the progress that has been achieved in each of these areas, and conclude by developing some working hypotheses that might be used to explore the influence of agriculture as a driver of countryside change. For economy of space, we first report on the data base aspects of the work. We then describe the outputs of the three review studies together, and present these in the context of an overview of the major social, economic and policy factors that have impacted on farming over the period since 1990. This material is then used as the basis of our discussion for future research agendas.

Processes of Countryside Change: Database Development

- 3.3 As part of the research that grew out of Countryside Survey 1990, Potter and Lobley (1996) undertook a socio-economic survey of 504 occupiers of land in 169 ITE sample squares during 1993. The data from this study are particularly useful because they were tied so closely to the sampling framework used by Countryside Survey. They provided the first detailed and systematic information on the structure of farming operations in the sample squares, and therefore represent a valuable base line against which future changes might be assessed.
- 3.4 Following the recommendations of the CS2000 Scoping Study, we proposed these data that were acquired by Potter and Lobley (1996) should be

integrated with other information being brought together in the CS2000 database, and that CEH become their custodians. Although the field survey and farm data were linked in the analysis made by Potter and Lobley (1996), there was at the time this study was undertaken, no capability for making such a linkage in the CS2000 database. We considered it essential that this deficiency be overcome in order to provide the foundation for further work.

- 3.5 Thus as part of this study we commissioned Potter and Lobley to prepare a copy of their survey data in a suitable format that would enable it to be transferred into the CS2000 database. This work has now been completed.
- 3.6 Appendix 2 describes the format and context of the data arising from the *Processes* Study. These data have been supplied in two formats *SPSS* (version 9.0.0) and Excel 97 file and have been based to the staff within CEH responsible for developing the CS2000 database.
- 3.7 The crucial step in this work has been to clarify and document how the data from the *Processes* study can be linked to CS data. Four variables can be used to make the association:
 - LANDCLAS: ITE land class;
 - LANDTYPE: Landscape type (note: the marginal upland and upland landscape have been merged due to low responses in the Upland group);
 - SQNO: ITE sample square number; and,
 - OCCID: ITE ownership/occupancy boundary unit

The OCCID variable related to a set of digital boundaries present within the 1990 field survey layer of the CS2000 database so that land cover or vegetation data from the various Countryside Surveys can be extracted by ownership unit to be used in the detailed analyses of these data.

Agriculture in the 1990s: Changing Contexts

Information sources

- 3.8 In order to understand the social, economic and policy factors that shaped agriculture during the 1990s, we commissioned three supporting studies:
 - As part of their work on the results of the *Processes* Study, we also asked Potter and Lobley to consider the results of their earlier work in relation to the general changes in farming that had occurred since 1990. We also asked them to suggest what scope there was for further analysis in relation of new information from CS2000. The report arising from this work may be found in Appendix 3.
 - To give a broader perspective on recent market trends and emerging issues, we commissioned Winter and Smith to reflect on and extend their recent work in this area (see for example Winter

et. al 1998). The aim here was to explore the environmental impacts of recent changes and those likely to be set in train by the reforms envisaged under Agenda 2000 reforms. The report arising from this work may be found in Appendix 4.

- Finally, to develop an understanding of the links that could be made between national sources of information, such as the June Census and the FBS, and CS2000, we commissioned McNally and Kiddle to provide a statistical summary of the major trends in farming during the 1990s. The work of McNally (Appendix 5) sought to use FBS data to describe changes in the intensity of farming practices over the last decade. Kiddle (Appendix 6) considered the extent to which the June Census data at Local Authority District scales could be used to look at performance and structural and changes in farming on a regional basis.

3.9 The outputs from these studies have been put into a wider context also by considering the key changes in agriculture in the period up to the last Countryside Survey (CS1990). Key sources of information on this earlier period of change were the reviews of Wilkinson (1997) and Little (1998), and the report on the causes of vegetation change undertaken as part of ECOFACT (see Firbank *et al.*, 2000).

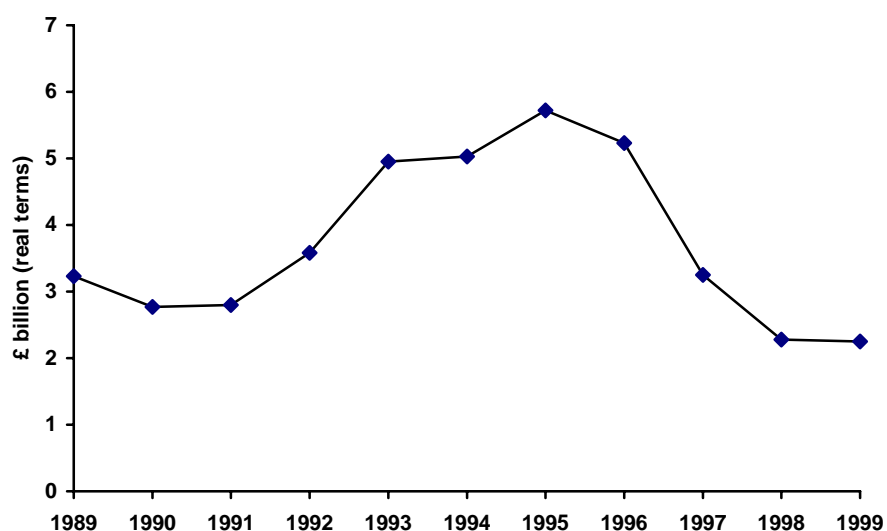
Polarisation vs Consolidation, Specialisation and Diversification

3.10 Some commentators (e.g. Firbank, 2000) have described the general changes that occurred in the structure of British agriculture during the 1980s as one of geographical ‘polarisation’. Although the term is often used imprecisely, it involves the idea that we observed during this period the increasing regional specialisation of farming activities. In part the process was manifested by reduction in area and number of mixed farms and the increasing dominance of intensive arable farming in those areas of the east and south east of England, where the economic returns from such activities were most profitable. The structure of farming in such areas is contrasted with that of the west and north, where mixed farming gave way to more exclusively pasture-based systems. To what extent has such polarisation been maintained and continued during the 1990s?

3.11 In the analysis that we present below, it will be shown that while the pattern of spatial differentiation of farming activities has been maintained, the processes of polarisation that typified the 1980s has been replaced across all regions by those of :

- ***Consolidation***, that is the tendency towards fewer, larger farms.
- ***Specialisation***, that is the tendency for farms to concentrate on a narrower range of activities so that labour requirements and other inputs may be easier to predict and control.
- ***Diversification***, that is the tendency for farm enterprises to develop other sources of income through off-farm activities.

- 3.12 It will be argued that although these changes suggest restructuring in the agricultural industry, there is little evidence that they have been associated with any significant lessening in *management intensity*. Indeed, there are some signs that the consolidation and specialisation processes have combined concentrated to increase such management pressures in some areas, despite the development of policies to encourage better *environmental practice* in farming.
- 3.13 These changes can mainly be understood in terms of the response of farming to economic pressures during the 1990s. The period since 1993 was one in which a boom was followed, after about 1996, by a deep recession in farming (Figure 3.1). In real terms total farm income doubled between 1990 and 1995, before falling back by over 60% between 1995 and 1999. Faced with declining incomes, farmers appear to have sought strategies for overall cost reduction, efficiency gains and management flexibility. It will be suggested that such pressures appear to have overridden some of the potential gains sought by environmental policy towards agriculture during this period.
- 3.14 A key policy measure during the 1990s was the reform of the Common Agricultural Policy (CAP) in 1992. The final package of reform measures agreed included:
- a significant reduction in support prices for cereals and beef, with more moderate reductions in dairy price support;
 - the introduction of a new system of compensation aids to arable farmers (in the form of the Arable Area Payment Scheme) and augmented livestock premium payments to beef and sheep producers together with a new premium payment to dairy farmers;
 - the introduction of a set aside requirement for arable farmers, set at a rate of 15% for the first year; and,
 - the introduction of a series of ‘accompanying measures’ designed to boost rural development and agri-environmental schemes.
- 3.15 As Potter and Lobley (1993) note, however, while a number of predictions about the impacts of these measures on farming were made (e.g. Oglethorpe *et al.*, 1993), they suggest the policy change has had little effect. They argue that the effects were ‘eclipsed at the farm level’ initially by the combined impact of movements in world market prices and then by fluctuations in the value of Stirling.

Figure 3.1: Total Income from Farming in UK

Source: MAFF Press Release (see Winter and Smith – Appendix 3)

- 3.16 The review of Winter and Smith (Appendix 4) also consider that the structural effects of the 1992 reforms of farming to have been modest, even though they fundamentally shifted the balance of the CAP from price support to direct payments. Their review suggests, however, that the scale of the effects varied from sector to sector, and took place against the impacts of a number of other drivers of change.
- 3.17 In Table 3.1 we bring together material provided by the commissioned studies, to explore both the extent to which changes within farming since CS1990 may be detected in the results of CS2000, and how we might use these survey data to explore possible environmental consequences. The Table is structured around the themes of ‘consolidation’, ‘specialisation’ ‘diversification’ and ‘management intensity’, and sets out a series of analyses that can be made using CS2000 data in conjunction with other sources of information about farming, such as the June Census and the FBS.
- 3.18 In the discussion that follows we focus on the period 1988-97, in that these are most likely to be reflected in the information collected during the CS2000 Field Survey in 1998. The longer term implications of the ‘crisis’ in agriculture at occurred towards the end of the decade will be considered at the end of this chapter, in the context of opportunities for developing the ‘post CS2000 research agenda’.

Table 3.1: Summary of recommendations for further work on analysis of agricultural drivers using CS2000 data.

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	CS2000 'short term'	CS2000 'long term'
<p>Consolidation:</p> <p><i>What effects does the trend towards fewer, larger farms have for the environment?</i></p>	<p>Extend analysis of district level June Census data (1988-97) for holding number, size and mean size to Wales and Scotland.</p>	<p>Determine loss of farm area to non-agricultural cover types by SSR⁸, PCC⁹ typology and CSEZ¹⁰.</p> <p><i>To what extent do patterns of loss of agricultural land recorded by CS2000 match June Census data?</i></p> <p><i>What geographical contrasts exist in the conversion of agricultural land to other uses?</i></p>	<p>Use follow-up to PCC⁵ to determine extent of consolidation by PCC typology.</p> <p><i>What is the relationship between of quantitative and qualitative cover change to consolidation process?</i></p> <p><i>How do patterns of land cover change relate to changing patterns of ownership or tenancy?</i></p>
	<p>Extend analysis of district level June Census data (1988-97) for labour inputs and use of contractors to Wales and Scotland. Refine FBS analysis for labour inputs.</p>		<p>Use follow-up to PCC to determine extent of changing labour inputs and use of contractors by PCC typology.</p> <p><i>Is there any relationship between cover change and changing labour inputs on farms by region and zone?</i></p>
<p>Polarisation & Specialisation:</p> <p><i>To what extent are the regional/zonal patterns in farming observed during the 1980s being maintained and what are the environmental consequences?</i></p>	<p>Extend analysis of district level June Census data to cover both Scotland and Wales and the period 1984-90 in each country.</p> <p><i>Are regional/zonal contrasts in farm structure being maintained, reducing or increasing in 1990s?</i></p>	<p>The analysis in the shifts between major agricultural cover types and changes in diversity of cover and vegetation types within the farmed landscape by SSR and CSEZ using CS1990 and CS2000.</p> <p><i>Is the structure of the farmed landscape becoming more or less similar between regions and CSEZ post 1990?</i></p> <p><i>How does environmental stock change by 1993 PCC typology?</i></p>	<p>Use follow-up to PCC to determine extent of changes in structure of farm enterprise in relation to EC Farm Type¹¹ and PCC typology.</p> <p><i>Are regional and zonal contrasts maintained or increasing?</i></p> <p><i>To what extent are farm enterprises becoming more specialised in terms of the range of activities?</i></p> <p><i>How do changes in farm structure relate to 1993 PCC farm types?</i></p>

/cont.

⁸ SSR= Standard Statistical Region

⁹ PCC=Processes of Countryside Change Study; PCC Typology = Typology of farmers defined by Potter and Lobley (1996).

¹⁰ CSEZ = Countryside Survey 2000 environmental zone.

¹¹ Categorisation of farm types used in June Census and FBS

Table 3.1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	CS2000 'short term'	CS2000 'long term'
<i>Diversification</i>	Analysis of recent census data on diversification by SSR and CSEZ. Extend analysis of 'local economy' by using data such as <i>EC Farm Structures Survey, Annual Employment Survey, Labour Force Survey, and ONS classification of local authority districts.</i>		Use follow-up to PCC to determine extent of off-farm diversification by PCC typology and EU Farm Type. <i>How have different types of enterprise responded to changed economic circumstances via diversification? What role does off-farm income have in triggering/preventing land cover change?</i> What is the impact of part-time working on levels of 'environmental management'?
<i>Management Intensity</i> <i>Fertiliser and pesticides</i>	Extend FBS analysis of <i>fertiliser and pesticide</i> inputs using other data sources (e.g. Survey of Fertiliser Use). Attempt regional disaggregation and use levels by farm type	Expectation: little change in impacts of fertiliser and pesticide use. Analysis of the relationship between changes in relevant IBDs within the farmed landscape by SSR and CSEZ. Extend CS2000 IBD system to formally include measures of biological condition of freshwaters. Disaggregate by SSR and CSEZ to examine response in relation to character of farmed landscape.	Use follow-up to PCC to determine changing use of fertilisers and pesticides.
<i>Grazing intensity</i>		Expectation: Little overall change, but developing regional contrasts. Analysis of the relationship between changes in relevant IBD scores by SSR, CSEZ and especially LFA/non-LFA areas.	Use follow-up to PCC to examine changes in intensity of pasture management
<i>Other aspects of farm management</i>	There are other aspects of farm management not captured by JC and FBS – direct analysis using CS2000?	Extend CS2000 system of IBDs to develop composite agricultural intensification index; disaggregate by SSR and CSEZ. Index should include information on level and quality of environmental stock.	Use PCC follow-up to assess how farm types have responded generally to economic changes via intensification of on-farm operations.

/cont.

Table 3.1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	CS2000 'short term'	CS2000 'long term'
<i>Environmental practice/policy</i>	Extend regional analysis JC data for LFA/non-LFA districts to include ESA/non-ESA districts.	Comparison of stock and quality change in 'policy-on' vs 'policy off' situations. Will require access to MAFF Countryside Stewardship and ESA monitoring data. Exploitation of CS2000 as contextual data for agri-environmental monitoring	Use PCC follow-up to look at take up of environmental advice/information, levels of environmental awareness and response agri-environmental schemes by farm types.
		Use CS2000 results to define environmental potential and/or targets for farmed landscape.	Use PCC follow-up to develop 'sustainability profiles' of farm managers and farm enterprises and relationships between profiles and 1993 PCC farm typology and change 1990-98.

a. Consolidation

- 3.19 The process of *consolidation* is evidenced by the fact that over the period 1988-97, all regions have experienced a decrease in the number of agricultural holdings and an increase in mean holding size.
- 3.20 Table 3.2 shows the information derived from the June Census for the change in farm area and number by SSR. These data show a loss in the total area of agricultural land in England by about 2% over the period 1988-97; this rate of loss maintains the trend observed throughout the 1980s. The highest rates of loss of area were in the North West, South East, South West and West Midlands.
- 3.21 **The loss of the tilled land and managed grass broad habitats to other broad habitat categories is clearly one that could be explored using CS2000 data, and we recommend that such analysis is undertaken (Table 3.1).** The analysis can be made at the scale of the SSRs and the CS2000 Environmental Zones¹², and should include Scotland, Wales and England. The analysis would establish the extent to which broad trends identified in the June Census could be 'read across' into CS2000. More importantly it would enable a detailed analysis of the exchange of

¹² The four landscape types used for publication of CS1990 have now been replaced by six environmental zones that nest within the country units. For England and Wales the three zones are: (a) the flat lowlands in England and Wales typical of the south and west; (b) the nearly flat lowlands of the west and central parts of the country; and, (c) the uplands and upland margins. For Scotland the zones are: (d) lowlands; (e) intermediate and islands; (f) highlands.

Table 3.2: Regional changes in the area, number and mean size of holdings in the June Census, 1988-97

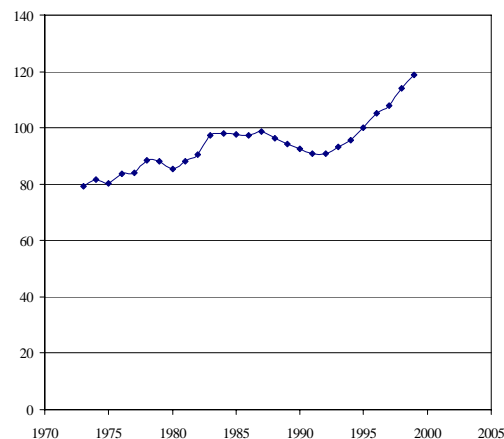
Region	Total area of holdings in JC			Total number of holdings in JC			Mean holding size		
	1997	Change 88-97	% change	1997	Change 88-97	% change	1997	Change 88-97	% change
North	1038383	-10784	-1.03	11398	-576	-4.81	87.62	3.48	3.97
North West	425419	-22063	-4.93	11177	-1619	-12.65	34.97	3.09	8.84
Yorks & H'side	1095544	-11277	-1.02	16042	-1516	-8.63	63.04	5.25	8.34
East Midlands	1227769	-18966	-1.52	15799	-1572	-9.05	71.77	5.94	8.28
West Midlands	935525	-24273	-2.53	18871	-1063	-5.33	48.15	1.43	2.96
South West	1802425	-35166	-1.91	35603	-1101	-3.00	50.07	0.56	1.12
East Anglia	989034	-20318	-2.01	11421	-1588	-12.21	77.59	9.01	11.61
South East	1657757	-73731	-4.26	24466	-2835	-10.38	63.42	4.34	6.84
All England	9173853	-216569	-2.31	143955	-11194	-7.21	60.53	3.20	5.29

agricultural land with other broad habitats to be made in a way that is not possible using June Census data alone.

- 3.22 A key element of this analysis of loss of agricultural land would be to explore geographical contrasts in conversions to developed land and woodland. The June Census data suggests a general increase throughout the decade in the area of farm woodlands in England, Scotland and Wales. However, unlike the June Census data, CS2000 information allows the exchange of land between agriculture and other, non-agricultural cover types to be documented. CS2000 thus potentially brings a new dimension to the analysis of changes to the farmed area.¹³
- 3.23 Table 3.2 shows that while the total area of agricultural land declined over the period 1988-97, the number of holdings also fell by 7%. The combination of these trends in farm area and number suggests that a process of farm amalgamations occurred throughout the period. The process of consolidation was most evident in East Anglia, Yorkshire and Humberside, the North West and the East Midlands.
- 3.24 Amalgamation is most likely on farm types that could benefit from economies of scale. Such changes may be part of larger structural transformations that include both reductions in labour inputs and a trend towards renting or contracting out the management of land.
- 3.25 Kiddle (Appendix 6) provides an analysis of changes in labour inputs recorded in the June Census. In England as a whole, there has been a slight fall in working family members per holding, whereas there has been a rise in both Wales and Scotland. However, all three countries have seen a steep

¹³ It should also be noted that estimates of change in farm woodland from the June Census are problematic (See Watkins, Appendix 7, and Chapter 4 of this report).

Figure 3.1: Contract work (MAFF)



decline in full-time family workers per holding. While this has been matched by a rise in part-time family workers in Wales and Scotland, the rise in England is small. Full-time hired labour units per holding have fallen in all three countries, whereas part-time labour units per holding have only risen in Wales.

- 3.26 These changes in the level of labour inputs occur against a background of increasing use of contractors (Figure 3.1). MAFF estimates that as much of 10% of all farmed land in the South East is farmed under contract and; it is also significant in places of high arable production such as the Midlands.
- 3.27 While these effects of changing farm size cannot be investigated directly using CS2000 data they are clearly an issue that could be explored in any follow-up the 1993 *Processes of Countryside Change Study*.
- 3.28 Potter and Lobley (Appendix 3) suggest the renting out of land and use of contractors may be part of a process initiated by farmers who are on a trajectory out of agriculture, or who have elected to become part-time operators by taking up employment off the farm. It is not known, however, whether use of contractors, or the more general process of consolidation and reducing labour inputs has particular environmental consequences – although it is clearly an issue that could be investigated in any future socio-economic survey of farm enterprises in the CS2000 survey squares.
- 3.29 Potter and Lobley (1996) put the results of their earlier socio-economic survey in context by suggesting that at this time farmers decisions were still conditioned by the price support and a ‘coupled’ system of producer aid that had been available under the Common Agricultural Policy (CAP) up to this time. They felt that, with the 1992 reforms to the CAP, both their survey and CS1990 reflected conditions end of a major period of transformation in farming. They argued that changes, which had earlier been more widespread and less farm specific, had by the early 1990s, become confined to particular situations. The thesis they developed was that change was increasingly confined to situations where succession (generation change) was taking place

on farms, or where an occupier was striving to ‘catch-up’ through a programme of intensification of activities.

- 3.30 **Given the process of consolidation identified above, we recommend that a further survey be undertaken of farmer enterprises in the CS sample squares is undertaken, in a follow-up to the 1993 *Processes* Study (Table 3.1 section b). The aim would be to determine the extent to which consolidation has impacted upon the farms covered by the previous survey. The new study would enable the effects of consolidation, as a trigger of environmental change to be tested against the other identified as significant during the 1980s. The response of the different farm types identified by Potter and Lobley (1996) towards these consolidation pressures could also be investigated.**
- 3.31 The *Processes* Study identified different categories of farmer according to whether they were on an expansionary or contracting path. These classifications were useful in explaining past change but may be good predictors of future change. One distinction that could be considered would be between those who are able to react and even exploit policy change and recession and those who are forced to absorb such change if they are to stay in farming.

b. Specialisation

- 3.32 The process of *specialisation* within agriculture is suggested by data such as that presented in Table 3.3, which shows the changes in number of different farm types over the period 1988-97 by region. As Kiddle (Appendix 6) notes, the general decline in Mixed and General cropping holdings implies a move towards specialisation, where labour requirements may be easier to predict and control. The environmental effects of greater specialisation are unknown, but as Little (1998, p.108) notes, they could include:
- Reduction in the diversity of the ‘on-farm’ landscape.
 - Abandonment of marginal land (eg. river valley grassland)
 - Threat of dereliction to traditional farm buildings as they become redundant
- 3.33 In fact, as Table 3.3 shows, not only has there been a decline in Mixed and General Cropping, but also a decline in all those types of holding which can be regarded as the more labour intensive farm types. Hence Pigs and Poultry, Dairy, Horticulture, General Cropping and Mixed holdings have seen the greatest percentage decline, whereas Cereal, Lowland Cattle and Sheep and Other holdings are increasing in number. All regions have experienced the decline in Dairy, Pig and Poultry, Horticulture and Mixed holdings, and the rise in Other holdings. Increases in Cereals farm numbers were concentrated in the West Midlands and the South West, with the expansion in lowland cattle and sheep most marked in the North.

Table 3.3: Regional changes in numbers and proportions of EC farm types.

Region		CEREAL	GENCRO	HORT	P&P	DAIRY	LFA CS	LOW CS	MIXED	OTHER	ALL TYPES
East Anglia	1997	3019	3568	825	582	110	0	784	807	1519	11214
	Change 88-97	-208	-1049	-432	-277	-81	0	73	-36	327	-1683
	% change	-6.45	-22.72	-34.37	-32.25	-42.41	0.00	10.27	-4.27	27.43	-13.05
East Midlands	1997	3926	2212	773	450	1310	642	2646	1319	2324	15602
	Change 88-97	164	-1068	-188	-234	-563	-81	172	-147	318	-1627
	% change	4.36	-32.56	-19.56	-34.21	-30.06	-11.20	6.95	-10.03	15.85	-9.44
North	1997	1012	112	71	157	1902	3205	2390	760	1518	11127
	Change 88-97	35	-89	-106	-80	-617	-350	427	-187	272	-695
	% change	3.58	-44.28	-59.89	-33.76	-24.49	-9.85	21.75	-19.75	21.83	-5.88
North West	1997	477	637	792	433	2636	1021	1954	419	2621	10990
	Change 88-97	26	-313	-268	-307	-815	-28	-79	-148	286	-1646
	% change	5.76	-32.95	-25.28	-41.49	-23.62	-2.67	-3.89	-26.10	12.25	-13.03
South East	1997	5294	1126	2610	769	986	0	4968	1778	6046	23577
	Change 88-97	79	-556	-1288	-480	-611	0	-427	-398	751	-2930
	% change	1.51	-33.06	-33.04	-38.43	-38.26	0.00	-7.91	-18.29	14.18	-11.05
South West	1997	2584	610	1463	1002	6521	1886	10524	2751	7901	35242
	Change 88-97	365	-224	-331	-276	-2200	-653	791	-273	1583	-1218
	% change	16.45	-26.86	-18.45	-21.60	-25.23	-25.72	8.13	-9.03	25.06	-3.34
West Midlands	1997	1738	1303	980	525	2680	1000	5094	1761	3587	18668
	Change 88-97	192	-255	-222	-185	-879	-171	-11	-349	727	-1153
	% change	12.42	-16.37	-18.47	-26.06	-24.70	-14.60	-0.22	-16.54	25.42	-5.82
Yorkshire & Humberside	1997	2839	1799	518	815	1640	1879	2338	1501	2478	15807
	Change 88-97	-102	-492	-194	-315	-599	-274	114	-271	425	-1504
	% change	-3.47	-21.48	-27.25	-27.88	-26.75	-12.73	5.13	-15.29	20.70	-20.70
England	1997	20889	11367	8032	4733	17785	9633	30698	11096	27994	142227
	Change 88-97	551	-4046	-3029	-2154	-6365	-1557	1060	-1809	4689	-12660
	% change	2.71	-26.25	-27.38	-31.28	-26.36	-13.91	3.58	-14.02	20.12	-8.17

Key to farm types:

Type	Variable name
Cereals	CEREAL
General cropping	GENCRO
Horticulture	HORT
Pigs and poultry	P & P
Dairy	DAIRY
Cattle and sheep (LFA)	LFACS
Cattle and sheep (lowland)	LOWCS
Mixed	MIXED
Other	OTHER

3.34 Analysis of the way these changes in the number of different enterprise types are translated into changes in land cover within the agricultural landscape is complex. In the context of CS2000 the analysis is made more difficult because the year of the survey saw major economic changes that may have reversed earlier transformations. For example, as Winter and Smith note (see Appendix 4), the fall in profitability in the arable sector resulted in a small decline in the area under cereal cultivation in 1998, down 2.5% in the UK between 1997 and 1998, and a further 9.1% between 1998 and 1999. By

contrast the area under oilseeds rose by 13.7% between 1997 and 1998, but declined again by 14.9% between 1998 and 1999.

- 3.35 Major shifts were also observed during the decade in the livestock sector. Potter and Lobley (Appendix 3) observe that 1980s and early 1990s saw many lowland dairy farmers turning to semi-intensive beef production, after the imposition of milk quotas in 1984. During the 1990s profitability in the milk and livestock sector cattle numbers have fallen as the result of an appreciating currency, changing market conditions and more specific factors such as the beef export ban. However, the patterns of change vary between sector. Kiddle (Appendix 6), for example, shows that beef cattle numbers rose up until 1997, but dairy cattle numbers fell everywhere throughout the decade. Since the change in dairy outweighed the increase for beef, in aggregate there was a decline in total cattle numbers. The decline of beef since 1997 is described by both Potter and Lobley, and Winter (See Appendices 2 & 3).
- 3.36 Given such volatility, it is important to try to separate out short-term and more recent fluctuations from longer-term transformations of the character of the farmed landscape that are more likely to be picked up by CS2000. Using the MAFF June census returns for the period up to 1997, Kiddle (Appendix 6) reports the following trends:
- A decline in the area of cereals (Table 3.4), maintaining the trend observed in the period up to CS1990.
 - A shift from arable land to 'other land'. This was mainly due to due to set-aside, but also partly due to development of farm infrastructure. In addition to set-aside, the 'other land' category includes land taken up by farm buildings. For the period up to 1997, the June Census data suggest that the larger the proportion of arable land in a region, the greater has been the decrease in that proportion over the decade, and the greater the subsequent rise in the proportion of other land. Thus the largest proportional shifts are observed in the South East and East Anglia. Table 3.5 shows absolute changes for other land.
 - An increase in other crops¹⁴, that include potatoes, crops for stock feeding, sugar beet, hops and rape for oilseed, especially in the South West and East Anglia.
 - A decline in the area of temporary and permanent grassland in all regions except East Anglia (Table 3.6).
- 3.37 On the basis of these data Kiddle (Appendix 6) suggests that it is not entirely clear that farmers have halted expansion of arable area, even though total agricultural area may have fallen. The figures suggest a shift in the proportions of different cover types within the area of farmed land, which was itself declining. Table 3.7 summarises the absolute changes in area for the major cover types for the period 1988-97 by SSR.

¹⁴ Note – other crops does not include set-aside

Table 3.4 Changes in cereal area in England, thousands of hectares

Region	Cereals as % of UAA 1988	Total cereals area 97	Change in area 88-97	% change in area 88-97
East Anglia	53.78%	509.1	-33.7	-6.21%
East Midlands	46.22%	531.4	-44.8	-7.77%
North	15.21%	153.6	-5.9	-3.73%
North West	14.57%	55.4	-9.7	-14.99%
South East	43.52%	647	-106.4	-14.13%
South West	23.26%	362	-65.3	-15.28%
West Midlands	30.58%	271.4	-22.1	-7.53%
Yorks. & H'side	39.02%	403.7	-28.1	-6.51%
<i>All England</i>	34.62%	2933.9	-316.2	-9.73%

Table 3.5 Changes in 'other' land in England, by region, 1993-97, Thousands of hectares

Region	Other land 1993	Other land 1997	Change 1993-7	% change
East Anglia	36.4	74.4	38.0	104.23%
East Midlands	25.4	67.9	42.5	167.25%
North	11.6	22.3	10.8	93.53%
North West	6.7	9.9	3.3	48.28%
South East	68.2	122.2	53.9	79.13%
South West	40.2	67.6	27.3	68.14%
West Midlands	18.7	39.2	20.5	109.77%
Yorks. & H'side	18.2	48.2	29.9	164.52%
All England	225.5	452.1	226.5	100.42%

3.38 The loss of temporary and permanent grassland to cereals and other crops, and its possible environmental consequences, was noted by Winter and Smith (Appendix 4). The trend is supported by the work of Andersons (1997), Winter and Gaskell (1998), and Robinson and Lind (1999) and seems to have occurred even though such land was ineligible for Arable Area Payments¹⁵. It would seem that these shifts were largely driven by the profitability of cereals, and crops such as potatoes and flax (see Winter and Smith, Appendix 4).

¹⁵ Potter and Lobley – Appendix 2, page 5 – suggests that AAPS should/did have put a break on the trend towards the conversion of permanent grass. Check?

Table 3.6 Changes in grassland area in England, thousands of hectares

<i>Region</i>	Grassland as % UAA 1988	Total grassland area 97	Change in area 88-97	% change in area 88-97
East Anglia	10.40%	106.1	1.2	<i>1.12%</i>
East Midlands	27.97%	314.9	-33.7	<i>-9.67%</i>
North	50.01%	516.2	-8.5	<i>-1.62%</i>
North West	66.14%	277.8	-18.2	<i>-6.14%</i>
South East	31.75%	475.7	-73.9	<i>-13.46%</i>
South West	62.58%	1067.1	-82.8	<i>-7.21%</i>
West Midlands	54.09%	475.5	-43.6	<i>-8.41%</i>
Yorks. & H'side	32.46%	343.3	-15.9	<i>-4.43%</i>
All England	41.07%	3576.7	-278.9	<i>-7.24%</i>

- 3.39 Winter and Gaskell (1998) suggest that eligibility rules have fixed a rigid pattern of arable agriculture, resulting in an undesirable landscape that is ecologically unsustainable. They note that the eligible areas were established after many years of arable expansion, and particularly in eastern England, they may now contribute to keeping farming all-arable. They argue that have been a powerful disincentive to a return to more mixed farming systems so far.
- 3.40 Although set-aside was an integral part of the 1992 reform to the arable sector, commentators suggest that its positive environmental impact has been very limited (Winter *et al.*, 1998). The majority of farmers managed their set-aside for agronomic rather than for environmental reasons. Even though there was a requirement that certain landscape and environmental features should be protected on or adjacent to set-aside land the area affected has been small and declining. Overall, within the arable sector, Winter *et al.* (1998, p.71) have argued that 'policy.... was having a strong influence on land use, but not on the intensity of land use within that system'.
- 3.41 McNally (Appendix 5) shows that there is some clear differentiation of farm types, as defined by the FBS, by SSR and CS2000 Environmental Zone. These data suggest that these geographical contrasts might be used as the basis of further analysis of CS2000 data for the farmed landscape. **We therefore recommend that the following analyses be undertaken in relation to the changing structure of the farmed landscape and the trend towards increased specialisation (See also Table 3.1).**
- **The analysis in the shifts between major agricultural cover types by country, environmental zone and SSR, to determine whether the trends suggested by June Census data can be observed in CS2000.** A key feature of CS2000 is the potential it has to link observations for the

Table 3.7: Summary of major land use changes within the farmed landscape, 1988-97 (thousands of hectares)

Region	Cereals	Grassland	Other crops	Horticulture
East Anglia	-33.7	1.2	69.2	-9.1
East Midlands	-44.8	-33.7	17.6	-5.0
North	-5.9	-8.5	2.6	-0.2
North West	-9.8	-18.0	4.7	-1.7
South East	-106.0	-82.8	40.1	-9.8
South West	-65.3	-82.3	73.5	0.0
West Midlands	-22.1	-43.6	17.7	-1.4
Yorks. & H'side	-28.0	-15.9	-3.1	2.9
All England	-316.2	-278.9	153.0	-24.3

stock land cover and to patterns plant biodiversity. Changes in the proportions and representation of the different Countryside Vegetation System (CVS) classes could be considered in relation to the underlying changes in the structure of the farmed landscape.

- Analysis of geographical contrasts in changes in the structure of the farmed landscape.** As Potter and Lobley note (Appendix 3), even in the absence of additional survey material from land managers, some understanding of the likely causes of the changes recorded by CS2000 may be achieved indirectly through analysis of already available secondary data, including re-analysis of the *Processes* data themselves. They suggest that a useful exercise would be to undertake a 'look forward' from the 1993 to identify farmers and situations most likely to have been affected by the market changes up to the time of the resurvey. The expansion of 'other crops', coupled with the gain in farm woodlands, suggest that we may see a more varied farmed landscape than in the recent past. CS2000 field survey and LCM2000 data could be used to develop an index of agricultural diversity, that could be compared for different regions, and (using field survey data) over time. The extent to which such diversity changes have any direct environmental consequences is not known. However, linked to the analysis of vegetation suggested above, and extended using the concept of 'environmental stock' previously used by Potter and Lobley (1993), this would seem an useful area of investigation. Potter and Lobley (Appendix 3) note, for example, that it would be interesting to see if the distribution of farm types identified in the earlier survey exhibited any association with

recorded changes in environmental stock¹⁶. Unfortunately only the 1990 ownership boundaries are available for the analysis of change recorded by CS2000. It would be valuable, and part of any follow-up the *Processes* Study to update ownership records (see recommendations for further work on ‘consolidation’, above),

- **The analysis of changes in farm structure within CS Survey Squares post 1993.** The most direct way to determine how changes in farm structure and processes such as specialisation might have impacted upon the stock and quality of land cover in the CS Survey Squares, would be to undertake a follow-up the *Processes* Study. The structure of the new survey could develop out of the ‘look forward’ analysis described above, and could explore how the different types of farm enterprise have responded to changing market conditions over the period since 1993.

c. Diversification

- 3.42 There is considerable debate over the extent of farm diversification in Britain. This is partly due to differences in definitions and partly due to the difficulty of obtaining reliable information on the process. Most workers suggests that farm diversification has been limited to date, with particular spatial concentrations relating to market opportunities, local opposition and planning policies (Ilbery and Bowler, 1993; Murdoch and Marsden, 1994).
- 3.43 Evans and Ilbery (1992), for example, estimated that only 6% of farms had accommodation enterprises and only ‘a fraction’ of these ‘generated significant income’ (Morris and Evans, 1999: 353). More recently, however, Gasson et al (1998) surveyed 491 English farmers in 1997 and asked about measures taken in response to the financial uncertainties of the 1990s. While most had relied on conventional ‘productivist’ responses, most notably increasing production from existing enterprises (65%), nearly a fifth (18%) had started *non-farming enterprises*.
- 3.44 The June Census now includes a question on farm diversification but it has not been set for sufficient time to examine changes in importance of the process to be measured directly. For the period 1988-97 more indirect evidence must be sought. The results form three areas of the census support the hypothesis of greater diversification in farm incomes:
- i **There has, as we have seen, been a significant fall in full-time family workers per holding and an increase in use of contract labour** (paras 3.25 and 3.26). While such changes do not, in themselves, establish that income diversification is taking place, they are consistent with such a trend.
 - ii **There has been an increase in the number of those types of holding, where off-farm enterprises may be more easily taken up.** For example, numbers of Cereal holdings, where activity tends to come in

¹⁶ Potter and Lobley (1996, p. 26) define environmental stock to be the area of extensive grass plus the area of deciduous wood and semi-natural vegetation on a farm holding

short intense bursts during the year, have increased in all but two regions, East Anglia and Yorkshire and Humberside. Changes in Lowland Cattle and Sheep holdings have varied between a rise of over 20% in the North to a fall of nearly 8% in the South East. However, where there have been rises in the numbers, Kiddle (Appendix 6) suggest that this may reflect a change of enterprise from dairy to beef.

iii **Increases in the ‘Other’ category within the classification of EC farm types.** This is used as a ‘catch-all’, for enterprises that do not fit well with mainstream agriculture. The category includes, for example, specialist mushroom growing enterprises, goat or equine enterprises. It also include holding of limited economic importance, such as specialist set-aside, specialist grass and forage (only grass or rough grazing, with no livestock held) or non-classifiable holdings (fallow or buildings and other areas only where no Standard Gross margins are calculated. The expansion in number of holdings is widespread, with the largest shifts in the North, Yorkshire and Humberside, West Midlands, South West and East Anglia. It should be noted, however, that the area covered by such holding is small.

3.45 The extent to which these changes can be traced through to changes in the stock and quality of habitats associated with the farmed landscape is unclear. They are likely to be small scale and localised. Certainly they would be difficult to disentangle from some of the effects of specialisation noted above, although they may result in a more diversified farm landscape. However, Little (1998 p. 108) notes that the effects are likely to include:

- The poor utilisation of grassland, particularly by horses leading to weed invasion and boundary neglect.
- Increased use of ranch-style fencing giving rural areas ‘inappropriate urban finishes’.
- Poor conversion of barns to dwellings, disrupting the integrity of traditional farmstead patterns.

3.46 Diversification is clearly an issue that could be usefully explored in a follow-up survey to the 1993 *Processes* Study, because the process may, in the long term, impact on patterns of land management and rural change. Opportunities for off-farm income, for example, may profoundly affect the ability of some farmers to remain in some form of agriculture, albeit part-time, and thereby affect the rate of environmental change in the farmed landscape.

3.47 **We therefore recommend that the issue of diversification and the role of ‘off-farm’ income in maintaining the integrity of the farm enterprise is one focus of any future social survey in the CS sample squares (Table 3.1).** As with the investigation of the process of specialisation described above, the extent to which diversification has occurred could be related to the type of operation found by the 1993 study, to determine how different enterprises have responded to changed economic circumstances. The impact

of part-time working on levels of 'environmental management' within the farm could also be assessed.

d. Management Intensity

- 3.48 The environmental impact of changes in farming practice and the general level of the intensity of farm management have been widely discussed. Little, (1998) provides a recent review. In this study we focus on those general measures of management intensity that can be derived from sources such as the June census or the FBS, and ask how might changes be detected by CS2000.
- 3.49 McNally (Appendix 5) provides an analysis of the intensity of farming using the FBS. Within the arable sector she shows an average annual increase in fertiliser and pesticide expenditure per ha of main products on Cereals farms, General Cropping Farms and Mixed farms between 1988 and 1997. The increase coincides with the period in the mid-'90s when returns for these farms were particularly high, as indicated by Net Farm Incomes. The data used by McNally have been deflated by the fertiliser price index and so reflect changes in volume.
- 3.50 The environmental impacts of these changes are difficult to interpret, however, since impacts will be dependent on application levels and location. The implication of the increase in pesticide expenditure is particularly difficult to determine, because in the FBS it is referred to as 'crop protection expenditure'. Thus a farmer purchasing a more expensive but less environmentally damaging product would appear to be a more intensive user than a farmer using a less damaging product on the same area. For present purposes, however, it is assumed that 'pesticide expenditure per ha' does reflect intensity of use, rather than the character of the products purchased.
- 3.51 McNally's analysis of fertiliser and pesticide intensity extends up to 1997. Potter and Lobley (Appendix 3) note that recent farm surveys (e.g. Winter *et al.* 1998) suggest that fertiliser use and the application of farm chemicals has not noticeably declined on many farms, and in some cases may actually have increased. Thus the situation at the time of the CS2000 Field Survey may not have been very different to the early part of the decade. As Potter and Lobley (Appendix 3) suggest, it will be interesting to see if these trends in rotations and farming practice have translated into measurable gains or losses of biodiversity.
- 3.52 Within the livestock sector, various measures of intensity can be constructed. Kiddle (Appendix 6), for example, suggests that by matching change in livestock numbers to area of grassland and rough grazing, it is possible to give a picture of the stocking density. The pressure on grassland can be followed by looking at the change in livestock units per 100 ha of grassland and rough grazing¹⁷.

¹⁷ This includes temporary grassland under 5 years, permanent grassland over 5 years and sole rights rough grazing.

Table 3.8: Livestock units per 100ha of grass and rough grazing

<i>SSR</i>	88	97	change	%change
East Anglia	141	24	-17	-12.05
East Midlands	171	174	3	1.75
North	154	165	11	7.14
North West	165	177	12	7.27
South East	148	145	-3	- 2.02
South West	167	169	2	1.20
West Midlands	195	201	6	3.07
Yorks & H'side	162	165	3	1.85
All England	165	168	3	1.82

Table 3.9: Livestock units per 100ha grass and rough grazing for England, Wales and Scotland

<i>Region</i>	1988	1997	change 88-97
England	165	168	3
Wales	178	206	28
Scotland	58	63	5

- 3.53 The idea of a livestock unit is based on the relative metabolic energy requirements of different types of livestock in a yearly period. If a dairy cow represents one unit, then a beef animal represents 0.75 units, all other cattle represent 0.5 units and sheep represent approximately 0.15 units. Using these figures, it is possible to calculate the approximate livestock units per 100ha of grass and rough grazing for each SSR (Table 3.8). The data in Table 3.8 come from the review by Kiddle (Appendix 6); McNally (Appendix 5) provides a more detailed analysis of changes in grazing livestock units by farm type, using the FBS, together with an additional measure of intensity based on animal feed per livestock unit.
- 3.54 Table 3.8 suggests that in England there has been little overall change in grazing livestock units per unit area of grassland, but that there is considerable regional variation. There has, for example, been a substantial extensification of livestock production especially in East Anglia. This may in part be due to the substitution of beef for dairy cattle, and sheep for cattle, which will affect the calculations. On the other hand, the figures also suggest livestock production is becoming more intensive elsewhere, especially in the North and North West.
- 3.55 On the basis of her analysis of the FBS, McNally (Appendix 5) suggests that while the absolute changes in stocking density among all farm types have been small for England, there are larger differences between farm types than changes over time within farm types. It would appear that the mean grazing livestock unit per ha grazing land has increased for all farm types except mixed. The small overall change, she suggests, is to be expected, given the stocking density restrictions for claiming livestock subsidies imposed by

CAP, and the fact that farmers were very near to the limit anyway (see Potter and Lobley, Appendix 3, and Winter and Smith, Appendix 4). However, it is clear that while this intensity measure might not be changing markedly, this does not imply a static situation within farming.

- 3.56 The detailed analysis of livestock numbers provided by Kiddle (Appendix 6) suggests that while there was only a small increase in intensity for England, both cattle and sheep numbers declined at the country level. **The loss of cattle and sheep took place against in the context of a reduction of about 7% in total grazing area (Table 3.6). Thus we appear to be seeing the more intensive use of a smaller stock of grassland.** The situation appears to be very different in the beef and dairy sector.
- 3.57 Although cattle numbers in the beef sector generally increased in all English regions up to 1997, there has been a continuous decline in numbers of dairy cattle in all English regions and throughout the decade. East Anglia and the South East experienced the greatest percentage decline, each losing around 30% of their dairy cattle. The North and North West both lost over 10%, while the East and West Midlands and Yorkshire and Humberside were nearer the national average loss, between 14 and 16% lower. In spite of the impact of BSE between 1995 and 1997, not all regions had their greatest declines during that time; East Anglia and the South East in particular saw greater percentage losses between 1990 and 1993 than in the later period.
- 3.58 There has been little change in sheep numbers in England, but generally there has been a rise in numbers in the northern regions (e.g. 11% in the North West) and a fall in the south of the country (e.g. 15% in the South East) (Table 17). East Anglia has the smallest share of the national flock, and this is declining, while the North, which has the largest share of the national flock, is growing, indicating a concentration of sheep farming in certain regions.
- 3.59 Table 3.9 gives comparable for livestock production figures at the country level. While livestock intensity has changed little in England, Wales has seen an increase of 16% in livestock units per 100ha of grassland. This is probable due to the 6% increase in sheep numbers over the decade. Since Wales also showed a 6% increase in total grazing area, these figures suggest a significant increase in the intensity of use of the grazing resource. Figures suggest that Scotland has about the same area of grazing land in 1997 as in 1988. Thus the slight increase recorded in Table 3.9, probably reflects an increase in cattle, sheep and pig¹⁸ numbers.
- 3.60 Kiddle's review (Appendix 6) notes an interesting contrast between LFA and non-LFA areas for livestock numbers and livestock units per 100 ha grass and rough grazing. She suggests that within LFAs pressure on grazing land appears to have increased as stocking densities have risen and the proportion of grazing land in these areas has fallen. She argues that this points to a

¹⁸ Kiddle (Appendix 4) reports that while the numbers of pigs remained roughly constant over the decade in England, Wales lost 20% of its pig herd and Scotland increased its pig numbers by 38%.

different set of environmental pressures in these areas compared to non-LFA areas.

- 3.61 The reviews by Potter and Lobley (Appendix 3) and Winter and Smith (Appendix 4) suggest that within the dairy sector, the trends fostered by the quota system arising from the 1992 CAP reform, continued though out the decade. There was a further increase in the area devoted to forage maize and other cropping on farms with the capacity to intensify in this way. Farmers were able to purchase additional quota from outgoing producers expanded herd size.
- 3.62 Milk quotas are discussed at length by Winter and Smith (Appendix 4). High trading of quota continued in 1990s has appeared to result in the concentration of production on larger, more efficient holdings. Since there are economies of scale in this sector, production tends to be concentrated on larger farms. Winter and Smith suggest that such concentration is likely to have led to greater intensification of production. On farms large enough to remain viable, Potter and Lobley argue that trend towards more intensive grassland management observed up to 1990 is likely continued, with increased planting of forage maize and other arable crops displacing grassland, especially in England. This will have further eroded the grassland resource in the pastoral landscapes especially those of the South West and South Wales.
- 3.63 Dairy farms are noted for being very intensive, leading to higher estimated nitrogen and phosphorous¹⁹ yields per unit area (Little 1998). However, the overall environmental effects of quota trading are ambiguous. Farms that lease out quota might become less intensive, if they do not substitute some other more intensive livestock enterprise for dairy. By contrast, farms that lease in quota could become more intensive, although they might have better facilities for storage and handling of animal waste and thus lead to a reduced overall environmental impact.
- 3.64 An important scientific advance that has taken place since the publication of CS1990 has been the development of the Countryside Vegetation System (CVS) and the range of ecological indicators (Indicators of Biodiversity) designed to assess vegetation condition (see Bunce *et al.* 1999, Firbank, 2000). Shifts in the representation of different vegetation types within the countryside, and their associated IBD scores can give insights into changes in management practice and intensity. The main Indicators of Botanical Diversity (IBD) that have been proposed for the analysis of CS2000 data are listed in Table 3.10.
- 3.65 It has been proposed (eg. Firbank, *et al.* 2000) that the system of IBDs can be used to make a qualitative assessment of habitat condition and the significance of changes in condition over time. In the context of CS2000, these indicators will be used to describe the condition of the BAP Broad Habitats that will be the focus of the initial report for the survey.

¹⁹ Also, especially, pigs and poultry

Table 3.10: Indicators of Botanical Diversity used to monitor CS2000 vegetation changes (see Firbank *et al.* 2000)

IBD	Full name
1	CVS Aggregate class
2	CVS Classes
3	Changes in Functional Attributes
4	CVS Classes unique to one plot type per 1 km square
5	Species richness
6	Ellenberg scores
7	Frequency of species groups
8	Frequency of aggregate class preferential species
9	Frequency of English Nature indicator species
10	Frequency of food plant for animal groups
11	Frequency of scarce plants in NVC categories
12	CVS classes per 1 km square

- 3.66 **Table 3.1 summarises our recommendations for further analysis of CS2000 data to explore the environmental impacts of changes in the intensity of agricultural management suggested by our review of the June Census and FBS data for the period 1988-97.** The section on management intensity is divided between fertiliser and pesticide inputs, grazing intensity, and ‘other aspects’. Firbank *et al.* (2000) has set out in detail how different types of management pressure can be explored using the system of IBDs developed as part of the ECOFACT project. The analysis presented by these authors in the context of CS1990 results can clearly be extended using the results of the latest survey to determine how the situation has changed since the earlier survey. Table 3.1 sets out some general expectations.
- 3.67 In taking such work forward, however, it is important to note that there are many aspects of farm management that are not easily captured by data such as that provided by the June census and the FBS. Some these management impacts can be more directly investigated using CS2000 data. **In Table 3.1 we recommend that analyses such as those undertaken by Firbank *et al.* (2000) using CS1990 data, are extended to develop a more general indicator of the condition of the farmed landscape.** Such an indicator could draw upon the existing system of IBDs and information about the levels of ‘environmental stock’ present on farms. Given the structure of CS2000, such an indicator could be disaggregated by country unit and by CS2000 environmental zone. The robustness of such measures at the scale of Standard Statistical Regions could also be investigated.

Conclusions and implications for further work

- 3.68 The review presented in this chapter provides contextual information for the agricultural driver that can be used to help interpret the initial outputs from CS2000. Table 3.1 sets out our recommendations for this more detailed analysis. Collectively they allow hypotheses about the processes of ‘polarisation’, ‘consolidation’, ‘specialisation’, ‘diversification’, and ‘management intensity’ to be tested more rigorously, and their environmental

consequences explored. Table 3.1 mainly identifies work that could be undertaken in the short-term, that is once CS2000 have been launched in November 2000. **We recommend that such work be taken forward as part of a post-launch research programme, such as that which followed CS1990.**

- 3.69 Table 3.1 also identifies work of a more long-term nature. Our review, and feedback from the workshop held to comment on the outputs from this study suggests that there is considerable justification and support for a socio-economic survey within the CS2000 sample squares. This work would clearly build on Potter and Lobley's *Processes of Countryside Change Study*. **However, we recommend that its scope be extended to include a wider range of factors affecting rural areas.** In Table 3.1 we describe only those issues related to agriculture. In the next section we consider how such a survey could be developed to take better account of forestry.
- 3.70 A further socio-economic survey of farms within the CS2000 sample squares can be justified on several grounds:
- (i) ***To maintain the continuity of the existing data series:*** The data from the *Processes of Countryside Change* study are of considerable value in the context of Countryside Survey, because they are tied so closely to the sampling framework used by the survey. They provide the first and only systematic information on the structure of farming operations in the sample squares. They therefore stand as an important baseline against which future changes can be assessed.
 - (ii) ***To refine and update the data series:*** As Potter and Lobley (Appendix 3) note, while the 1993 survey data can be used to develop a 'look forward', such analysis is limited unless the dynamics of land tenure and management are understood. A resurvey would allow decision-making histories to be constructed for farms in the sample squares. It would also provide the opportunity to explore the new issues that are presently impacting on farming to be understood and their likely environmental consequences explored. Winter and Smith (Appendix 4) provide a summary of recent work on the current 'agriculture crisis' and its short and medium term impacts. Tables 3.11 and 3.12 are drawn from their work and summarise the results of recent surveys that explore likely farmer responses. It would clearly be valuable to explore how the farms in the survey squares are responding and how they fit with the national picture. The review of Winter and Smith (Appendix 4) suggests there is evidence that farmers appear to show 'a strong commitment to increased production and to specialisation' as a strategy to cope with recent uncertainties. This hypothesis could be tested in the CS sample squares.
- 3.71 In their discussion of the case for further, work Potter and Lobley (Appendix 3) suggest an additional reason why a second survey might be justified. They argue that it would allow some of the limitations of the first to be overcome.

Table 3.11: Farmers' Perceptions of Likely Steps to Secure Future

<i>Steps to secure future</i>	<i>% of Respondents</i>
Expand or increase farm output	56
Withdraw from unprofitable enterprise	35
Continue as at present	30
Other family member take up paid work	22
Start non-farming enterprise	21
Self (the farmer) take up paid work	14
Intend to withdraw and sell up	12
Reduce costs or inputs	1
Sell or let land/building/assets	1
Other steps	1
Non response	4

Source: Prosper 1998: p21

Table 3.12: Response to Financial Uncertainties of the 1990s

<i>Type of response</i>	<i>% of Respondents</i>
Steps to increase income	
Increase output from existing enterprises	65
Cut out an unprofitable enterprise	32
Start a non-farming enterprise	18
Introduce a more profitable enterprise	15
Other family member takes off-farm employment	12
Intend to withdraw and sell up	12
Take paid employment outside the farm	5
Steps to cut direct costs	
Reduce amounts of inputs used	45
Reduce machinery costs	42
Reduce labour costs	38
Steps to cut the cost of borrowing	
Sell assets to pay off debts/overdraft	18
Borrow from cheaper interest sources	14
Lengthen repayment period of loans	6
Other steps	
Carry on as before	45
Take financial advice	30
Increase farm area to spread costs	26
Leave farming altogether	4

Source: Gasson *et al* 1998: p. 28

- 3.72 They note, in particular, the suggestion that the *Processes* study was limited because it was restricted to farmers and farm families as agents of change. They suggest that a resurvey would 'allow for a more comprehensive coverage of other types of occupiers and land managers of land in the sample squares, leading to a more balanced view of the drivers of change'. This suggestion is in line with the recommendations that we have made in chapter 2 of this Report, where we have argued that a more complete understanding of the rural context of the survey squares is required.

3.73 **We therefore recommend that a follow-up to the *Processes of Countryside Change* survey is considered as part of DETRs longer-term research programme.** We suggest, however, that its scope and purpose be revised to take account of the broader range of rural policy issues that now need to be examined. Our consultations indicate that the survey should aim to:

- Increase the coverage of the survey by surveying a larger number of squares to take account of the larger number of samples used for CS2000;
- Target additional samples on particular land classes important for environmental policy purposes such as those essential for delivering BAP target habitats;
- Improving farmer capture within the surveyed squares, particularly in cases where coverage was below 50% of the area farmed, and extend the survey to other land owners within the sample squares.
- Refining the measure of environmental stock used as the dependant variable in the subsequent data analysis.

3.74 In making such a recommendation we recognise that the cost of such a survey could be significant. Enlarging the survey to include other landowners and managers would require considerable extra resource, even if the number of sample squares visited was not increased. Given the complexity of such a survey, it may well be that it could be more efficiently undertaken as a series of linked socio-economic studies rather than as a single unified piece of work. Whatever option is selected, however, the goal should be to include the information in the CS2000 database so that integrated analyses of socio-economic and environmental change can be undertaken.

Chapter 4. Forestry as a Driver of Countryside Change

Introduction

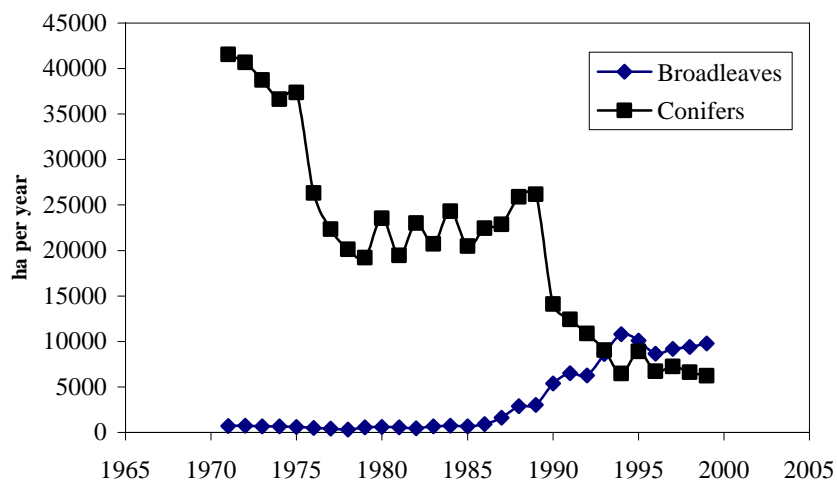
- 4.1 In this chapter we consider how policy changes towards forestry have impacted on patterns of land cover during the 1990. The background to this review is the commissioned study by Watkins (Appendix 7). We consider this material here, together with information available from the Forestry Commission to develop recommendations on how CS2000 might be used to explore the impacts of forestry as an important driver of countryside change.

Evolving Policy Frameworks

Forest expansion

- 4.2 Throughout the 1990s it was the policy of successive Governments to support the extension of the woodland area. The aim initially was to afforest 33,000 ha a year, including 12,000 ha a year under the Farm Woodland Scheme.
- 4.3 An important driver of this policy shift was the problem of surplus agricultural land in Europe. The 2nd Report of the Agriculture Committee of the House of Commons reported that there could be anything from one million to five million hectares of surplus agricultural land by 2015 (House of Commons 1990). It went on to suggest that ‘the most significant alternative land use in the next twenty years is likely to be forestry’. The Committee argued that there was now ‘the scope, if not the necessity, for a far greater emphasis on the role of woodlands and forestry in the process of rural development’ (House of Commons 1990 xv). The process of change is, however, likely to vary regionally with, for example, conversion in Wales being limited by the need to retain the small area of high quality agricultural land found here.
- 4.4 As Watkins (Appendix 7) notes, however, the general support for forestry that had been present in the late 1980s and early 1990s was to some extent undermined by several policy changes. For example, the confidence of private commercial forestry was knocked by the 1988 decision to remove longstanding tax concessions that had originally been designed to encourage planting. The form and role of the Forestry Commission then came under scrutiny, and in 1992 it was separated into Forest Enterprise and the Forestry Authority from April 1. Later, in 1994, there was speculation about the possible privatisation of Forest Enterprise. Sales of former Forestry Commission plantations continued for much of the decade. In addition, there were many changes to the detail of the woodland grant schemes available.
- 4.5 As a result, although forest expansion occurred, it did not take place at anything like the rate initially envisaged (see below). Nevertheless, ideas about the perceived surplus of agricultural land meant that one of the principal locational factors affecting forestry throughout the twentieth

Figure 4.1 Rates of broadleaf and conifer planting in Great Britain, 1971-1999
(Source: Forestry Commission, Economics & Statistics Unit)



Note: planting rates are for new woodlands and *do not* include restocking
Source Forest Industry Council of Great Britain (1998)

century, namely that afforestation should only take place on ‘unimproved land’ of low agricultural value, was no longer of paramount importance. This change underlay many of the detailed policy changes that took place through the 1990s, and we have seen the marked expansion of broadleaved woodland in lowland, agricultural landscapes, and a decline in the rate of planting of non-native conifer plantations.

- 4.6 Figure 4.1 shows how planting rates for broadleaves and conifers have changed since the early 1970s in Great Britain²⁰. The period since the last Countryside Survey has been characterised by a continuing fall in the rates of conifer afforestation, to around 6000-7000 ha/year, and an increase rate of broadleaf planting, which now stands at about 10000 ha/year. Forestry Commission data suggest that the total woodland area of GB in 1999 was about 2.58 million ha, or about 10.7% of the land surface (see Forestry Commission, 1999).

Woodland management

- 4.7 Watkins (Appendix 7) suggests that in the 1980s there was a resurgence of interest in the management of broadleaved woodland. This interest was maintained throughout the 1990s, and there was an increased emphasis on the management of all types of woodland with the aim to promote nature conservation, landscape, recreation, shooting and the provision of public access. Sustainable forest management and the importance of maintaining and promoting biodiversity became key elements of forest policy (Table 4.1).

²⁰ Planting rates do not include restocking. See Forest Industry Council of Great Britain (1998).

Table 4.1: Key elements of recent policy towards forestry in the UK

The UK Biodiversity Action Plan (UKBAP) contains several action points relating to forests. The most important is the implementation of the biodiversity aspects of the UK Sustainable Forestry Programme, published in 1994 as a sister document to the UKBAP, which set out the Government's forestry policies. These include:

- *Maintenance and appropriate enhancement of biodiversity in all woodlands*
- *Protection and expansion of our ancient and semi-natural woodlands*
- *Creation of new native woodlands and encouraging the planting of site-native trees and of broadleaved woodlands more generally.*
- *Research into methods of assessing and enhancing biodiversity in woodlands.*

And also the more general policies for:

- *Expanding woodland cover*
- *Regenerating existing woods*
- *Restructuring plantation forests*

Source: Forestry Commission, 'FORESTRY AND THE UKBAP', <http://www.forestry.gov.uk/biodiversity/bionote1.html>

- 4.8 The shift in aims of management reflected changing demands of the public and was reinforced by a range of new and modified policies introduced by the Forestry Commission, English Nature, the Countryside Commission and their successor organisations. This shift has affected, to differing degrees, all types of woodland owner from large commercial forestry concerns through to the owners of small woodlands.
- 4.9 The physical manifestations of this general shift in management aims included subtle changes to the size and shape of individual woodland stands; changes in the mixtures of species established; changes in establishment techniques, with a move away from plantations towards the use of natural regeneration; and changes in thinning regimes.
- 4.10 Large commercial woodlands, especially in Scotland and the uplands, have continued to be largely coniferous, though much more attention has been paid to the careful management of non-wooded land within plantations such as rides, fire breaks, watercourses, and transitional areas between woodland and semi-natural habitats. As the time came to replace first rotation plantations which had been established earlier in the century (1920s-1950s) the opportunity has been taken to improve the layout and design of plantations to make them fit more easily in the landscape and improve their potential for nature conservation and public access. The realisation of the devastating effects of windthrow on maturing coniferous stands in upland plantations encouraged the restructuring of plantations into separate permanent felling coupes, of different sizes depending on the topography, with wind firm edges.
- 4.11 Another key trend throughout this decade was the increasing level of acceptance of the importance of semi-natural woodlands and habitat. This was reflected in continuing support for the careful management of ancient

semi-natural woodlands throughout the UK. In practical terms this led to the protection of old areas of Scottish native pinewoods, and the encouragement of their extension through natural regeneration. It also led to the re-introduction on a fairly extensive scale of traditional management techniques such as coppicing and pollarding.

- 4.12 In lowlands woodland there was a move towards longer term less intensive management away from clear cutting and replanting. There was a change of emphasis towards small-scale working, the maintenance of diversity of structure and the use of a wider range of species. The careful management of natural regeneration through thinning, singling, freeing of natural regeneration, and coppicing became more common. Throughout the decade there was an increase in interest in the application of Continuous Cover Forestry.

Exploring the Forestry Driver using CS2000

- 4.13 On the basis of the expected impact of changes in forest policy during the 1990s, Watkins (Appendix 7) has suggested a number of trends that could be tested using CS2000 data. **These are summarised in Table 4.2, which sets out our recommendations for work that can be undertaken in the short-term using these data either alone or in conjunction with other key data sources.**
- 4.14 The availability of Forestry Commission woodland survey information clearly provides an important backdrop for the analysis of CS2000 data. These data both allow the robustness of CS2000 outputs to be tested and provide useful complementary information that can be used to extend and deepen our understanding of changes within woodland habitats. The National Inventory of Woodland and Trees (NIWT) is particularly useful in this respect.
- 4.15 Woodland Inventories have been undertaken by the Forestry Commission at roughly 15 year intervals since the First World War. NIWT is the most recent such survey. It aims to record the changing area and composition of woodlands since the last inventory that was carried out between 1979 and 1982 (Forestry Commission 1998).
- 4.16 The Inventory will provide information on woodlands over 2ha²¹. It consists of two components. First, a complete mapping of all woodland parcels at 1:25,000 scale, based on the analysis of aerial photography. Basic data on composition of the woodland will be recorded²², and these data will be stored in a GIS. Second, a more detailed survey of a 1% sample of the area in these woodlands, based on a field visit. The data collected includes information on ownership and use, together with a range of structural information about the woodlands that enable aspects of its ecological and management status to be determined.

²¹ Woodlands less than 2ha, are covered in a separate exercise, the Survey of Small Woods and Trees.

²² Woodlands are classified into seven basic types: conifer, broadleaved, mixed, coppice, coppice with standards, shrub, young tress, ground prepared for planting and felled.

Table 4.2: Expected trends and potential analyses using CS2000 for the forestry driver

Woodland type & context	Expected trend	CS2000 Analysis
Coniferous afforestation of semi-natural habitat	<i>This declined through the 1990's. There were considerable regional variations with most taking place in upland Scotland and to a lesser extent, Wales. Virtually non-existent in upland England. Negligible in the lowlands on heaths and semi-natural grassland. Particular attention should be paid to measuring the success of policies designed to encourage native Scottish pine woodland.</i>	Change in stock of Coniferous Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Coniferous afforestation of 'improved' habitat	<i>Although policies were designed to encourage this type of afforestation, relatively little took place in the decade because the level of grants did not outweigh the decline in the capital value of farmland upon planting. Small patches of this afforestation occurred in the lowlands. There may be a concentration in areas designated as Community Forests.</i>	
Broadleaved/mixed afforestation of semi-natural habitat	<i>There may well have been an increase in this type of afforestation in response to special schemes designed to encourage the establishment of native mixtures of broadleaves, such as upland birch woodlands in Scotland. Many new small farm woods may have been established on remaining fragments of semi-natural grassland.</i>	Change in stock of Broad-leaved Mixed and Yew Woodland Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Broadleaved/mixed afforestation of 'improved' habitat	<i>If policies have been successful, one would expect a considerable increase in the establishment of new broadleaved mixed woodland on improved land. This is likely to consist of many new small farm woodlands, used primarily for game or landscape purposes. These may well be concentrated in areas where game shooting is particularly important (i.e. parts of East Anglia; Gloucestershire). There may also be concentrations in specially designated areas such as Community Forests and the National Forest.</i>	
Natural regeneration of woodland on semi-natural habitat	<i>This will occur in relatively small patches across the UK. It is particularly likely on ungrazed, steeply sloping valley sides in the uplands of Scotland, Wales and northern England; on lowland ungrazed heaths and commons; and on ungrazed patches of semi-natural grassland such as steep slopes in the Downs and Cotswolds.</i>	Separate analysis of shrub category within Broad-leaved Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which regeneration has occurred.
Natural regeneration of woodland on 'improved' habitat	<i>Generally very small-scale. There will be a tendency for some areas of managed natural regeneration to be found adjoining existing semi-natural woodland if policies designed to increase the size of such woods are working.</i>	
Loss of woodland to improved agriculture	<i>This is likely to be rare in England, with the conversion of woodland to arable land virtually halted. It is most likely to take place in heavily grazed parts of the uplands.</i>	Use flow accounts to identify types of land on which deforestation has occurred.
Loss of woodland to semi natural habitat	<i>This will have taken place frequently, but usually on a small scale. It is most likely to occur where there are specific conservation schemes to remove plantations and natural regeneration in order to restore lowland heaths, chalk grassland, sand dunes and other valued habitats.</i>	
Woods showing little change	<i>Many areas of woodland will show little change over the decade. This may be because of the stage in the rotation, i.e. even-aged plantations may show little discernible change from pole stage onwards until perhaps a major thinning. Some mixed broadleaved woods that are carefully managed under say a continuous cover system, will show little change even though valuable timber may have been removed. Other woods may show no change because they are unmanaged. With the move to more subtle forms of woodland management there is a strong likelihood that woods which are managed, but which show no discernible change, will be increasing in number.</i>	Analysis of CS2000 Indicators of Biodiversity for woodland broad-habitat, with linked analysis to structural information provided by NIWT.
Conversion of coniferous woodland to broadleaved woodland	<i>This should be a rare occurrence especially in England. It is most likely to take place in larger upland plantations where extensive restructuring is taking place at the end of the first rotation.</i>	Use flow accounts to identify pattern of exchange of stock between Broad-leaved and Conifer Broad Habitats. Change in frequency of CVS classes.
Conversion of broadleaved/ mixed woodland to coniferous woodland	<i>This should be taking place on a fairly extensive scale as formerly mixed plantations made up to the 1970's have their coniferous element removed. This is particularly likely on woods on traditional landed estates where mixed plantations have been very popular. It will also take place in mixed plantations made on ancient woodland sites.</i>	

- 4.17 The opportunities for analysis of the woodland resource, which the availability of information from CS2000 and the NIWT provide, have recently been considered in a study undertaken for English Nature (Haines-Young *et al.* 2000). This work suggests that while there is some duplication between these data sources, much can be gained by linking them.
- 4.18 Previous work on the analysis of woodland characteristics using CS1990 data (Stark *et al.* 1996) suggested that the field survey methods used for Countryside Survey do not yield reliable structural information for woodlands. The survey does, however, give a good picture of the botanical characteristics of woodlands, particularly for the ground layer. By contrast, structural data for woodlands from the NIWT is good, while the range of botanical information collected as part of the Inventory, is more limited. As a result, Haines-Young *et al.* (2000) suggested that these two data sources might be combined to derive a more complete picture of woodlands than is available from either of the datasets if considered in isolation.
- 4.19 The information on woodland structure that is available from the NIWT is derived from a sample, and estimates are made for the population of woodlands in a given area using a statistical algorithm. The results of NIWT will mainly be published at the country and county levels. The field sample data could, however, be aggregated in other ways. **We recommend, for example, that work be undertaken to aggregate the Inventory plot data at CS2000 land class level.** This would enable estimates of the structural properties of woodlands to be derived using the Countryside Information System (CIS), and used alongside other woodland data that can be obtained from CS2000.
- 4.20 We suggest that this additional work on the joint analysis of CS2000 and NIWT data is considered as part of DETR's medium term research programme.** Information from the NIWT is unlikely to be available for the whole of GB until early in 2001 (Smith, pers comm.). This work could be undertaken as part of a larger study that also looked at the relationship of the NIWT and CS2000 woodland polygons in the CS2000 sample squares. The CS2000 data could include both that derived from the field survey and LCM2000. Information on the transfer of land between broad habitat categories in CS2000 would bring a useful new dimension to the analysis of the NIWT, because the latter does not record information about the character of the land on which new planting has occurred. Only the nature of the loss of is recorded.
- 4.21 Thus analysis of CS2000 and NIWT data within the CS field survey squares would assist in the cross-calibration of each data source. It would also provide the framework in which to undertake a more detailed, longer term analysis of ownership patterns within the sample squares, that could help us better understand the 'rural context' in which CS2000 data had been collected (cf. Chapter 2).
- 4.22 As Watkins (Appendix 7) notes, during the 1990s there has been a marked trend for woodland ownership to become increasingly distinct from farm ownership. More woodland areas are in the possession of specialist organisations such as the Woodland Trust, wildlife and other conservation

trusts, as well as small private owners. **It is recommended therefore that, if a follow up study to the *Processes of Countryside Change* study is undertaken, then its scope should be extended to include interviews with all woodland owners and managers in the survey squares.** This would enable changes within farm woodlands to be separated from those taking place in other types of woodland, and a better understanding of the factors shaping woodlands to be developed.

Conclusions

- 4.23 Our review of woodlands suggests that the 1990s have been significant in terms of encouraging new broadleaved planting and promoting the restructuring and better management of the existing woodland stock. In many ways the problem of tracing the key policy changes though to their impacts on the ground is more tractable than for agriculture, but the exercise is no less interesting. Woodlands are important components of our landscapes. They are a significant habitat because they provide a range of economic and recreational opportunities for people. They are also reservoirs of biodiversity and contribute much to the character of the countryside.
- 4.24 In the context of taking forward the use of CS2000 data, in the short to medium term there are a number of avenues for analysis that could be attempted. These have been set out in Table 4.2. Rather than approach such analysis in an *ad hoc* manner, however, we suggest that it might be advantageous to undertake this work in more focused and policy relevant way. For example, English Nature has recently considered the opportunity that CS2000 provides for the construction of habitat accounts for nature conservation (Haines-Young *et al.* 1999, 2000). This work showed that woodlands would be a useful focus for the development and application of the approach. **We therefore recommend that DETR consider the possibility that further analysis of the woodland driver be taken forward using the habitat accounts approach in partnership with others.**
- 4.25 Our review suggests that there much that can be done in terms of further analysis by linking CS2000 with other national data sources such as the National Inventory of Woodland and Trees. In the longer term, however, there is also scope for gaining further information about woodland ownership and management. **We have therefore also made recommendations in terms of broadening the scope of any follow-up socio-economic survey of landowners and managers within the CS sample squares.** A survey of woodland owners and managers within the CS2000 sample squares is seen as part of the important process, described in Chapter 2, of developing a better understanding of the ‘rural context’ in which Countryside Survey is set.

Chapter 5. Exploring the Drivers of Countryside Change: Next Steps

- 5.1 Countryside Survey 2000 was not designed to look explicitly at the *causes* of change. Rather, its purpose is to *describe* change in terms of a large number of important ecological features associated with the wider countryside. The survey data can, nevertheless, give us important insights into some of the drivers of change, particularly where it can be combined with other information.
- 5.2 This study has focused mainly on socio-economic and policy issues relevant to the agricultural and forestry sectors. Although other types of driver have to be considered, such as those relating to the changing economic and social structure of rural communities, it is clear that even taking these two areas alone, there is scope for further more detailed analysis of CS2000 information.
- 5.3 In the short term it would be valuable to explore how the changes in agriculture and forestry policy that took place during the 1990s are picked up in the results of CS2000. The extent to which one may make a 'read-across' with other information sources such as the June Census, the Farm Business Study and the National Woodland Inventory, for example, would clearly be helpful for the CS2000 user community. Not only would such work inform users about the types of change detected by the Survey. It would also help us define a wider range of indicators that could be used to describe the condition of the wider countryside that would be useful for policy purposes. **We recommend that such work should be taken forward in the short to medium term, once CS2000 has been launched in November 2000.**
- 5.4 In the longer term it is also clear that there is a strong justification for undertaking a follow-up to the socio-economic survey carried out in the CS sample squares in 1993. Although an important element would be to collect information about the farm enterprises within the survey squares, we have argued that any further work should taken in a wider range of issues that those affecting agriculture. **We recommend that *all* types of landowners and managers are interviewed. The goal should be to build up a much better understanding of the rural context of the Countryside Survey sample squares, and hence the socio-economic and policy factors likely to shape change within them.**
- 5.5 CS2000 is the fourth of its kind. With each successive survey the scope of the work programme has been enlarged and its concepts refined to ensure that the outputs are relevant to current science and policy needs. This study has shown that the framework in which we seek to understand countryside change is evolving rapidly. **Previous Countryside Surveys have been based on a rigorous understanding of the environmental setting in which the survey data have been collected. As we look to the future, it is clear**

that we also need to understand more completely the social and economic situation in which change is occurring.

- 5.6 Agriculture and forestry will remain important drivers of countryside change. Current trends suggest, however, that many other factors, including the growth of rural industry, social and demographic change, and the relationship between town and country, will control the stock and quality of the habitats and associated landscape features that make up the wider countryside. This study, and the work we suggest should follow from it, will provide the foundation for helping us define our future monitoring needs. Ultimately, it may help us gain a better insight into the environmental consequences of these other, important socio-economic drivers of countryside change.

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