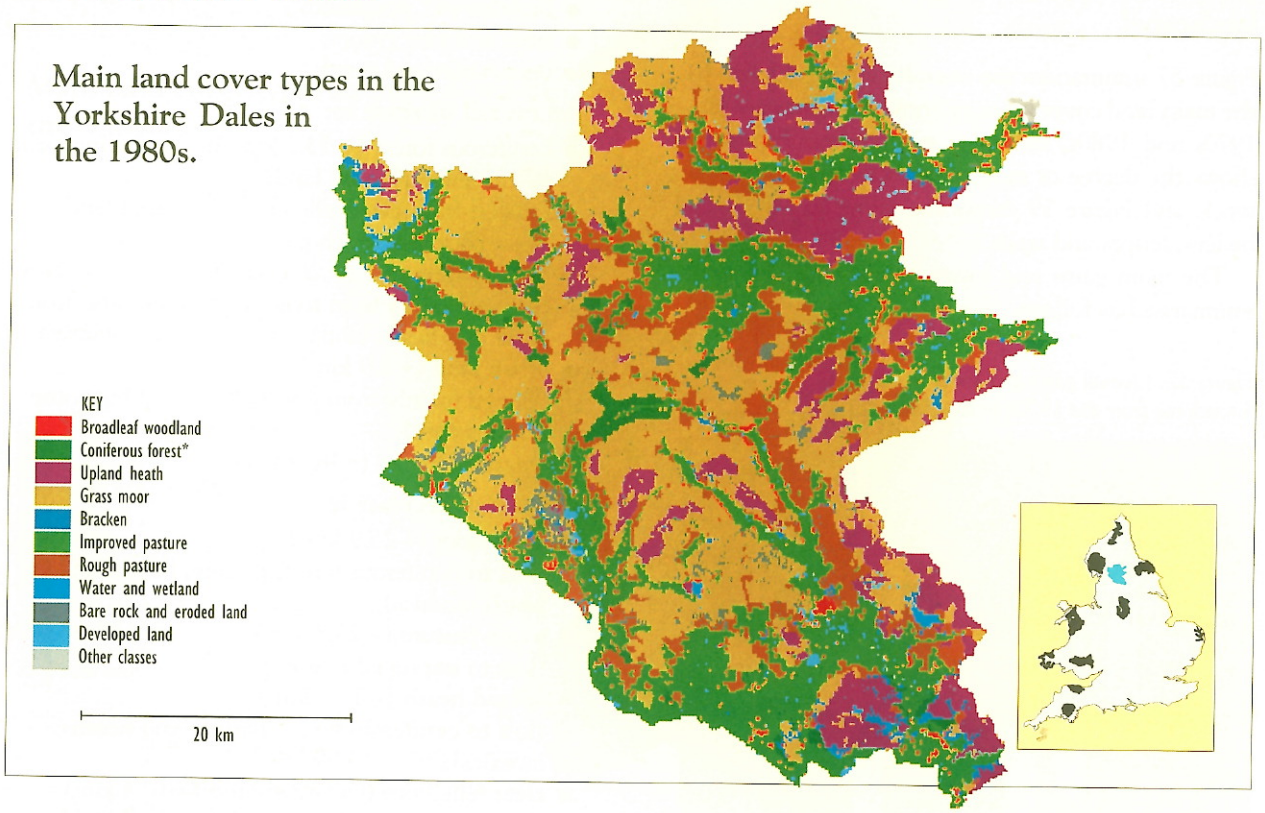
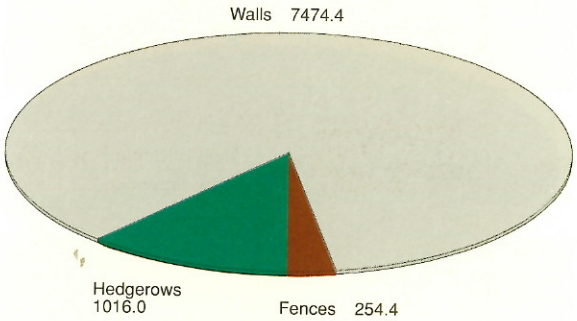
The Yorkshire Dales



The character of the landscape

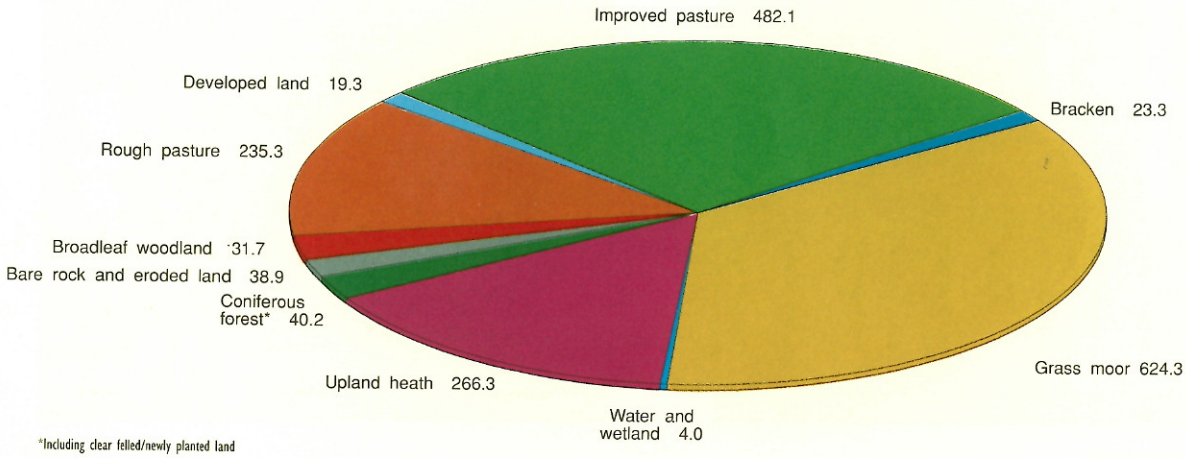
The Yorkshire Dales cover an area of magnificent upland within the central Pennines of northern England. The landscape straddles the Pennine watershed and consists of high fells and long, deep 'dales' that have been carved by both glacier and river action. This has created a landscape of dramatic contrast. The plateau tops are predominantly grass moorland, with more heather on the millstone grit areas in the north-east and south-east. The dales are characterised by a landscape of pastures and meadows, with dry stone walls, barns and stone-built villages.

Figure 61. Proportion of different boundary features in the Yorkshire Dales in the 1980s (km).



Total Park area 1,768.7 sq km

Figure 60. Proportion of different land cover types in the Yorkshire Dales in the 1980s (sq km).



*Including clear felled/newly planted land

What has happened to the Yorkshire Dales landscape?

Figure 62 summarises the overall gains and losses in the main land cover types in the Yorkshire Dales between the 1970s and 1980s, shown as net change. Figure 63 shows the degree of movement between land cover types, and Figure 64 shows the gains and losses in hedges, fences and walls.

Figure 62. Overall gains and losses in land cover types in the Yorkshire Dales from the 1970s to the 1980s (sq km).

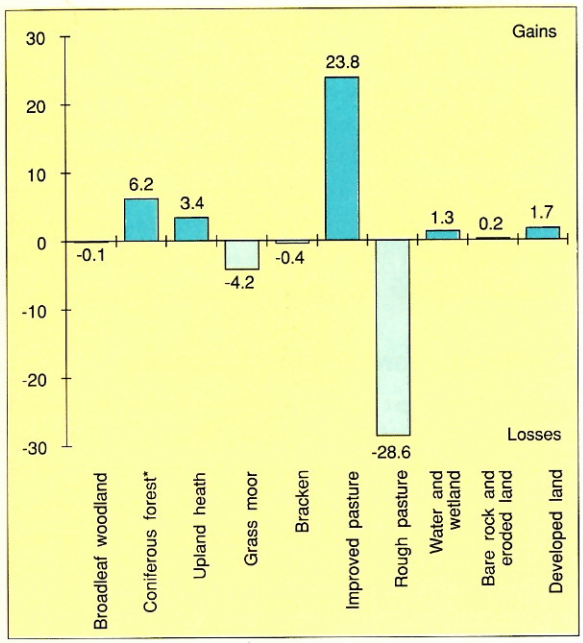
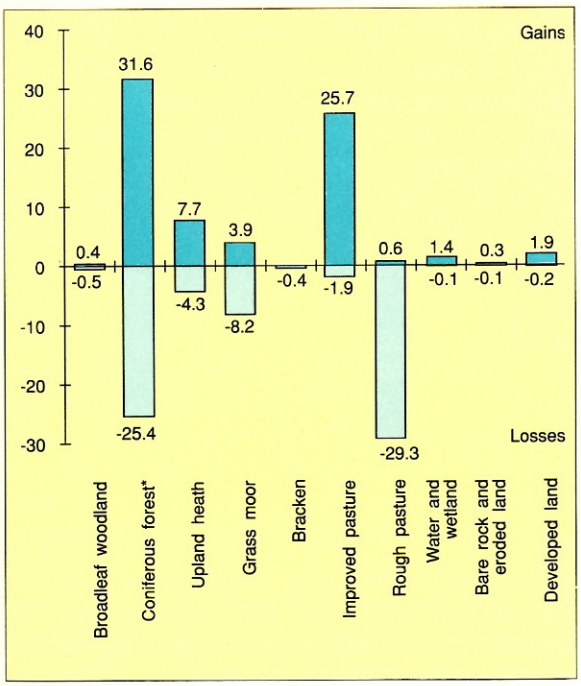


Figure 63. Areas gained to and lost from each land cover type in the Yorkshire Dales from the 1970s to the 1980s (sq km).



*Including clear felled/newly planted land

The main gains and losses in the Yorkshire Dales can be summarised as follows.

Little overall change in:

- broadleaved and mixed woodland;
- scrub;
- bracken;
- trees, tree groups and small ponds.

An overall increase in:

- coniferous forest (+ 24.8 km^2, not including clear felled/newly planted land) (gained mainly from clear felled/newly planted land);
- improved pasture (+ 23.8 km^2) (gained mainly from rough pasture);
- upland heath (+ 3.4 km^2) (gained from grass moor and mosaics);
- developed land (+ 1.7 km^2) (gained from rough and improved pasture);
- inland open water (+ 1.3 km^2) (gained from rough pasture);
- eroded peat (+ 0.2 km^2);
- length of fences (+ 19.5 km).

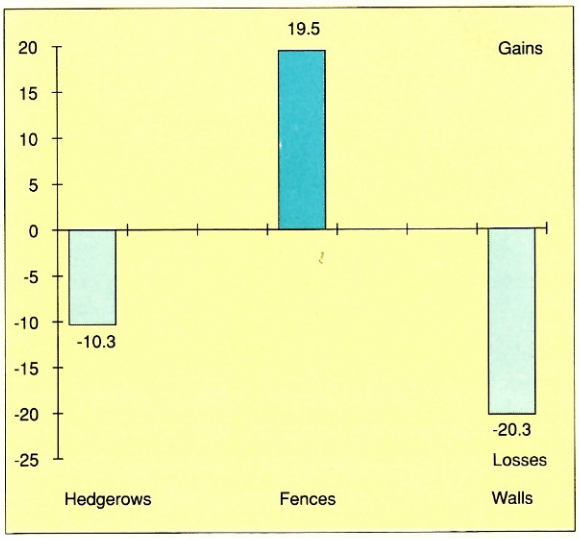
An overall decrease in:

- rough pasture (– 28.6 km^2) (lost mainly to improved pasture);
- clear felled/newly planted land (– 18.6 km^2) (lost mainly to coniferous forest);
- grass moor (– 4.2 km^2) (lost to coniferous forest and newly planted land);
- length of hedgerows (– 10.3 km) and walls (– 20.3 km).

Considerable movement into and out of:

- rough pasture (gross change 29.9 km^2);
- clear felled/newly planted land (gross change 29.4 km^2);
- coniferous forest (gross change 27.6 km^2, not including clear felled/newly planted land);
- improved pasture (gross change 27.6 km^2).

Figure 64. Changes in field boundaries in the Yorkshire Dales from the 1970s to the 1980s (km).



3. THE NATURE OF CHANGE

Common themes

So far the survey information has been used to demonstrate the overall patterns of change, both for the Parks as a whole and for individual Parks. A number of changes took place in all of the Parks, while others were found in only some of them. It is helpful to look in greater detail at the changes that have taken place, to examine the common themes that emerge and to put some of the conclusions in a wider context. That is the purpose of this chapter. In it we look at each of the main types of land cover and examine differences between the Parks and explore examples of changes that took place. Such case studies also show the care that is required when interpreting the information. For example, certain changes may have been small at the whole Park level, but of particular significance in individual areas or parishes.

Woodlands and forests

Woodlands and forests are prominent features in most of the National Parks. Taking the Parks as a whole, the main changes in these land cover types were between coniferous high forest and clear felled/newly planted land. The other classes remained relatively constant between the 1970s and 1980s. A similar pattern was evident in each of the individual Parks, although there were subtle differences in each.

Broadleaved and mixed woodland

The total extent of broadleaved woodland remained virtually unchanged in most of the Parks, with the exception of the Brecon Beacons and the Broads. In the Brecon Beacons the extent of broadleaved woodland decreased by 2.1 km^2 (4 per cent) from a total area of 57.8 km^2 in the 1970s. This decrease consisted mainly of change to rough and improved pasture and could have resulted from either woodland clearance for farming or from long-term neglect. In the Broads, by contrast, the area of broadleaved woodland increased by 5.4 km^2 (nearly 20 per cent) from 27.4 km^2 in the 1970s. This increase included 2.3 km^2 gained from the scrub class and 1.4 km^2 from the freshwater marsh class. This change probably reflected successional development of vegetation, from freshwater marsh and scrub, to deciduous woodland. This theme is discussed in more detail in the section, below, on water and wetland. The area of mixed woodland also stayed relatively constant in all of the Parks. It only changed slightly in the North York Moors and in Snowdonia, where it showed a small increase. In both cases the gain was mainly from clear felled/newly planted land, as a result of the maturing of new planting schemes.

Scrub

In the maps of the individual Parks scrub was usually amalgamated with broadleaved and mixed woodland and generally changed little. In some Parks, however, change in the extent of scrub is significant in its own right. In Dartmoor, for example, there were just over 12 km^2 of scrub in the 1980s, which represented a decrease in area of 2.2 km^2 (15 per cent) since the 1970s. This loss was mainly to upland grass moor, rough and improved pasture and to bracken, perhaps due to agricultural reclamation or other scrub clearance. There has also been an increase of scrub from these same types of land cover, resulting in quite a high level of gross change. This demonstrates the very changeable character of what are often marginal areas of land.

Coniferous forests and plantations

By far the greatest apparent change in woodland and forests was related to coniferous forest and the clear felled and newly planted areas. The latter could be of broadleaved or mixed, as well as coniferous species, although the bulk of the area is likely to be coniferous. All of the Parks, except the Pembrokeshire Coast and the Broads, have significant areas of coniferous plantation. The largest areas are concentrated in Snowdonia, the Lake District, the North York Moors, Northumberland and the Brecon Beacons.

Change in plantations in the Parks was of two types. Firstly, there was change between coniferous forest and clear felled/newly planted land as new plantations matured and mature ones were felled. Clear felling can have dramatic effects on the National Park landscape. Secondly, there was gain from other categories, mainly from moor and heath but also from rough and improved pasture as new areas were planted and began to mature.

The Brecon Beacons, Dartmoor, Exmoor, the Lake District, the Peak District, the North York Moors and the Yorkshire Dales mainly illustrated the first of these two types of change, characterised by the rotation between clear felled/newly planted land and coniferous forest. In these Parks there were relatively small net changes in the total area under forestry, but substantial movement between clear felled/newly planted land and coniferous forest as blocks within the plantations passed through the rotation.

Some of these Parks also demonstrated small increases in the total area of coniferous forest and clear felled/newly planted land. In the Brecon Beacons,

Figure 65. Changes in coniferous forest and plantation land in Snowdonia between the 1970s and 1980s.

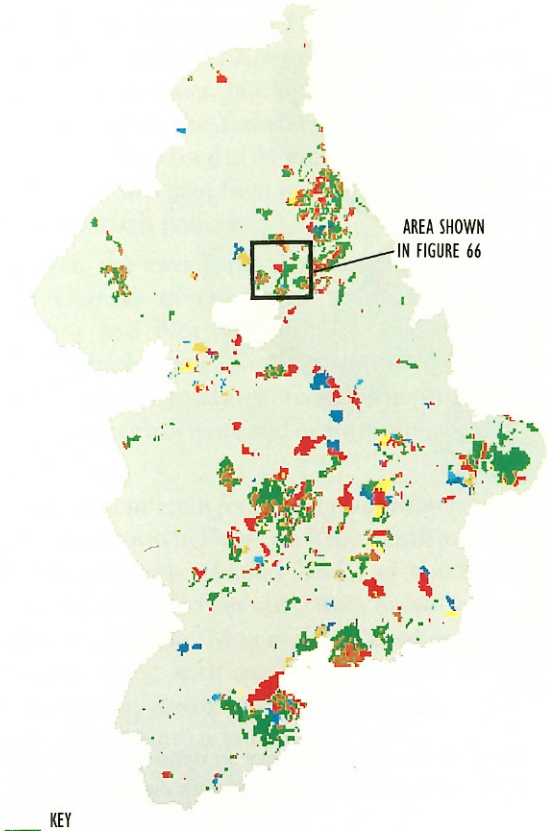
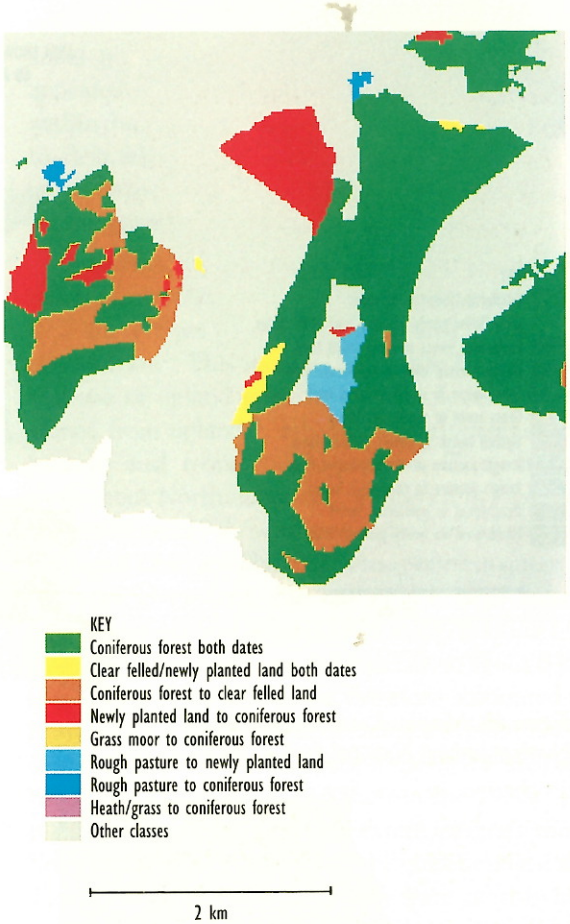
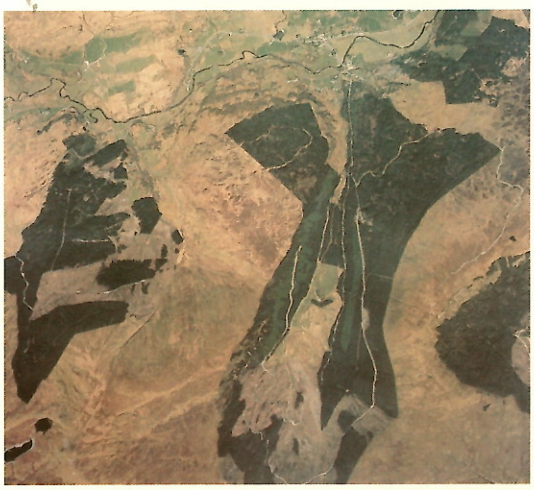


Figure 66. Changes in coniferous forest and plantation land in an area near Blaenau Ffestiniog in Snowdonia between the 1970s and 1980s.



G. Lloyd/SWP

This photograph shows part of this area planted with conifers.



ADAS Aerial Photographic Unit/Countryside Commission

This 1980s aerial photograph corresponds to the map above, showing the same area near Blaenau Ffestiniog.

Figure 67. Changes in coniferous forest and plantation land in Northumberland between the 1970s and 1980s.

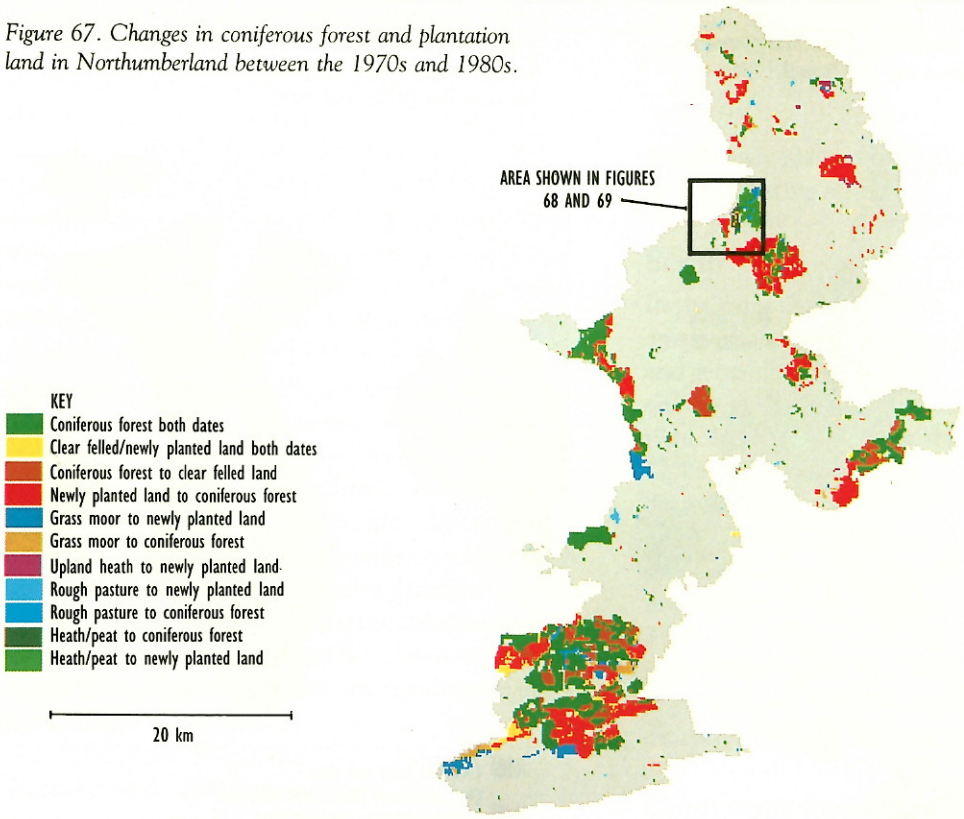


Figure 68. Moorland at Uswayford in the Northumberland National Park in the 1970s.

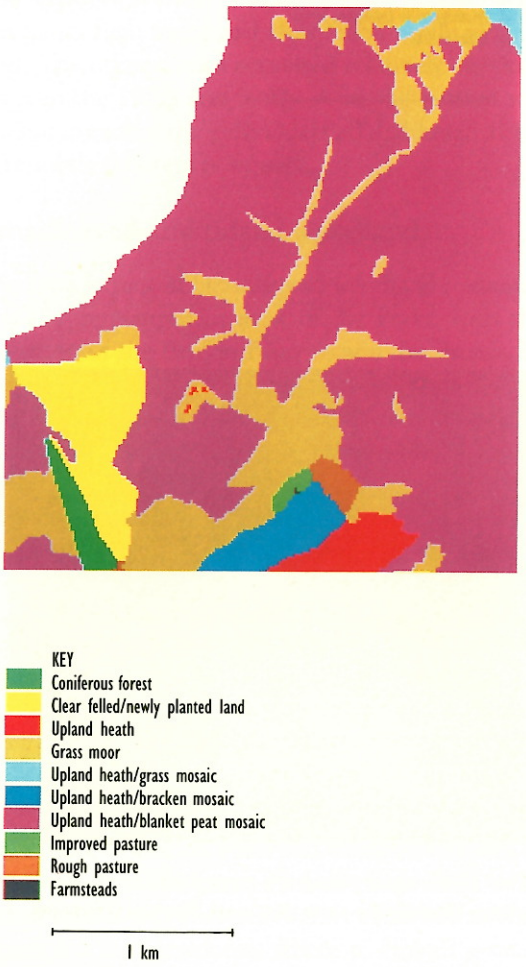
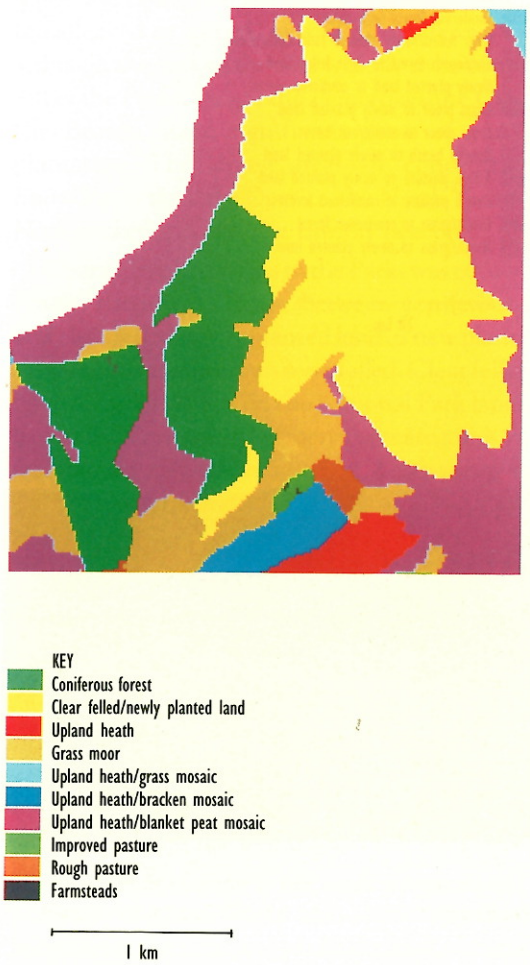


Figure 69. Coniferous planting on moorland at Uswayford in the Northumberland National Park during the 1980s.



there was a net increase of 9.4 km² (9 per cent) from an area of 109 km² in the 1970s, with the gain being predominantly from upland grass moor. In the Lake District, the net increase was 11.0 km² (9 per cent) from 120.6 km² in the 1970s, with roughly equal gains from upland grass moor, bracken and rough grazing. The net increase in the Yorkshire Dales was 6.2 km² (18 per cent) from a total of 34 km² in the 1970s, with roughly half of this gain from upland grass moor and a third from rough pasture.

However, the two Parks that demonstrated the greatest changes in coniferous plantations were Snowdonia and Northumberland. These Parks experienced both change within plantation land and the expansion of the total area of coniferous plantation at the expense both of moor and heath and of enclosed farmland.

Change in coniferous forest and plantation land in Snowdonia is shown in Figure 65. The overall increase in clear felled/newly planted land and coniferous forest was 42.8 km² (18 per cent) from a total area in the 1970s of 236.9 km². Most of the increase was from upland grass moor, with smaller gains from upland heath, from heath/grass mosaic and from rough pasture. This was equivalent to a gain of some 2.7 km² (or 270 hectares) per year over the average 16 year period in question. (To put this in perspective, this is equivalent to a gain in plantation land of about 380 football pitches a year, although the actual rate is likely to have varied throughout the study period.) Figure 66 demonstrates the type of change that has taken place, showing the movement between different types of land cover between the 1970s and 1980s in an area north of Blaenau Ffestiniog. It mainly shows internal changes as existing forests pass through the stages of the rotation, although new planting can be seen in side valleys near the head of the River Lledr. The aerial photograph illustrates how part of this area appeared in the 1980s and shows the clear felling within the existing plantation, identified as 'coniferous to clear felled' on the change map. The photograph adjacent to it illustrates how part of this area appeared on the ground.

In Northumberland, the overall area of clear felled/newly planted land and coniferous forest increased by 29.7 km² (16 per cent) from a total area in the 1970s of 184.1 km². This increase was made largely at the expense of upland grass moor, with lesser amounts gained from upland heath, from heath/blanket peat mosaic and from rough pasture. The changes throughout Northumberland are shown in Figure 67. Figures 68 and 69 show an area of the Park where there was significant new planting in the period in question. It shows Uswayford, the last of the large forestry plantations planted around 1976 to 1978. It is a high altitude, valley-head site and extends to about 8 km² of planting. This area alone therefore accounted for nearly one third of the overall increase in planted land described above. The illustration shows the area as it was firstly in the 1970s and then in the 1980s. The planting clearly reduced the extent of grass moor, heather and blanket peat moorland quite dramatically. The photograph illustrates how part of this area appeared on the ground.

Northumberland National Park

This photograph shows part of the new coniferous planting at Uswayford.

Moor and heath

Moor and heath is a typical landscape feature in nearly all of the National Parks except in the Broads. In the Pembrokeshire Coast National Park it is restricted to the Preseli Hills and to some areas of coastal heathland and lowland grassland, making up only 15 per cent of the Park area. In all of the other Parks, upland moor and heath makes up between one third and one half of the Park area.

In the Parks as a whole, the overall extent of moor and heath declined slightly between the 1970s and 1980s, with the main losses being to coniferous forest and plantation land, as discussed above. Bracken decreased in area overall, changing mainly to coniferous forest or to pasture. Possibly the most notable feature was the high level of change between different types of moor or heath vegetation, showing how dynamic this type of vegetation can be, especially in response to different types of management, including burning of heather moorland and variations in stocking levels. Similar patterns of change were demonstrated, to varying degrees, in each of the Parks.

Change within moor and heath

A number of the Parks demonstrated change between heather and grass moorland and the various different moorland vegetation mosaics, which include heath and grass, heath and bracken and heath and blanket peat. These Parks included the Brecon Beacons, Dartmoor, Exmoor, the Lake District, the North York Moors, the Peak District and the Yorkshire Dales, where the general trend was a change from heather to grass moorland. Change like this was particularly apparent in the Brecon Beacons. Here the extent of upland heath (excluding mosaics) declined by 8.5 km^2 (11 per cent) to 69.6 km^2 in the 1980s. Of this overall decline in area, over a third changed to grass moor and a further third to upland heath and grass mosaic. Such changes could well have resulted from increased numbers of sheep grazing on the moors, which research has shown can reduce the heather in the moorland at the expense of an increase in moorland grasses. Research on grazing damage to heather was presented to the National Parks workshop in 1990 (5). This categorised the Brecon Beacons as an area where there had been widespread loss of heather due to grazing pressure. Figure 70 shows the extent of change in moorland throughout the whole of the Brecon Beacons. Figure 71 focuses in to show the types of changes that took place in an area of the Black Mountains. Both illustrate the change from heather to grass moorland, as well as the movement between different types of moor and heath.

The extent of bracken

Bracken is a significant component of moor and heath vegetation in many of the Parks and, although it is poisonous to stock and damaging to other moorland vegetation, it is also a characteristic and seasonally

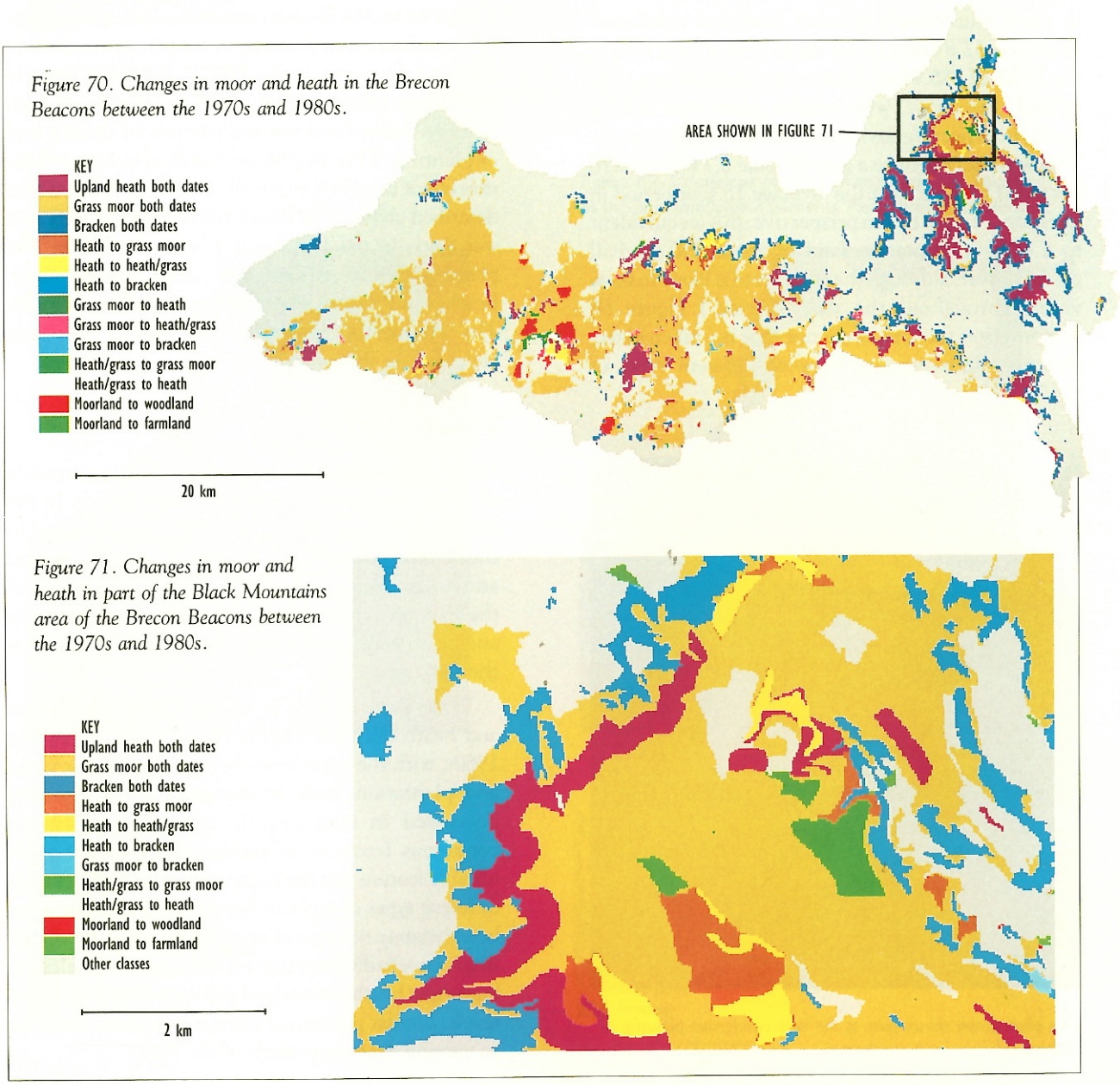


Figure 70. Changes in moor and heath in the Brecon Beacons between the 1970s and 1980s.

Figure 71. Changes in moor and heath in part of the Black Mountains area of the Brecon Beacons between the 1970s and 1980s.

colourful feature. It is particularly common in the Lake District and in the North York Moors, where it represented 15 and 18 per cent of the moor and heath area respectively in the 1980s. The spread of bracken in upland areas has been the subject of much comment and research as changes in farming practices, particularly the disappearance of bracken cutting for animal bedding and changes in grazing, have led to its continuing spread. It has been estimated that bracken cover in Wales, and in other parts of upland Britain, has advanced at a rate of from 1 to 3 per cent per year in the last two decades (6). Elsewhere, however, it has been suggested that reduction in bracken cover is more general than its spread (7). This may be due to the increased use of bracken control techniques such as Asulox in the 1970s.

It is not easy to interpret the figures showing the extent of bracken in the National Parks. This is partly because there were problems in detecting bracken in aerial photographs at certain times of the year, which introduced an element of potential inaccuracy. There were also difficulties in detecting areas of bracken that were encroaching gradually into moorland because such movement is subtle, even over a period of time, and there are usually few reference points to which it can be related. The patterns of change must therefore be treated with some caution. It is nevertheless apparent that in the Parks in general there was some loss of bracken to conifer plantations and to rough or improved pasture, as well as movement between bracken and other types of moorland. However, the pattern of change varied from Park to Park. The gains from, and losses to bracken in the six Parks where such change was apparent are summarised in Table 2. The greatest net gain was in the Brecon Beacons, mainly at the expense of grass moor, and the greatest net loss was in the Lake District, mainly to grass moor and improved and rough pasture. An independent survey in the Lake District (8) confirms that bracken has been lost from enclosed land.

Bracken encroachment over heather moorland has been a particular cause for concern in the North York Moors National Park. Although Table 2 shows that the total area of bracken in the park has decreased, this is largely due to loss of 2.4 km^2 to coniferous forest and newly planted land, and 1.3 km^2 to heather/bracken mosaic, which could have been a result of bracken clearance, or possibly just a result of the time of year that the photography was taken. At the same time, there was an increase in the area of bracken in some places, with small gains from upland heath, from heath and bracken mosaic, from rough and improved pasture and from other unclassified land. The gains in bracken from moor and heath classes, which add up to 1.4 km^2, suggest an encroachment of bracken into moorland at a rate of some 0.1 km^2 (10 hectares) a year in the Park.

Figure 72 shows the typical pattern of bracken occurrence in the North York Moors, in an area at the southern end of Rudland Rigg. The map shows the amount of upland heath and bracken that remained throughout the period of the study, together with

Table 2. Change in the extent of bracken — gains from and losses to other land cover types (km^2).

Park	**Brecon Beacons**		**Dartmoor**		**Exmoor**		**Lake District**		**North York Moors**		**Snowdonia**	
Land cover	Loss to	Gain from	Loss to	Gain from	Loss to	Gain from	Loss to	Gain from	Loss to	Gain from	Loss to	Gain from
Coniferous forest	0.2	0.4	0.3		0.6	0.5	1.8	0.1	1.8	0.1	0.8	
Newly planted/ clear felled land		0.1			0.1	0.1	1.1	0.1	0.6	0.1	0.4	
Scrub	0.1	0.2	0.2	0.4	1.1	0.7	0.2		0.3		0.2	0.1
Upland heath	0.1	1.1			0.7	0.2	0.1		0.4	0.7		0.1
Grass moor	0.6	4.2	0.9	0.4	0.1	0.1	4.9	1.1	0.1		0.4	0.4
Heath/bracken mosaic	0.2	0.1	0.6		0.5	0.2		0.3	1.3	0.7		0.1
Improved pasture	0.8	0.9	0.7		2.8		2.5		0.4	0.1	1.0	0.2
Rough pasture	0.5	2.4	0.4	0.1	1.0	0.5	3.9	0.5	0.1	0.2	1.5	1.0
Unclassified								1.0		0.7		
Area of bracken in the 1980s	**75.0**		**40.6**		**38.7**		**141.0**		**89.3**		**58.8**	
Net change from the 1970s to the 1980s	**+7.0**		**-2.5**		**-4.6**		**-12.0**		**-2.6**		**-2.3**	

The figures in the columns do not total exactly because of rounding of decimal points, omission of minor changes and changes to categories not listed here.

those areas that changed to or from bracken. The pattern of bracken on the steep dale sides rising up to the heather moorland on the plateau above is clear, as is the encroachment of bracken in part of the area.

Erosion of peat

In certain of the National Parks, notably the Peak District and the Yorkshire Dales, the erosion of blanket peat moorland has been a cause for concern. Certainly it is clear that in both of these Parks the total extent of bare eroded peat is substantial, with 16 km^2 occurring in the Peak District and 11 km^2 in the Yorkshire Dales in the 1980s.

The information from this study does not indicate any major change in the extent of erosion over the last two decades, although in the Yorkshire Dales the extent of eroded peat increased by 0.2 km^2 (2 per cent) from its 1970s total area of 9.7 km^2 (equivalent to an increase of approximately two football pitches a year). By contrast, in the Peak District there was no apparent change in the extent of eroded peat. However, other more detailed studies, such as the Peak District National Park's own moorland erosion study (9), suggest that this may give only a partial picture, as peat continues to be lost by the extension of gullies and the continuation of sheet erosion. Such changes are difficult to identify separately from aerial photographs and so change of this type would not be evident in this project.

Moorland gripping

In some moorland areas agricultural management can involve 'gripping', or the digging of drainage gullies to drain the land. These can have a considerable effect on the landscape because of the regular pattern of lines that they introduce to open moorland landscapes, the adverse impact of drainage on moorland habitats and the potential increase in erosion. The survey gave an indication of the changing extent of gripping by providing a count of the presence of grips in 1 km grid squares, although it did not provide an absolute measure of their length or number. Seven of the Parks showed evidence of at least some moorland gripping, but in the Peak District, the North York Moors, the Lake District, Exmoor and the Brecon Beacons it was not extensive, generally occurring in less than 30 grid squares. In all cases except Exmoor, the number of occurrences increased, and in the Lake District the

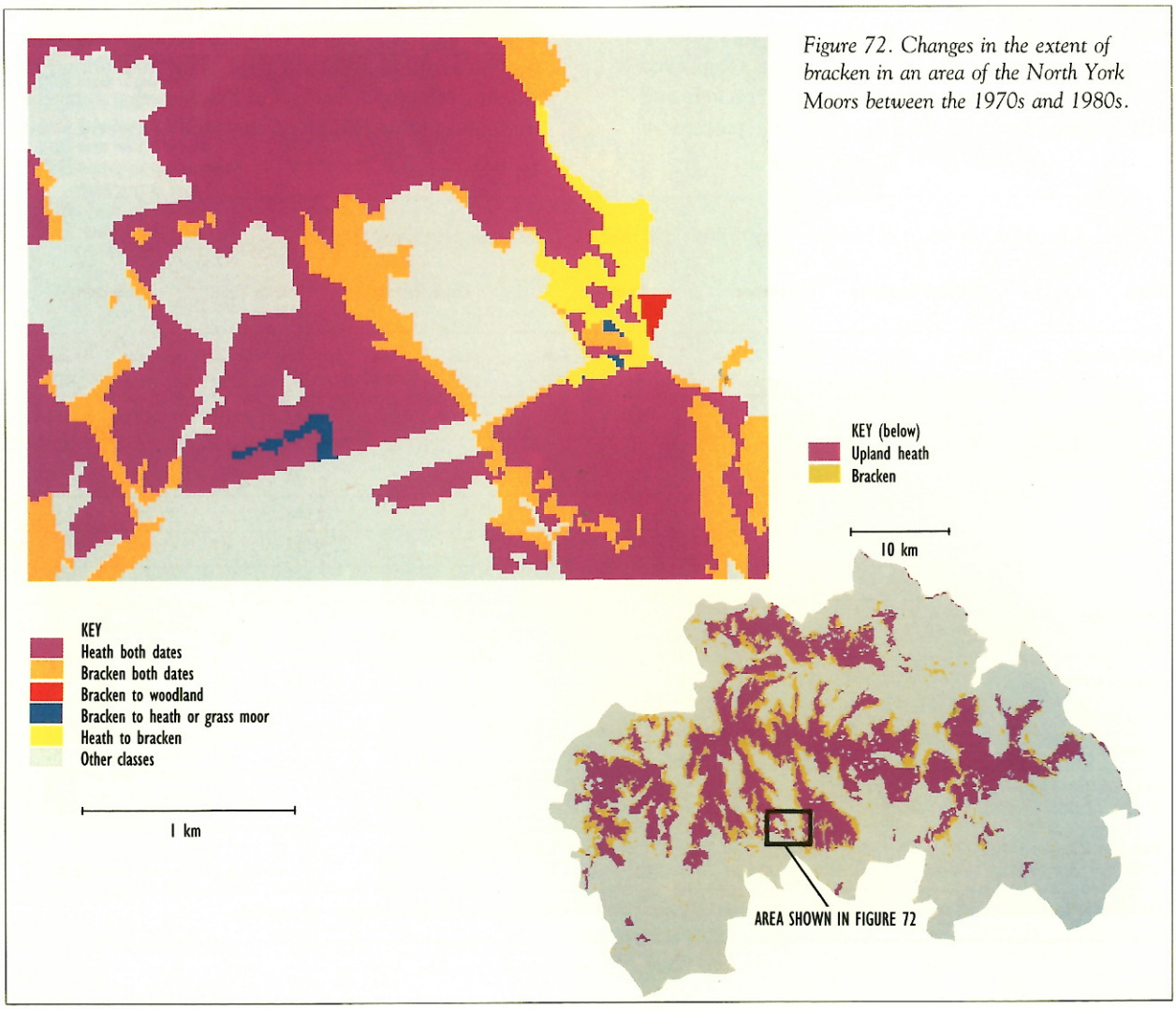


Figure 72. Changes in the extent of bracken in an area of the North York Moors between the 1970s and 1980s.

extent of gripping grew significantly, occurring in 32 grid squares in the 1970s and 74 in the 1980s, an increase of 42 or over 100 per cent.

Gripping is most widespread in the Yorkshire Dales and Northumberland National Parks. In Northumberland it occurred in 348 grid squares in the 1980s, representing a decrease of 63 grid squares (15 per cent) from the 1970s extent. By comparison, in the Yorkshire Dales it became markedly more widespread, increasing from 334 grid squares in the 1970s to 495 in the 1980s. This represented an increase in occurrence of 161 grid squares or 48 per cent. Figures 73 and 74 illustrate the distribution of gripping in the Yorkshire Dales in the 1970s and 1980s, superimposed on a map showing the extent of moor and heath.

Nick James/LUC

Moorland gripping at Garsdale Head, Yorkshire Dales National Park.

Enclosed farmland

Although the National Parks are renowned for their 'natural' landscapes, it is recognised that much of their beauty results from the harmonious interaction of people and nature. Because of this about 40 per cent of the area of the Parks as a whole is occupied by enclosed farmland in the form of rough pasture, improved pasture and cultivated land. The varying extent of enclosed farmland in the individual Parks reflects the severity of the environment, ranging from 66 per cent in the low-lying coastal landscape of the Pembrokeshire Coast National Park, to only 21 per cent in the high, inhospitable upland environment of the Northumberland National Park.

Figure 73. The extent of moorland gripping in the Yorkshire Dales in the 1970s.

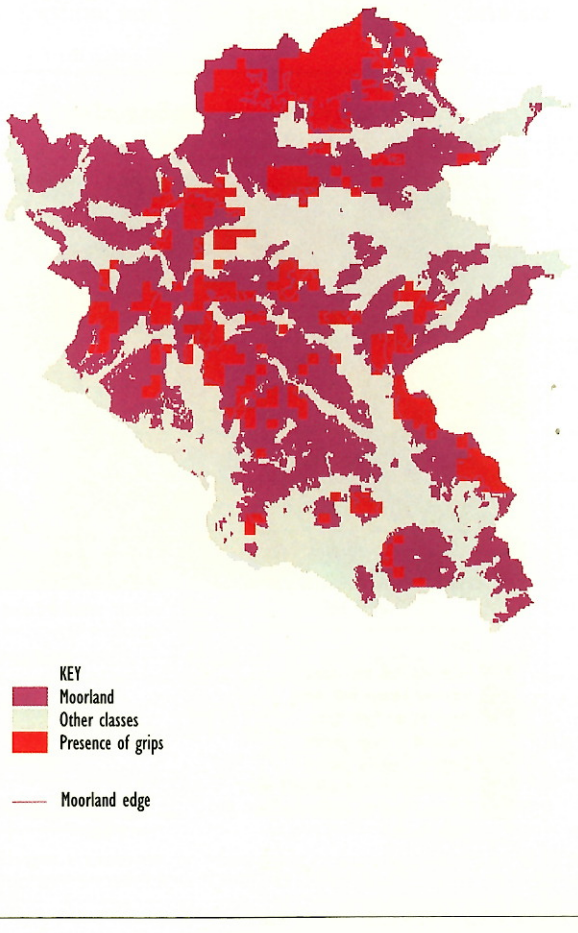


Figure 74. The extent of moorland gripping in the Yorkshire Dales in the 1980s.

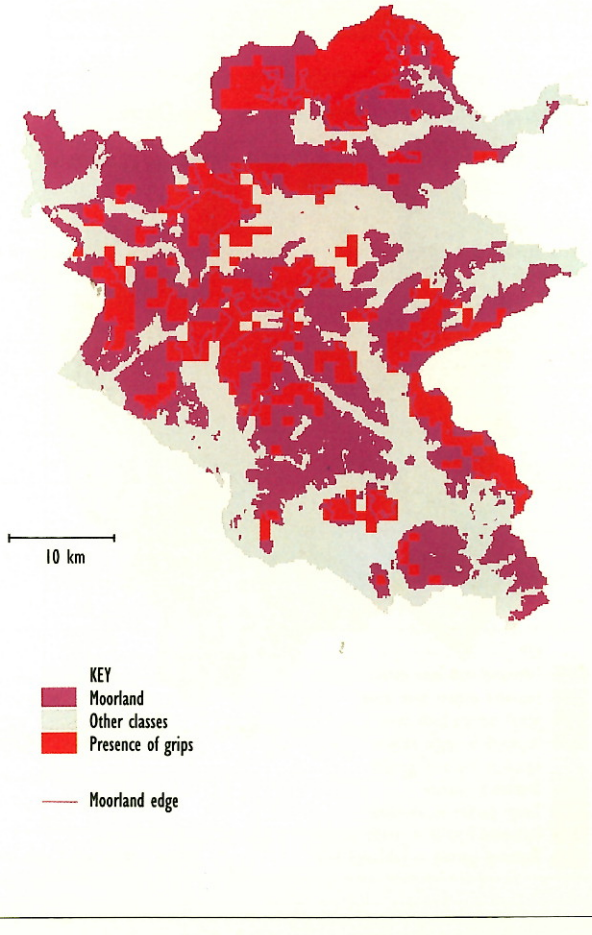
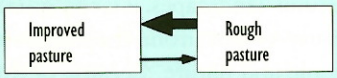


Figure 75. Summary of types of change in enclosed farmland.

- Dominant direction of change was from rough pasture to improved pasture to cultivated land, with a lesser degree of reversion in the other direction.

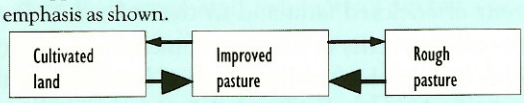
This pattern was particularly evident in the Broads, Dartmoor, Exmoor, the Pembrokeshire Coast, and the North York Moors, although here the change was almost wholly between improved pasture and cultivated land.

- Dominant change was from rough to improved pasture, with a lesser degree of reversion in the other direction.



This pattern was characteristic of the Lake District, Snowdonia and the Yorkshire Dales.

- Approximately equal change between types, with slight emphasis as shown.



This balance of change was only apparent in the Brecon Beacons.

- Change between types was relatively low, and gains and losses tended to balance each other out.

This situation was found in Northumberland and in the Peak District.

Gains and losses in enclosed farmland

In the Parks as a whole the trend in the last two decades has been for the extent of cultivated land and improved pasture to increase, and for rough pasture to decrease, although the situation varied in each of the Parks. The main changes were between different types of enclosed farmland, but there was change between enclosed farmland and other types of land cover. It should be noted, however, that it can be difficult to distinguish between improved pasture and cultivated land from aerial photographs. The most common changes were between rough or improved pasture and bracken, and between pasture and plantation land or coniferous forest.

Movement between bracken and pasture was widespread. Bracken is often cleared or reclaimed at the margins of moor or heath, to form rough or improved pasture. Conversely, reclaimed areas are abandoned and allowed to revert. The gains and losses often balanced each other out, but there were some overall changes. In the Brecon Beacons, for example, there was a small net loss of pasture to bracken, while in Exmoor, the Lake District and Snowdonia there was a net gain of pasture from bracken.

Loss of enclosed farmland to coniferous plantations occurred mainly as a result of planting on marginal areas of rough pasture. In the Lake District 3.7 km^2 of rough pasture was lost to such planting. In Snowdonia the loss was 6.6 km^2 and in the Yorkshire Dales it was 2.2 km^2.

Figure 76. Changes in farmland in the Lake District between the 1970s and 1980s.

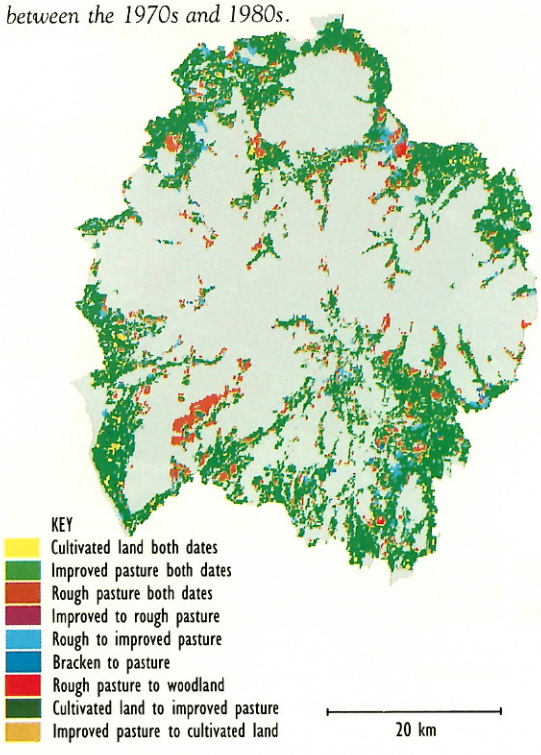
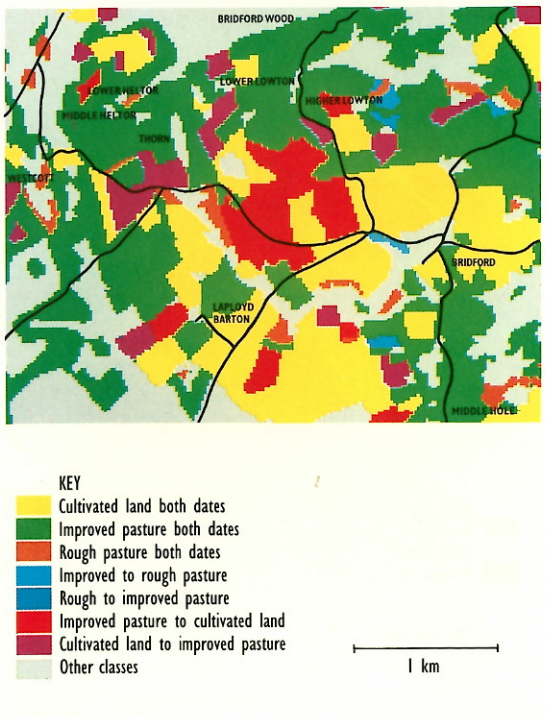


Figure 77. Changes in farmland near Bridford in Dartmoor between the 1970s and 1980s.



Changes in enclosed farmland

Enclosed farmland is subject to regular changes in the type and intensity of management, reflecting both general economic conditions and the circumstances of individual farmers. Rough pasture can be improved, improved pasture can be cultivated for crops, and both cultivated land and improved land may revert back to rough pasture. In the Parks as a whole there was widespread movement of this type, but the overall trend was towards more intensive management, with gains in improved pasture and cultivated land.

The nature of the changes in enclosed farmland in each of the Parks is summarised in Table 3. This shows both the overall change in the area of each type and the extent of movement between the different types. The patterns are complex but four 'models' can be identified that summarise the basic trends (Figure 75).

One of the findings of the Mid Wales uplands study (2) was that some reclaimed rough pasture subsequently reverted back to rough pasture, and was then reclaimed again. It is reasonable to assume that some of the gross change in the National Parks can be accounted for in a similar way; in addition to this, some rough pasture will have been improved for the first time, the impact of which is of greater concern.

Intensification of the management of enclosed farmland was most apparent in the Broads, where there was a loss of 17 km^2 of rough pasture to improved pasture and 35 km^2 of improved pasture in the period in question; and in the Lake District, the Yorkshire Dales and Snowdonia, where between 26 and 32 km^2 of rough pasture was lost in total, representing from 8 to 22 per cent of the original area in the 1970s.

In Figure 76 the overall pattern of such changes in enclosed farmland is illustrated for the Lake District National Park. The map shows how the enclosed farmland is concentrated around the low-lying fringes of the Park, but also penetrates to the core where it forms the extremely valuable in-bye land in the bottom of the dales. Change is scattered throughout the farmed area.

Figure 77, by contrast, shows how these changes have affected the landscape at the local level, for a small area of the Dartmoor National Park near Bridford, north of Kennick Reservoir, in the farmland fringes in the north east of the Park. It shows how changes between the types of enclosed farmland have occurred in what is a predominantly farmed landscape.

Field boundaries

The character of the traditional landscapes of the National Parks often owes a great deal to the type and pattern of the field boundaries. The Yorkshire Dales and the Peak District in particular all have landscapes in which stone walls are a vital component, and each had over 7,000 km of walls in the 1980s, or about 80 per cent of all of the field boundaries. Snowdonia and the Lake District had approximately 5,000 km of walls, representing just over 50 per cent of the boundaries. Stone walls also made up just over 50 per

Table 3. Changes in enclosed farmland.

	Overall extent in the 1980s with net change from the 1970s to the 1980s shown in brackets (km^2)			Movement between types of enclosed farmland (km^2)			
Park	Cultivated land	Improved pasture	Rough pasture	From improved to cultivated	From cultivated to improved	From rough to improved	From improved to rough
Brecon Beacons	23 (-6)	447 (13)	67 (-10)	13	19	18	11
Broads	81 (36)	115 (-18)	14 (-18)	35	3	17	4
Dartmoor	51 (8)	279 (-5)	35 (-3)	17	4	3	1
Exmoor	44 (11)	337 (2)	58 (-6)	24	13	9	2
Lake District	11 (2)	643 (31)	114 (-32)	6	4	32	1
Northumberland	4 (1)	120 (3)	103 (-3)	2	1	9	6
North York Moors	321 (8)	266 (-1)	22 (-2)	29	24	2	1
Peak District	12 (5)	650 (-2)	113 (-2)	9	4	7	3
Pembrokeshire Coast	82 (11)	271 (-8)	35 (-3)	51	39	5	2
Snowdonia	1 (-1)	349 (27)	316 (-26)	1	2	28	7
Yorkshire Dales	1 (0)	482 (24)	235 (-29)	0	0	25	0

The figures in brackets in the three left-hand columns refer to net change, while the four right-hand columns refer to gross change.

cent of boundaries in the Northumberland National Park, although the total extent was much less, at only 1,151 km.

In other Parks hedgerows are more common in the farmed landscapes. In the Brecon Beacons, Dartmoor and Exmoor, hedgerows, or hedgerows and banks, far outnumber walls, while in the North York Moors the two are about equally represented. In the Pembrokeshire Coast, banks and hedgerows predominate, while in the low-lying wetland landscape of the Broads ditches or 'wet fences' are more commonly found.

The overall trend in changes in field boundaries was the same in all of the Parks. Traditional boundaries of walls and hedgerows decreased while fencing increased. The length of woodland edge was also measured as a boundary feature and generally increased

Figure 78. The extent of hedgerows and banks in Exmoor in the 1970s.

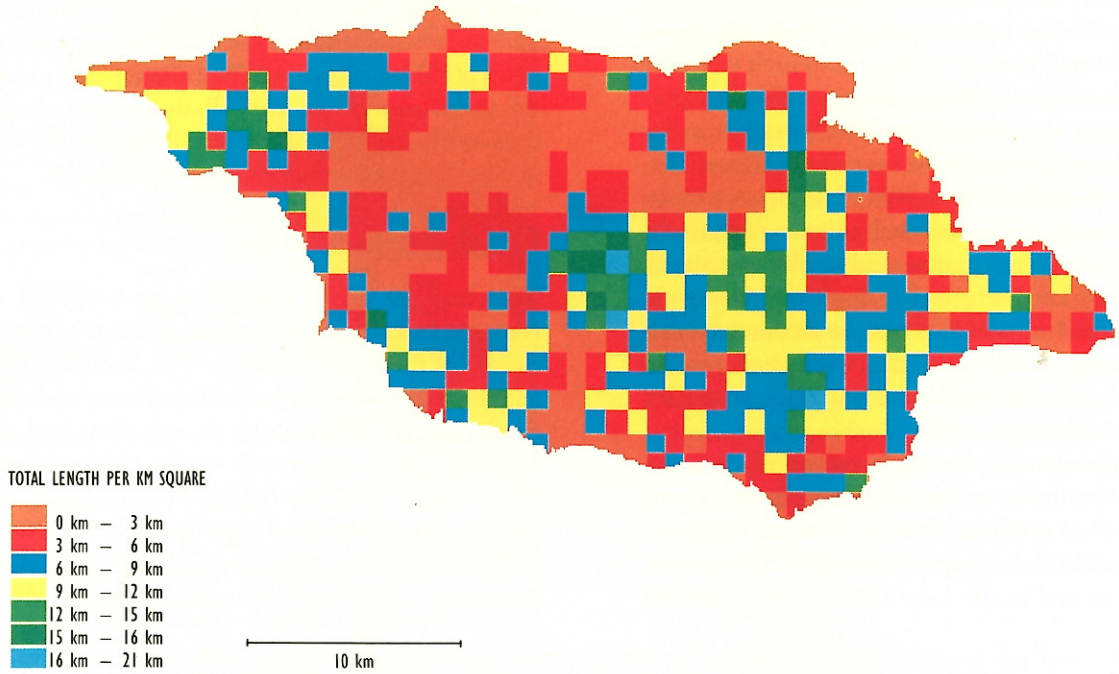
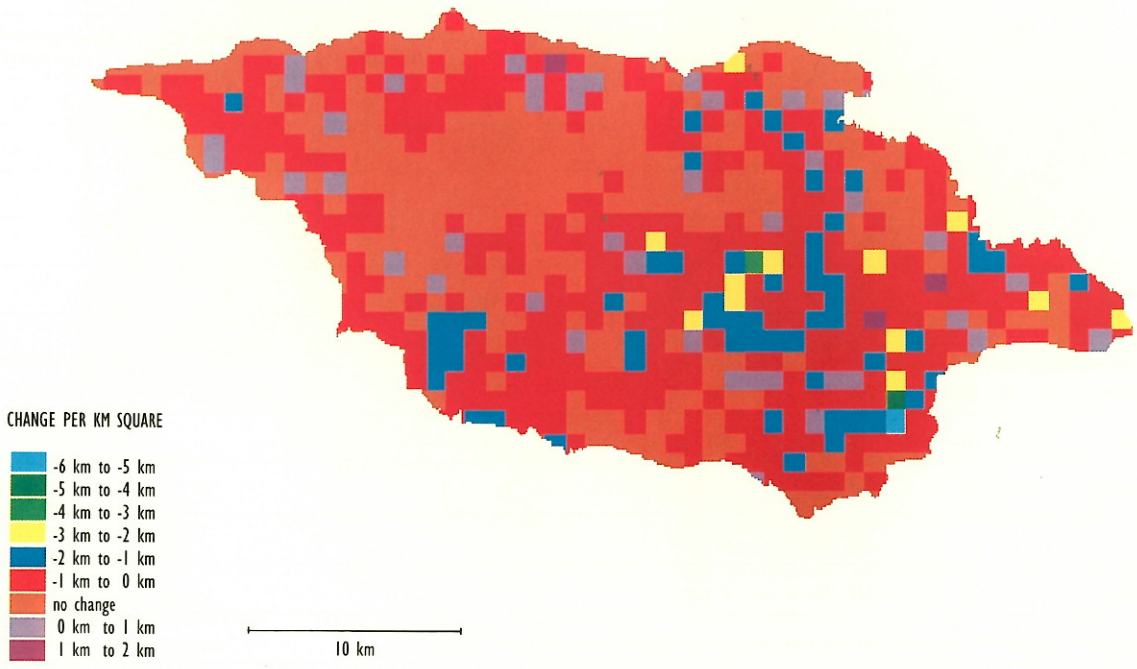


Figure 79. Changes in the extent of hedgerows and banks in Exmoor between the 1970s and 1980s.



at a rate similar to the increase in the amount of new forestry. Some traditional boundary features would have been 'lost' as a result of being incorporated into new forestry plantations.

Loss of hedgerows

The extent of loss of hedgerows varied widely between the Parks. At the extremes, Northumberland lost 0.5 km or less than 1 per cent of its 1970s total of 232 km, while Exmoor lost 343 km or 11 per cent of its 1970s total of 3,042 km. In practice, the loss in Exmoor may be over-exaggerated due to the difficulties of differentiating between hedgerows and banks in the aerial photographs, especially if hedges on top of banks have been cut back or layered. This means that the figures show a decline in hedgerows, accompanied by an apparent increase in banks, which almost certainly results from this difficulty. If the hedgerows and banks are combined then the loss was of the order of 5 per cent. Figures 78 and 79 show the loss of field boundaries in the Exmoor National Park as a whole. They show varying levels of loss throughout the Park. The greatest loss occurred where a new reservoir had been built. It should be noted in recording the length of hedges that no assessment of quality was made.

In the other Parks, the loss varied from, for example 7 per cent in the North York Moors, to only 3 per cent in the Brecon Beacons and Dartmoor.

Loss of walls

Decline in the length of walls was apparent in some of those Parks where walls are a significant feature in the landscape, notably the Yorkshire Dales, the Lake District, the Peak District and Snowdonia. The greatest losses were in Snowdonia, where 54 km (1 per cent) of the 1970s total of 4,968 km of wall were lost, and in the

Figure 80. The extent of walls in the Peak District in the 1970s.

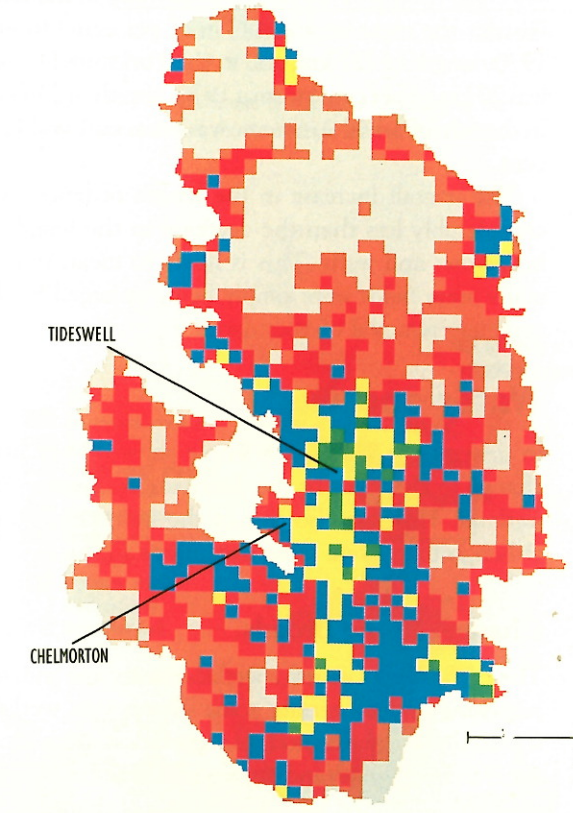
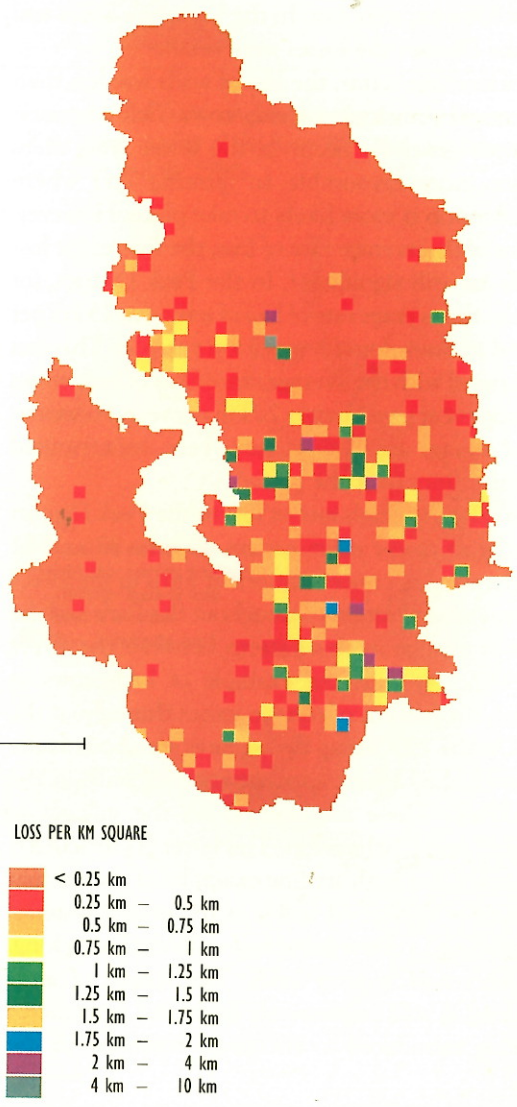
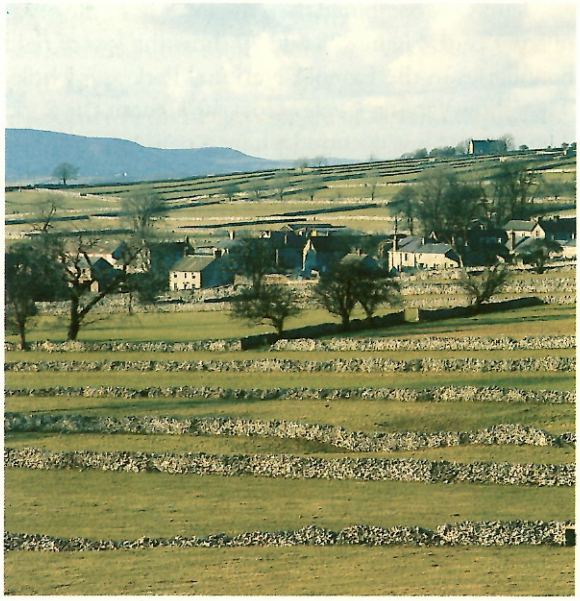


Figure 81. Changes in the extent of walls in the Peak District between the 1970s and 1980s.





Mike Williams/Countryside Commission

Stone walls at Chelmorton, a historic landscape in the Peak District National Park.

Peak District, where 229 km (3 per cent) of the 1970s total of 8,986km were lost. In the Yorkshire Dales and the Lake District the losses were smaller.

In percentage terms, the loss of walls was less than the corresponding losses of hedgerows. This is because hedgerows generally occur in the lower lying areas that are more favourable to farming and where intensification is more likely to take place. However, in terms of the average rate of loss, the figures for loss of walls are still significant. In the Peak District, for example, the average rate of loss of walls was 15 km per year and in Snowdonia it was 3 km per year. This can be compared with the average rate of loss of hedgerows in Exmoor of approximately 20 km per year. However, rates of change are likely to have been concentrated at certain times over the period.

The relatively high rate of loss in the Peak District is worthy of closer examination. Figures 80 and 81 show the varying concentrations of walls in the 1970s in kilometre grid squares throughout the Park and the extent of change in this pattern between the 1970s and 1980s. As with the example of hedgerows in Exmoor, the pattern of change varies throughout the Park. On the 1970s map two squares stand out as the areas with the highest concentration of walls in the whole Park. These are centred on the villages of Tideswell and Chelmorton. The latter is particularly well known, but both are fine examples of the ancient enclosure of mediaeval arable strip farming systems. This produced a dense pattern of walls enclosing long, often very narrow strip fields. The length of walls remaining is still impressively high and agreements are being introduced to encourage retention of the walls.

In all of the Parks it is important to note that the lengths of walls recorded in this survey gave no clues as to their condition. Although the overall loss of walls did not appear dramatic, this does not mean that those remaining were in good condition. In fact many of the Park authorities are concerned about the poor state of repair of many of these most important landscape features and are seeking to encourage their maintenance and rebuilding.

Changes in ditches and fences

In the Broads there was a decrease of 138 km (6 per cent) in the open ditches or 'wet fences' that often divide the fields in this wetland landscape. The length of ditches in the 1970s was 2,280 m.

In nearly all of the Parks the loss of hedgerows and walls was accompanied by an increase in the length of fences, as these more modern, low maintenance boundaries replaced the traditional ones. The increase was greatest in Exmoor, where the length of fences increased by 64 km (13 per cent) from a 1970s length of 474 km. In Dartmoor fences increased by 32 km (12 per cent) from a 1970s length of 265 km, in the Lake District the increase was 49 km (7 per cent) from a 1970s length of 722 km, and in the Yorkshire Dales it was 20 km (8 per cent) from a 1970s length of 235 km. In the other Parks the increase was between 1 and 4 per cent.

The overall increase in the length of fences was considerably less than the decrease in the length of hedgerows and walls. This is likely to mean that in many areas fields were simply being enlarged by the complete removal of boundaries.

Water and wetland

In general the Parks as a whole showed very little change in the areas or the distribution of water and wetland. This was also true of the individual Parks, although there were some exceptions to this.

Changes in the Broads

The Broads are of course a wetland landscape and, not surprisingly, demonstrate some changes in wetland features. The succession of vegetation from open water to fen, to scrub and carr woodland and eventually to climax woodland is a natural source of change in the Broads. The first part of the succession, with change from open water to marsh, was not apparent from the survey, although there was evidence of change resulting from the later stages of the succession. In the Broads as a whole, freshwater marsh changed to deciduous woodland and to scrub, and scrub also changed to deciduous woodland. This sequence of change is summarised in Figure 82.

Figure 83 shows the upper reaches of the River Bure and Ant in the 1970s, and the accompanying 1980s aerial photograph and map, Figure 84, illustrate the nature of the change. Here the extensive areas of fen have traditionally been maintained by the regular cutting of reed, sedge and marsh hay. As these practices have declined, the progression to woodland has continued, as is shown on the map.

There was some change in the other direction in the Broads, with a total of 0.4 km^2 of freshwater marsh changing to open water. This may have been the result of erosion of freshwater marsh due to the effects of boat traffic, a problem that has been identified by the Broads Authority in the Broads Plan (10), or it may have been caused by the temporary flooding of marshland or dredging for navigation.

BKS Surveys/Norfolk County Council

This 1980s aerial photograph shows the River Ant north of Barton Broad.

Figure 82. The succession of vegetation in the Broads (1970s to 1980s).

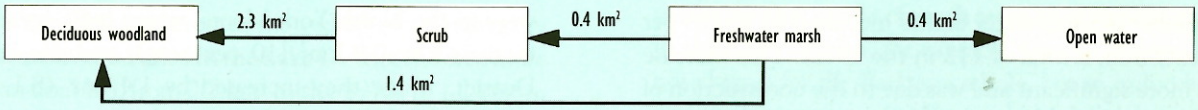


Figure 83. The landscape of the upper reaches of the River Bure and Ant in the Broads during the 1970s.

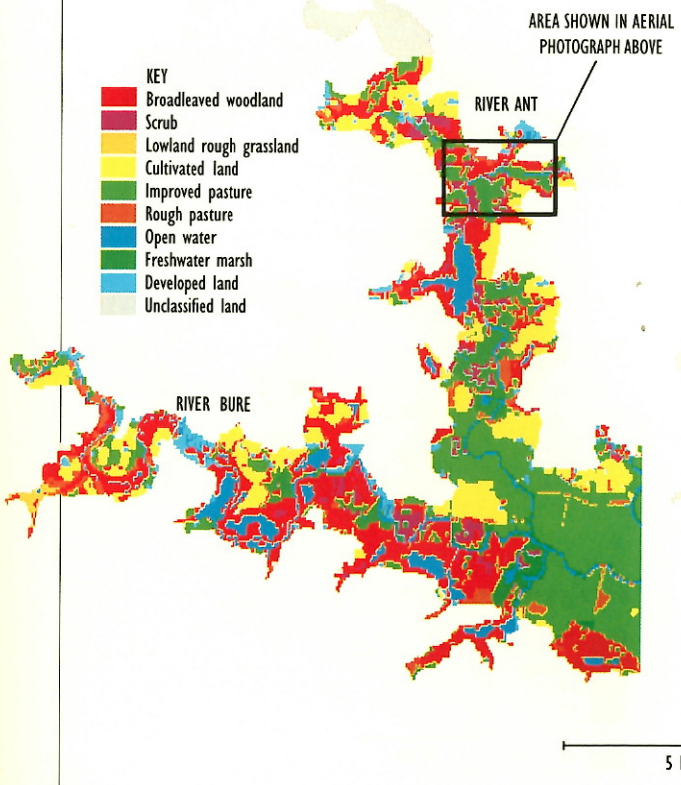
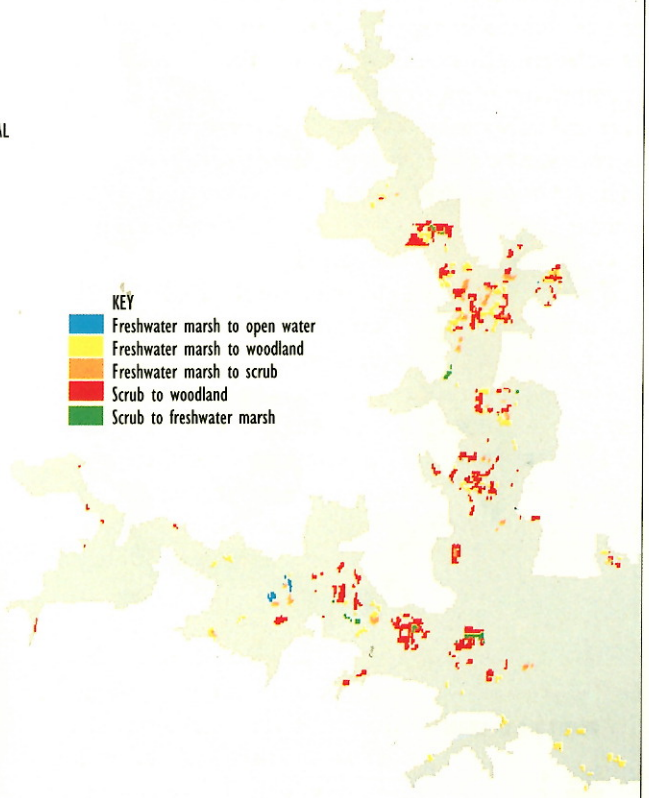


Figure 84. Successional change in the wetland landscapes of the upper reaches of the River Bure and Ant between the 1970s and the 1980s.



Ponds and reservoirs

The other main changes in open water bodies resulted from the development of individual reservoirs. The greatest increase was in Exmoor, where there was a gain of 1.6 km^2 of open water as a result of the building of Wimbleball reservoir.

Smaller water bodies, such as farm ponds and farm irrigation reservoirs, were counted in the survey. The most noticeable change in number was found in Pembrokeshire and in Dartmoor.

In Dartmoor a substantial decrease was found. However, most of the features counted were temporary water bodies formed as a result of rain filling depressions caused by military activity. The decline in numbers probably resulted from the dry weather in the hot summer of 1989 before the aerial photographs were taken in June, compared with the conditions in the 1970s. This was therefore not a real 'loss' of landscape features.

In the Pembrokeshire Coast National Park the number of small water bodies increased by 95 (85 per cent) from a total of 112 in the 1970s. This increase is more significant and was due to the construction of farm irrigation reservoirs to irrigate arable crops, particularly potatoes. Figures 85 and 86 show the extent of this change, demonstrating the change in the number of water bodies in kilometre grid squares throughout the Park, as well as their distribution in the 1970s. The maps show a concentration of new irrigation reservoirs in a number of areas, especially on the St David's and Dale peninsulas.

Other changes

There were a number of other changes in the Parks that are small in absolute extent, but may well have had a significant local effect on the landscape.

Developed land

The area of developed land of all types changed relatively little overall, either for the Parks as a whole, or for individual Parks. Built-up or 'urban' areas grew in extent in most of the Parks, but generally by less than half a square kilometre in total. The exceptions were in the North York Moors, where built-up areas increased by 0.9 km^2 (10 per cent), and the Lake District, where they increased by 1.4 km^2 (8.1 per cent). It should be noted, however, that approximately

Figure 85. The distribution of ponds in the Pembrokeshire Coast in the 1970s.

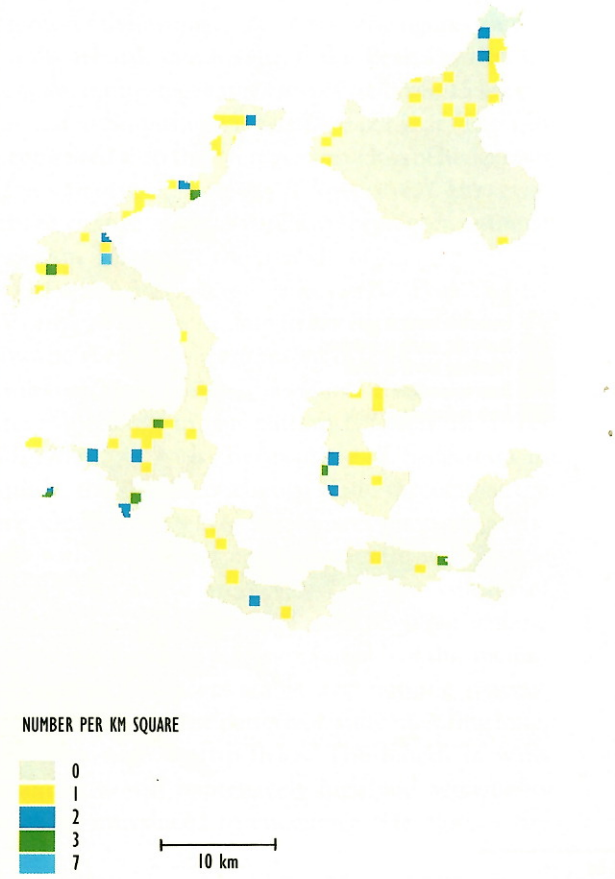
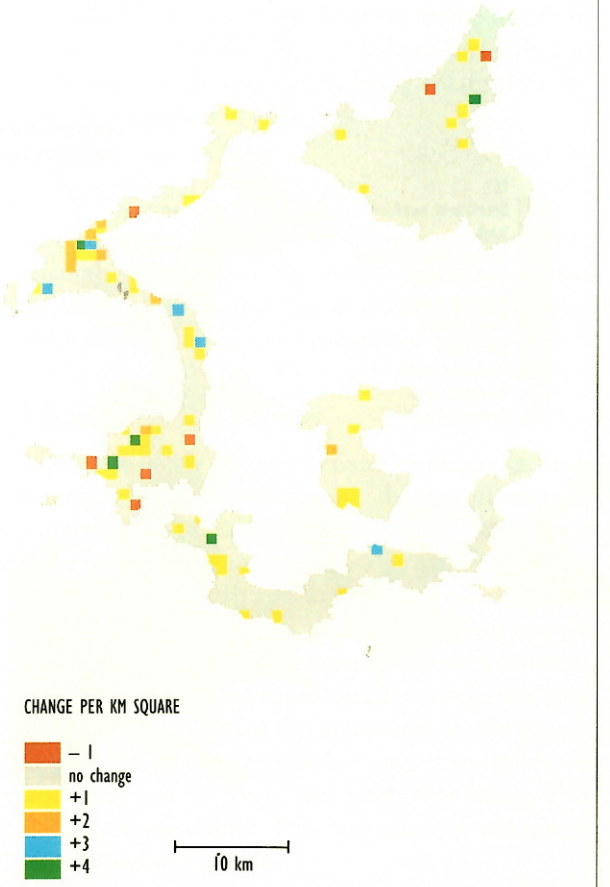


Figure 86. Changes in the distribution of ponds in the Pembrokeshire Coast between the 1970s and 1980s.



half of the increase in built-up areas in the North York Moors was from previously unclassified land, so this total increase may not all be a result of actual development. To put these figures in perspective, the increases in these Parks are equal to roughly 146 and 214 football pitches respectively. In the Yorkshire Dales the area increased by 0.3 km^2 (5 per cent) but in the remainder of the Parks the change was generally less than 3 per cent of the 1970s area.

There has been some change in other developed land. The area of quarries grew by 1 km^2 overall in the Yorkshire Dales and by just over 1 km^2 in Dartmoor. In the Peak District, where limestone quarrying and vein mineral working are important, the overall extent of mineral workings actually decreased, but there was 2.8 km^2 of gross change, which indicates that some workings had closed and been reclaimed, mainly to pasture, while new workings had taken land out of other uses. Most of the Parks also demonstrated small overall decreases in the extent of derelict land, probably due to reclamation schemes.

Major transport routes showed up as a noteworthy feature in two Parks. In the Lake District the area more than doubled, from 0.5 km^2 in the 1970s to 1.2 km^2 in the 1980s. The overall increase of 0.7 km^2 included the widening of the A66 in the intervening period. In Dartmoor also the area doubled from 0.4 km^2 to 0.9 km^2.

Trees and tree groups

Like small inland water bodies, these features were counted rather than measured, and it should be emphasised that this is the one part of the survey where the findings were estimated partly from a sample. Trees were counted where they occured within field boundaries and where they occured separately. Both types, but especially those in boundaries, generally decreased in most of the Parks, which is perhaps not surprising given the loss of hedgerows described previously. Groups of trees either remained constant or increased slightly in most of the Parks, possibly reflecting the emphasis on tree planting in the early amenity and conservation grant schemes. Other influences that could have affected both the number of individual and groups of trees include the impact of Dutch elm disease, wind-blown trees (although the survey pre-dates many of the recent gales), and the tightening up of felling licences. The general trends at the whole Park level, however, mask more local variations that can be of much more local significance. In the Lake District, for example, groups of trees did not change for the Park as a whole, but in individual parishes the picture was different. In Martindale parish the 37 groups of trees had reduced to 31 by the 1980s, while in Lakes parish the 137 groups increased to 145.

4. WHAT DO THE CHANGES MEAN?

Overall changes

The monitoring study has resulted in the first ever comprehensive census of landscape features in the most cherished of our landscapes. The amount of information now available, and the number of different ways in which it can be studied and presented, are substantial. The main conclusions, however, can be stated briefly, as follows.

- **In many respects the landscapes of the National Parks have changed little in the last two decades.** The overall levels of change in the area of water and wetland, in developed land, in rock and coastal features and broadleaved and mixed woodland and in the length of walls, were small in relation to the size of the Parks, and indeed some did not change at all. There was an overall increase in the area of cultivated land, improved pasture and coniferous forest and in the length of fences. This reflects a move towards more intensive management, and was accompanied by a total decrease in the more traditional features of the landscape, notably in the area of moor and heath and rough pasture and in the length of hedgerows. There was also a decrease in the area of clear felled and newly planted land.

- **The situation was, however, much more complex than these statements suggest, because there was so much movement between the different types of land cover.** This is particularly true of: the different types of enclosed farmland, which change with the intensity of management; the newly planted, clear felled and coniferous forest areas, which change as forests are planted, mature and are felled; and of the various types of moor and heath, as vegetation changes in response to variations in grazing and other management practices.

It is also important to remember that this study was concerned only with extent and does not indicate changes in the quality of land cover or other features, which is of such vital importance to the character and quality of National Park landscapes.

The scale and significance of change

The scale of change varied widely. Taking the Parks as a whole the biggest absolute changes were increases in the following:

- coniferous forest (including felled and planted land), which increased in area by 110 km^2 (11 per cent) in the period in question, from a total of 1021.6 km^2 in the 1970s, or by approximately 7 km^2 a year (based on the average period between the aerial photographs of 15 years);
- cultivated land, which increased by 74.9 km^2 (13 per cent) overall, from a total of 555.8 km^2 in the 1970s;
- improved pasture, which increased by 66.0 km^2 (2 per cent), from a total of 3892.7 km^2 in the 1970s.

At the other end of the scale, developed land of all types increased by just 10.8 km^2 (5 per cent) from a total of 207.1 km^2 in the 1970s for all of the Parks.

The main decreases were:

- heath, which decreased overall by 30.9 km^2 (2 per cent), from a total of 1392.5 km^2 in the 1970s;
- grass moor, which decreased by 49.1 km^2 (2 per cent), from a total of 3186.9 km^2 in the 1970s;
- and rough pasture, which decreased by 133.0 km^2 (11 per cent), from a total of 1245.6 km^2 in the 1970s.

There is no easy way of judging the significance of such changes in the National Parks. It would be possible to conclude on the one hand that the landscapes of the National Parks have been relatively stable over the period in question. The modest levels of change could indicate that the National Park designation has effectively conserved the character of these landscapes. On the other hand, the loss of, for example, moor and heath equivalent to an area of over 7 km^2 annually (that is over 1,000 football pitches each year) in all of the Parks, could be seen as a surprisingly high level of change for protected landscapes, as could the similar level of increase in coniferous forests. Both views would be valid; interpretation depends on one's point of view. There are, of course, other important changes influencing the landscapes of the National Parks that were not revealed by this study. They include the development of intrusive buildings, and issues such as military use and accessibility, which are not reflected in land cover.

In some ways the findings are unlikely to be a surprise to anyone. The overall trends, of increased intensification of land management, loss of traditional boundaries, loss of moorland vegetation and increased coniferous forest, have been widely recognised and frequently debated in the last two decades. However, few people have had a perception of the overall scale of such changes or of their complexity, and it is often the local impact of individual cases that provides the focus for such debates. This project has provided a factual background for such debates and has given a wider perspective on change.