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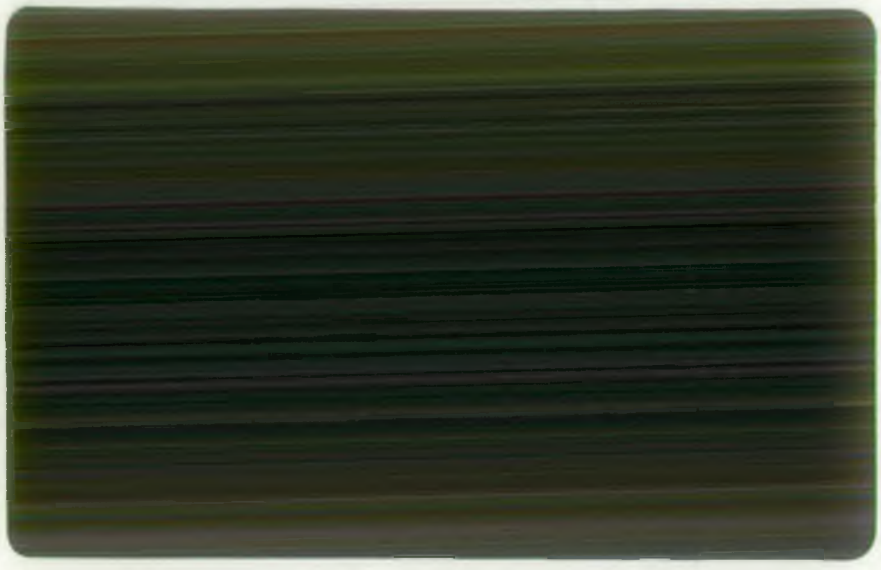

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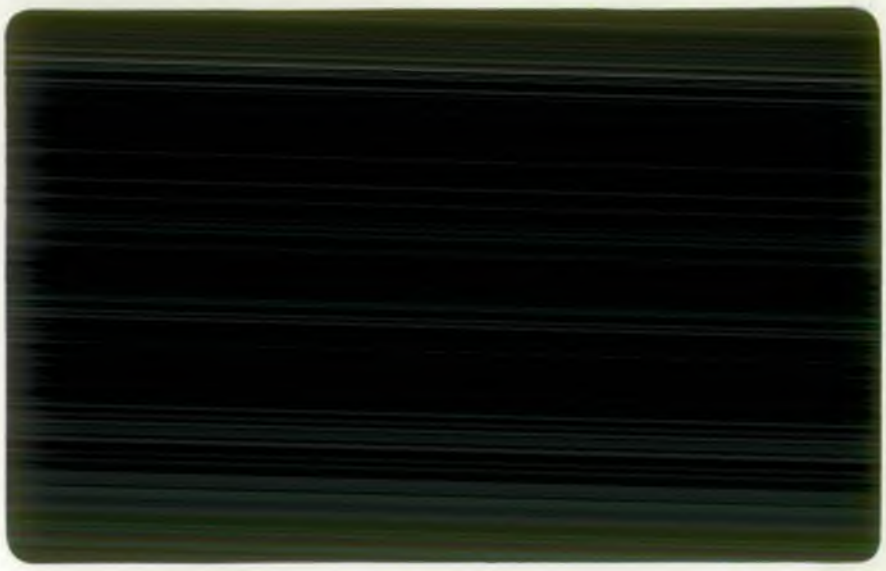

ENVIRONMENTAL INDICATORS

A set of environmental indicators for Environment Agency use

Environmental Assessment and Reporting Team,
Environmental Strategy Directorate, Head Office

July 2000

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1 OVERVIEW

This report shows a set of about 70 environmental indicators, including selected 'headline' indicators, designed for a range of Agency uses. Our vision is 'a better environment in England and Wales for present and future generations', and indicators are needed to show progress towards achieving this aim. They will help to show how the Agency is contributing to the objective of sustainable development, of which the environment is a key aspect. The indicators will be used:

- to show change in the environment in the Agency's annual reports and to highlight the role that the Agency has played in these changes;
- to put the Agency's role into perspective by providing information relevant to the whole environment;
- in the Agency's 'State of the Environment' reports at both regional and national scales and where appropriate in our Local Environment Agency Plans;
- to raise awareness about the environment by providing key information externally via the Agency's web site and internally via the intranet;
- to guide external bodies such as regional development agencies on environmental aspects of their sustainable development planning.

The set combines data across a broad range of environmental issues and does not solely relate to our responsibilities. Indicators have been drawn from a number of sources and where they overlap with the initiatives of other organisations this is acknowledged. It is envisaged that users will be able to select indicators from the set to suit their requirements so the list is not meant to be prescriptive. The set will assist in the selection of indicators for different purposes and promote consistency in their use between organisations and the Agency regions.

We recognise that many of the indicators are not ideal. This report is the first step in an evolving process. We will continually improve and develop our set of indicators to meet user needs.

2 REVIEW PROCESS

This report is for use now and for comments so that we can improve our indicator set in the future. We would particularly welcome responses to the following questions:

1) What are your views on the general approach taken for presenting a set of environmental indicators for a variety of uses?

2) Do you have any comments on the structure, organisation and presentation of the indicators?

3) Do the indicators adequately cover all aspects of the environment and if not, what do you see are the main omissions? Where would the data be sourced for any new ones?

4) Which indicators, if any, do you think should be excluded and why? What would you suggest should take their place (if anything)?

5) Do you have any suggestions for indicators that should be developed in the future?

6) What should be the relationship between indicator initiatives of the various organisations involved in environmental and sustainability issues?

7) How would you like to see the indicators reported, at what frequency, and using what media?

8) Is there a need for Agency headline indicators?

We would welcome responses and comments at any time, reflecting the evolving nature of this work. Please send to:

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3 BACKGROUND

This section:

- defines what is meant by environmental indicators
- proposes how they might be used
- asks if they should remain fixed over time
- describes the development of the set
- outlines the links with initiatives from some other organisations
- discusses the selection of the indicators for the Agency
- proposes headline indicators
- discusses targets for the indicators
- describes the framework to the indicator set.

3.1 What is an environmental indicator?

Our definition is: *Environmental indicators are quantified information, which show environmental change over time.*

3.2 How will the indicators be used?

Environmental indicators have three basic functions; simplification, quantification and communication. The Agency already communicates how well it is performing its operational functions through Operational Performance Measures (OPMs), but our vision is a 'better environment'. Indicators are needed to show progress towards achieving this aim, and to show that we are contributing to sustainable development, of which the environment is a key aspect.

The indicator set is not meant to be prescriptive and it is envisaged that it will be used as a reference for many purposes. Users may choose indicators relevant to the use they are putting them to and add more local or site specific data where necessary.

This set of environmental indicators will help the Agency to:

- measure the extent to which policies aimed at environmental improvements have achieved real improvements;

- identify the most significant problems in the condition of the environment. They will identify increasing pressures caused by stresses and strains on the environment, and allow us to focus resources;

- clarify how much progress we are making towards our vision and aspects of sustainable development;

- provide a consistent means of reporting environmental progress throughout the Agency from year to year, from region to region, and in Local Environment Agency Plans (LEAPs);

- provide consistent information about the environment to external bodies for their reporting purposes, whether these links are at area, regional or national level (for example to regional development agencies);

- provide a set of measurements that are readily understandable to all stakeholders, including Agency staff;

- clarify the confusion caused by the masses of environmental information available ('information overload');

- help people understand more about their environment, and the ways in which they can make a difference as individuals.

We intend to put this set of indicators onto our web site and to update them as new data become available.

3.3 Will the indicator set remain fixed?

It is important that the indicators used remain fairly constant if changes through time are to be shown. The indicators will need to be revised periodically though, in response to changing circumstances and as our knowledge develops, but there should be sound scientific reasons for additions, removals, or other changes. Some of the indicators that need to be developed and added to the set in the future are presented in Appendix I.

3.4 Development of the set of indicators

The issue of developing a set of indicators for the Agency was first raised in 1996 when the Department of the Environment (DoE) issued its set of *Indicators of Sustainable Development*[1]. About the same time, the Agency produced *The Environment of England and Wales*[2], which presented information on trends in pressures and the state of the environment, that formed an initial view of potential indicators. There seemed to be a general view that the Agency needed a set of indicators but these should link into indicators being developed by others.

Thames Region produced a set of indicators for use in its Thames 21 planning document, and some other regions started similar processes. The LEAPs Guidance issued in autumn 1997 required 'Environmental Overviews' of LEAP catchments, highlighting the need for a common set of indicators for LEAPs. Lists were produced for this purpose and discussed with LEAP staff, but many of the suggestions proved to be impractical due to the lack of data at an appropriate scale. During the following year, the need for a consistent, practical set became more apparent through links with local authorities on sustainability planning and in Regions where European funding for certain priority areas was being obtained.

3.5 Links with initiatives from DETR and MAFF

In producing this indicator set, the Agency is keen to ensure synergies between Government Departments and other organisations involved in similar exercises. Current and on-going

[1] DoE (1996) Indicators of Sustainable Development for the United Kingdom. London: HMSO.
[2] Environment Agency (1996) The Environment of England and Wales – A Snapshot.

initiatives by the Department of the Environment, Transport and the Regions (DETR), Ministry of Agriculture, Fisheries and Food (MAFF), English Nature and the Countryside Agency amongst others have all been considered in producing our set.

In many cases the Agency's indicators fit in with the environmental sections of the DETR sustainability indicators and indeed some are reproduced directly from the DETR publication, *Quality of life counts*[3]. The Agency's set develops the environmental aspects of those from DETR, with some indicators being presented differently or with a regional interpretation. The DETR set generally presents information on the UK scale, whereas the Agency's set is usually presented for England and Wales or on a regional basis. The regional split varies depending on the source of the data. The Agency data reflects our operational regions; other regional data sets represent government offices or MAFF regions. In time, and using GIS, it should be possible to manipulate most data sets to meet the boundary requirements of the user.

The MAFF publication, *Towards Sustainable Agriculture*[4], presents a set of key indicators reflecting the economic, social and environmental impacts of agriculture. The Agency's indicator set includes some in common with those presented by MAFF. Where common or similar indicators are used in both the Agency's and DETR's or MAFF's sets then this is noted in the text and in Table 2.

3.6 Indicator selection and framework

Indicators were selected to ensure coverage of the six 'Viewpoints' (states) and six 'Stresses and Strains' (pressures) of the Agency's framework for integrated environmental assessment. The indicator set attempts to cover all aspects of the environment rather than just the Agency functions. We look at the main pressures on the environment from social and economic activities as well as indicators on the state of the environment itself.

These frameworks can be described as:

Viewpoints (state):

V1 land use and environmental resources
V2 the status of key biological populations and communities, and of biodiversity
V3 the quality of the environment as determined by assessing compliance with standards and targets
V4 the 'health' of environmental resources
V5 environmental changes at long-term reference sites
V6 the aesthetic quality of the environment

Stresses and strains (pressures):

S1 natural forces
S2 societal influences
S3 removals and abstractions
S4 discharges and releases
S5 waste arisings and disposals
S6 illegal practices

[3] DETR (1999) Quality of life counts – indicators for a strategy for sustainable development for the United Kingdom: a baseline assessment. London: HMSO.
[4] MAFF (2000) Towards sustainable agriculture – a pilot set of indicators. London: MAFF Publications.

The terminology, V1, V2, S1, S2 etc, are used throughout the report as our indicator identifiers.

Data from a variety of organisations have been used to ensure this coverage. Data sources are duly recognised for each indicator.

The indicators have been assessed so that they generally meet the following criteria:

- scientifically sound
- easily understood
- sensitive to the change that they are intended to measure
- measurable and capable of being updated regularly
- the data and information are readily available.

This process led to the exclusion of some indicators and the recognition that some of the indicators proposed needed further development before they could be used consistently throughout the Agency. The analysis also showed that some of the originally proposed indicators really measured the way in which the Agency responds to the state of the environment or pressures on it, rather than measuring the environment or pressures directly. These 'response indicators' such as "the number of successful prosecutions for environmental damage", have been excluded because they already form part of the Agency's OPMs. The main reasons for the exclusion of some indicators used by others, and which some people may think are relevant, are contained in Appendix II.

Almost 70 indicators are proposed for use by the Agency (Table 2). A description of each indicator is given in Section 6. This description includes background information, the relevance of the indicator, any apparent trends, and targets or objectives if available.

These indicators are deliberately environmental and do not cover the full range of sustainable development issues, for example, those concerned with the economy are excluded. Some background indicators are included to set the scene for the main indicators of environmental change. These background indicators include human population, road traffic levels and the area of different agricultural crops. They help to explain many of the regional differences.

3.7 'Headline' indicators

The suggested set of headline indicators is presented in Table 1. These have been selected to encompass the Agency's responsibilities and contributions to environmental improvements. Use of the headline indicators will be promoted widely through annual reports. Other headline indicators may be added later when they have been further developed (Appendix I). In particular, we would like to add indicators for the state of key species, flooding and water resources.

Table 1. Proposed headline indicators

ID	Indicator
V2.3	Salmon catches
V3.3	Rivers of good or fair quality
V3.4	Compliance with the Bathing Waters Directive
S4.4	Loads of major contaminants to coastal waters
S4.11	Emissions to air from Agency-regulated industrial processes
S5.1	Waste arisings and management in the UK

3.8 Do all the indicators have targets?

Many of the indicators have targets against which change can be assessed. Where targets are available these are included on the graphics or in the associated text. A number of the indicators have no associated targets and progress must be measured by the indicator "moving in the right direction". Some of the indicators do not need targets, as they are included for background information. In many cases where data are available for projections of the indicator into the future then these have been included. Projections are based on the best knowledge at the time and are generally periodically revised.

3.9 Links to the Agency's Environmental Vision

The Agency is consulting on an environmental vision that identifies nine themes for concerted action. These are:

- improving the quality of life
- enhancing wildlife
- 'greening' the business world
- using natural resources wisely
- ensuring that the air is clean
- protecting and improving inland and coastal waters
- protecting and restoring the land
- reducing flood risk
- limiting and adapting to climate change.

Our set of indicators will be used to show progress with achieving our vision and any revisions to it. We have suggested which indicators are relevant to each theme in Table 2, although this depends on interpretation to a large extent.

The indicators that are specific to measuring success against each theme of our Environmental Vision are given in Appendix III.

4 THE INDICATOR SET

A set of almost 70 environmental indicators is proposed which cover both the Agency's role and the wider environmental context. These are presented in Table 2. The indicators in bold are those to which the Agency makes its greatest contribution in terms of regulation as well as monitoring. Indicators are based on data for England and Wales unless stated otherwise.

The indicators have an identifier (Agency ID) corresponding to the 'viewpoints' and the 'stresses and strains' (Section 3.6). They are also related to the nine themes in our Environmental Vision. Table 2 also makes a direct link between the Agency's indicators and those of DETR and MAFF. The DETR/MAFF ID column refers to the identifiers used by the respective organisations to number their indicators. This numbering will enable the reader to read across between the different reports.

5 FUTURE DEVELOPMENT OF THE INDICATORS

The presented set of indicators needs to be developed further in two ways:

1) Indicators that currently have data gaps or the data are not very reliable but where it is known that data will be available shortly, or where only a small amount of development is needed, are included in the set in the interim. These are:

- Estuary water quality (V3.6). The scheme used for collecting this data needs revision to be made more sensitive and robust.
- Long-term groundwater quality trends (V5.5). A groundwater-monitoring network is proposed which should improve these data.
- Major flooding incidents (S1.3). Definitions of what constitutes a major flood require greater clarity.

2) Indicators for environmental issues not represented, that require new monitoring, or could be produced through research and development are listed in Appendix I. Indicators that are currently in development by other organisations, such as DETR or the Countryside Agency, are also included in Appendix I where these will be useful to the Agency. Development of indicators for some of the subjects is currently underway. Examples are those being developed as part of the work on the Agency's chemical strategy.

6 THE INDICATORS IN DETAIL

The following pages detail each of the proposed indicators organised according to our Viewpoints and Stresses and Strains frameworks. Data are presented for the indicator with explanatory text, targets, and notes about apparent trends over time. Where possible, observations are made on actions being taken on the issue. Data sources are acknowledged and limitations of the data are noted. Some information on the possible scales of use of each of the indicators is also given.

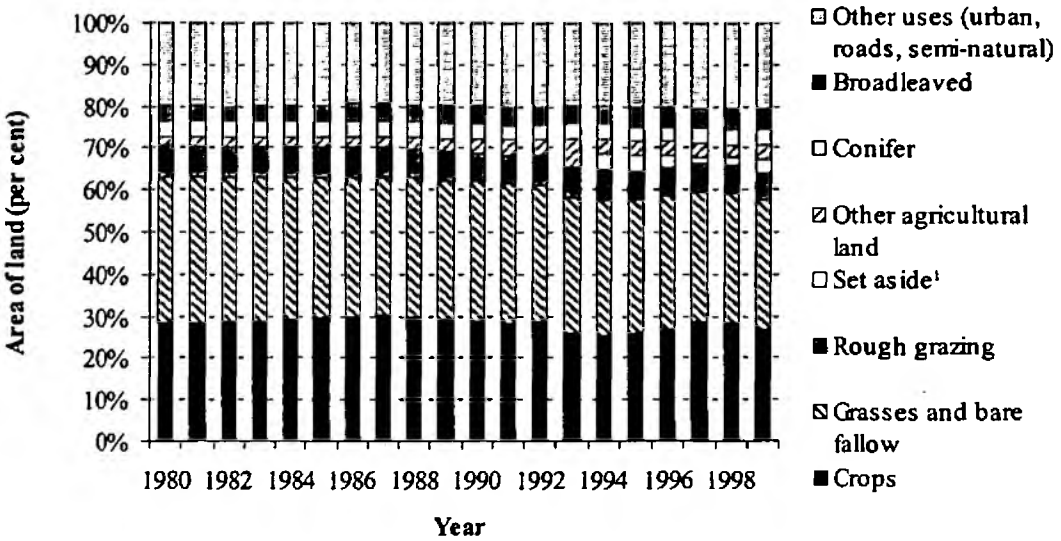
Table 2. Environmental indicators for Agency use[1]

	Agency ID	DETR ID	MAFF ID	Indicator	Quality of life	Enhancing wildlife	Greening business	Natural resources	Ensuring air is clean	Inland & coastal water	Protecting the land	Reducing flood risk	Climate change
VIEWPOINTS													
Land use and environmental resources	V1.1			Land use in the UK		●					●		
	V1.2		28	Agricultural land use				●			●		
	V1.3	S10		Area of woodland		●		●			●		
	V1.4	K1		Area of derelict land in England							●		
	V1.5	N4		Electricity from renewable sources in the UK			●	●	●				●
	V1.6			**River habitats classification**		●				●		●	
Key biological populations and communities, and biodiversity	V2.1			Occurrence of otters		●				●			
	V2.2	H13	35	Populations of wild birds in the UK		●					●		
	V2.3			**Salmon catches**		●				●			
	V2.4			**Coarse fish catches**		●				●			
	V2.5	S3		Trends in plant diversity in Great Britain		●					●		
	V2.6	S6		Extent and management of SSSIs in the UK		●				●	●		
Quality: compliance with standards and targets	V3.1	H10		Days when air pollution is moderate or higher in the UK	●		●		●				
	V3.2	P1		Concentrations of selected air pollutants			●		●				
	V3.3	**H12**		**Rivers of good or fair quality**		●	●	●		●			
	V3.4	**R2**		**Compliance with the Bathing Waters Directive**	●		●			●			
	V3.5	**M2**		**Dangerous substances in water**		●	●			●			
	V3.6	**R1**		**Estuary water quality**		●	●	●		●			
	V3.7			**Compliance with River Ecosystem Objectives**		●	●	●		●			
The health of the environment	V4.1	P4		Acidification in the UK		●	●		●	●	●		
	V4.2	**Q1**		**Nutrients in rivers**		●				●	●		
	V4.3		13	**Pesticides in rivers**		●				●	●		
	V4.4		27	Heavy metals in agricultural topsoils		●					●		
	V4.5	S2	26	Organic matter in agricultural topsoils				●			●		
	V4.6	P5		Ozone depletion in the UK	●	●	●		●				
Change at long-term reference sites	**V5.1**			**Difference in groundwater levels from the long-term average at eight selected sites**				●		●			●
	V5.2			**Monthly mean river flows of eight selected rivers**				●		●			●
	V5.3	N2		Sea level change		●						●	●
	V5.4			**Thames Barrier closures against tidal surges**								●	●
	V5.5			**Long-term groundwater quality trends**						●			
Aesthetic quality	V6.1	S5	32	Landscape features	●	●					●		
	V6.2			Beach litter in the UK	●	●				●			
	V6.3	K6		Quality of surroundings in England	●								
STRESSES AND STRAINS													
Natural forces	S1.1	N1		Annual average surface temperature in central England	●	●							●
	S1.2			Summer and winter rainfall				●				●	●
	S1.3			**Major flooding incidents (in development)**	●						●	●	●
Societal influences	S2.1	K3		Population density				●			●		
	S2.2	K4		Household density				●			●		
	S2.3			Final energy consumption in the UK			●	●	●				●

	Agency ID	DETR ID	MAFF ID	Indicator	Quality of life	Enhancing wildlife	Greening business	Natural resources	Ensuring air is clean	Inland & coastal water	Protecting the land	Reducing flood risk	Climate change
	S2.4	**Q2**		**Water demand and availability**			●	●		●			●
	S2.5	H11		Road traffic by type of vehicle in Great Britain	●			●	●				●
	S2.6	D20		Freight transport by mode in Great Britain	●		●	●	●				●
	S2.7	G1		Passenger travel by mode in Great Britain				●	●				●
	S2.8	S1	29	Net loss of soils to development in England	●	●		●			●		
	S2.9			Livestock on agricultural holdings				●	●	●	●		
	S2.10			**Craft on inland navigable waterways**	●					●			
	S2.11			Leisure day visits in the UK	●								
Removals and abstractions	**S3.1**	**Q5**		**Abstraction from fresh water**		●	●	●		●			
	S3.2	Q4		Water leakage			●	●					
	S3.3	D7		Household water use				●		●			
Discharges and releases	S4.1			Consumption of inorganic fertilisers in the UK		●				●	●		
	S4.2		15/16	Usage of pesticides in agriculture and horticulture		●				●	●		
	S4.3			**Pollutants from sewage treatment works**		●	●			●			
	S4.4	**R1**		**Loads of major contaminants to coastal waters**		●	●			●			
	S4.5	P3		Aerial emissions of nitrogen oxides (NOx) in the UK by sector		●	●		●				
	S4.6			Aerial emissions of volatile organic compounds (VOCs) in the UK by sector			●		●				
	S4.7	P3		Aerial emissions of sulphur dioxide (SO_2) in the UK by sector		●	●		●				
	S4.8			Aerial emissions of PM_{10} in the UK by sector			●		●				
	S4.9	H9		Emissions of greenhouse gases in the UK			●		●				●
	S4.10	N3		Carbon dioxide emissions by end user in the UK			●						●
	S4.11			**Emissions to air from Agency-regulated industrial processes**			●		●				●
	S4.12	**M4**		**Discharges from the nuclear industry in the UK**			●		●	●			
Waste arisings and disposals	**S5.1**	**H15**		**Waste arisings and management in the UK**			●	●			●		
	S5.2	**M3**		**Radioactive waste stocks in the UK**			●	●					
	S5.3	A5		Household waste and recycling				●					
	S5.4	**A7**		**Special waste arisings**			●	●			●		
	S5.5	D10		Construction and demolition waste going to landfill in the UK			●	●			●		
Illegal practices	**S6.1**			**Water pollution incidents**		●	●			●			

[1]The indicators have an identifier (Agency ID) corresponding to the 'viewpoints' and the 'stresses and strains' (Section 3.6). They are also related to the nine themes in our Environmental Vision (nine columns on right-hand side). The DETR/MAFF ID column refers to the identifiers used by the respective organisations to number their indicators. This numbering will enable the reader to read across between the different reports. Indicators in bold type are Agency data.

V1.1 Land use in England and Wales



Land use has varied substantially over the centuries as more and more land has been converted from woodland to agriculture for food production, and more recently, to provide homes for the increasing number of people and households. This indicator is included for context; there are no targets for the distribution of land use.

More than 70 per cent of the land is used for agriculture in England and Wales **(V1.2)**. During the 1970s large areas of land were drained to upgrade rough grazing land, intensify production from managed pastures or to introduce arable crops. Losses of agricultural land have tended to be balanced by land reclamation, for example, land restored to agriculture from landfill or mineral extraction. The total area of agricultural land is not expected to change significantly. The area used for crops has declined partly as a result of the introduction of the EC Set-Aside scheme.

The area of woodland has increased over the 20th century to around 8.5 per cent of total land area **(V1.3)**. The area continues to increase but England and Wales remain two of the least wooded countries in Europe.

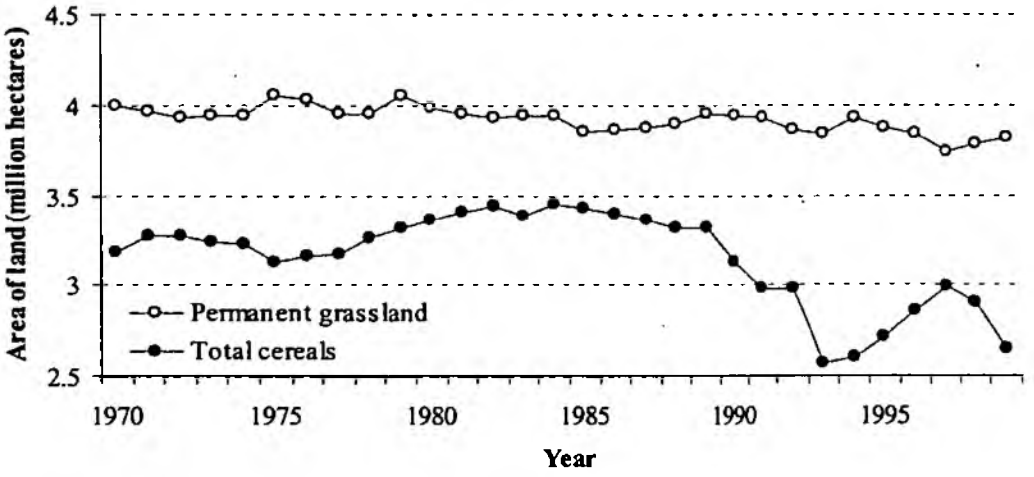
There is no direct source of information on the amount of urban land in England and Wales. The figures here are derived by subtracting the area of land used for agriculture and forestry from the total land area. It is not possible to separate the area for urban and semi-natural land use. Research has been commissioned by DETR to develop cost-effective methods to estimate the area of all land use.

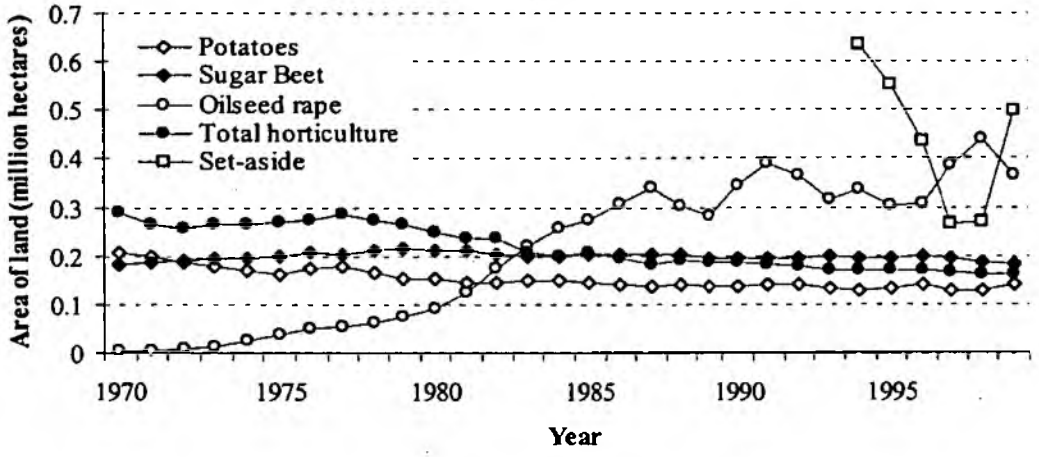
A land cover survey in 1990 suggested that the amount of land in urban uses (about 10 per cent) has grown rapidly in the past 50 years and is expected to continue to grow as more homes are built. Semi-natural vegetation covered about 13 per cent land in this survey, some of which is included in the agricultural returns shown above.

Data source: Forestry Commission, MAFF
Update period: Annual
Data notes: ¹Set-aside land for 1990 to 1993 is included in other agricultural land

Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

V1.2 Agricultural land use



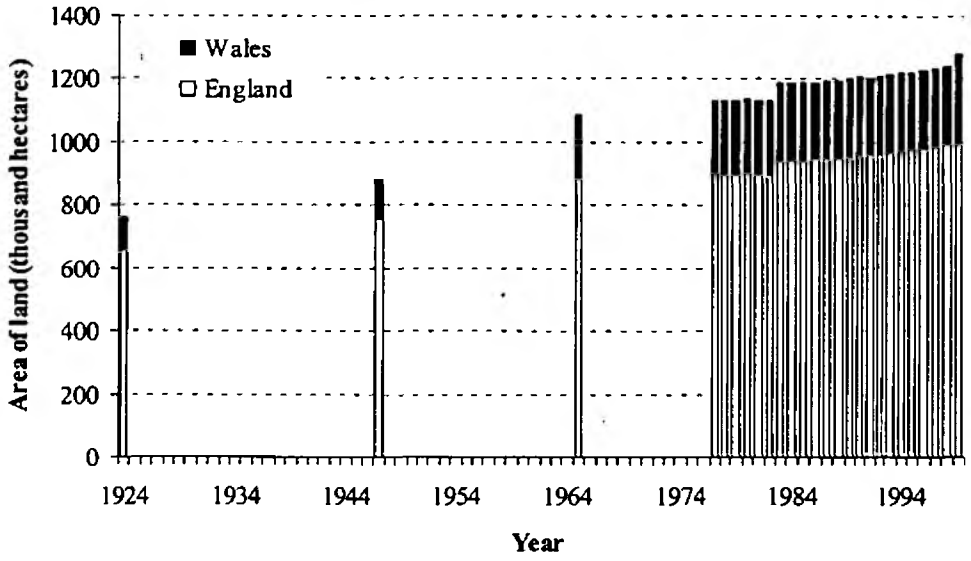


More than 70 per cent of the land is used for agriculture in England and Wales. Different types of farming systems can have different impacts on the environment. The drive for higher agricultural output during and after the Second World War has given way to the view that increasingly farmers must be seen as guardians of the countryside as well as food producers. Cropping patterns tend to change only over long periods but are affected by market prices for commodities and subsidies that may be available. Farming can be a major user of inputs in the form of artificial fertilisers and pesticides (**S4.1** and **S4.2**) which in turn can contribute to impact on the environment (**V4.2** and **V4.3**). Farms provide a high proportion of wildlife habitats and landscape features (**V6.1**). Intensive cereal production limits habitats for wildlife and reduces biodiversity in the countryside. Reduced habitats and insect abundance, in addition to the widespread use of broad spectrum insecticides, has led to a marked decrease in the abundance of farmland birds (**V2.2**). This indicator is presented mainly as a background indicator for context.

Data source: MAFF
Update period: Annual (June Census)
Data notes: Data at local level may be disclosive of census respondents and are therefore confidential. Permanent grassland is greater than five years old and excludes rough grazing. Sugar beet excludes stockfeed. Set-aside data are included from 1994 when it was included as a unique item in the census. Data are usually based on a MAFF Region but other areas may be possible.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.	*	Other	MAFF

V1.3 Area of woodland



Forests and woodlands enhance our landscape and are habitats for wildlife. They are places for leisure and recreation and are an economic resource for timber production, tourism, and local development and regeneration. England and Wales are two of the least wooded countries in Europe.

Over the centuries there has been a significant loss of forest cover in England and Wales, which fell to its lowest level of five per cent of land area at the start of the 20th century. The area of woodland increased to 8.5 per cent by 1998. Most afforestation has occurred in upland areas where agricultural production is restricted. The split between conifers and broadleaf woodland is roughly equal. Only about 15 per cent of the UK consumption of timber and wood products is met from our own resources.

During the 1990s, 15-20 thousand hectares of new woodland were created each year in the UK. Private owners assisted by the Woodland Grant Scheme and other Government grants have planted most of this new woodland. The majority of new woodland creation is now broad-leaved woodland or native Caledonian pine.

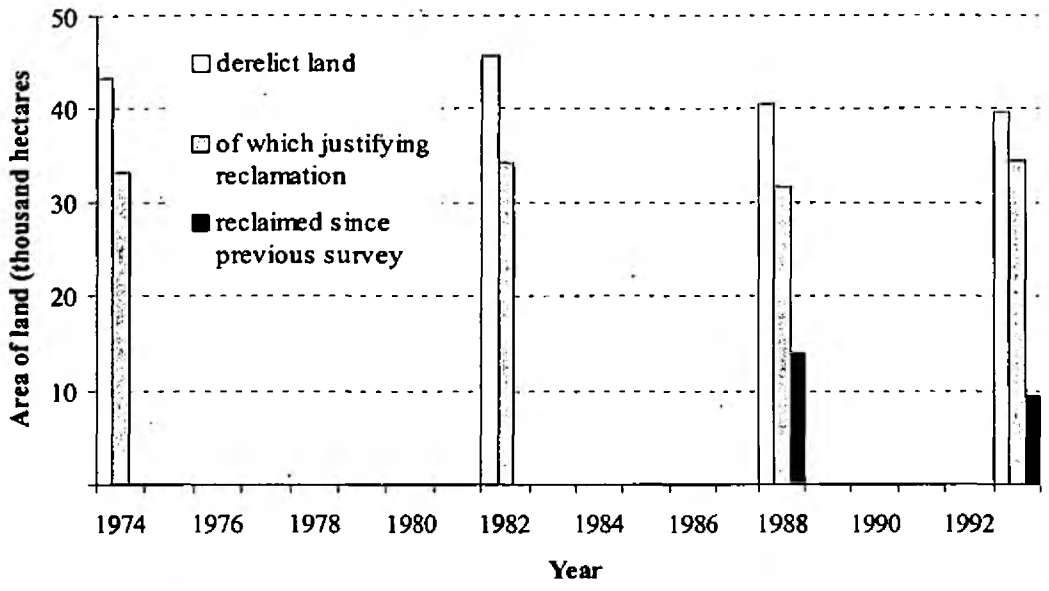
Ancient semi-natural woodland covers about 1.4 per cent of the total land area in Great Britain. They tend to be richer in plants and animals than other woodland areas and many were lost in the 1930s; depletion has now largely ended.

This indicator is modified from DETR (S10 and S11)

Data source: Forestry Commission
Update period: Unknown
Data notes:

Scales of possible use	UK	*	E&W	*	Agency Region		Local Govt.		Other	

V1.4 Area of derelict land in England



Derelict land is defined as land so damaged by industrial or other development as to be incapable of beneficial use without treatment. It is often associated with redundant coal mining areas and railways. With the ever-increasing need for land for housing, commercial developments, food production and biodiversity, derelict land represents a wasted resource. Dereliction and vacant properties may be symptoms of wider problems, but can themselves promote a spiral of degradation. Reclamation and regeneration of derelict land can help to revitalise local environments.

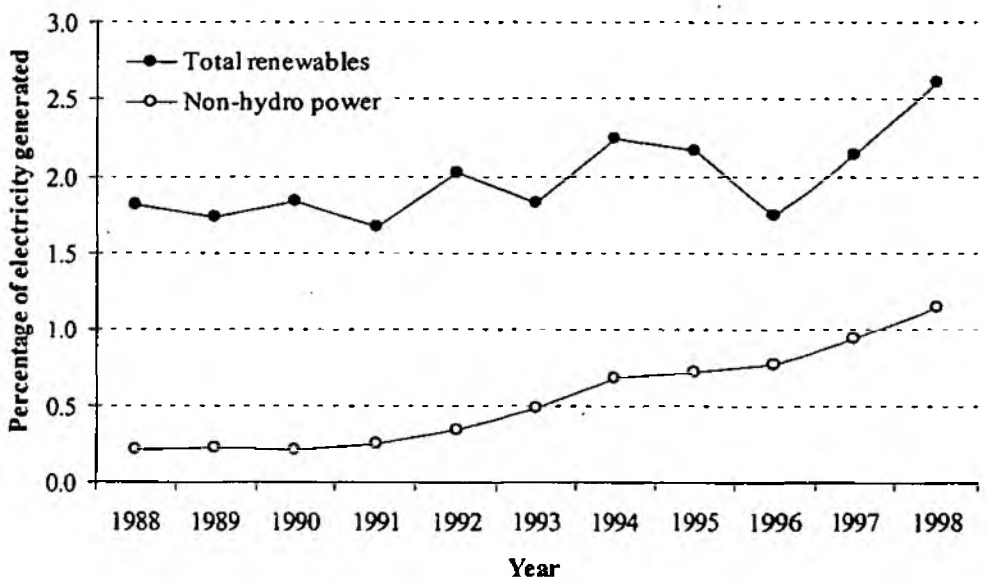
In 1974 there were 43,000 hectares of derelict land in England. By 1982 this had increased to 46,000 hectares but subsequently, with reclamation, it declined to around 40,000 hectares in 1988 and 1993. The National Land Use Database - a new survey, which is not quite comparable with the earlier ones because some types of sites have been excluded - has now provided an estimate of 17,300 hectares of derelict land in England in 1998 which would need some form of remedial work before redevelopment. There were about 40,000 hectares of derelict land in England in 1993, of which nearly 35,000 hectares justified reclamation. Between 1988 and 1993, nearly 10,000 hectares were reclaimed.

The stock of land and buildings available for recycling is continually being added to, as well as being developed. Of the derelict land reclaimed between 1988 and 1993, the most common use was for sport and recreation (37 per cent); the next most significant uses were for industry and commerce, and agriculture and forestry.

This indicator is taken from the DETR (K1).

Data source: DETR **Update period:** Unknown **Data notes:**									
Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	England

V1.5 Electricity from renewable sources in the UK



Emissions of carbon dioxide (**S4.9** and **S4.10**) mainly arise from fossil fuel consumption. Increasing the use of renewable sources to generate electricity will decrease the emissions of carbon dioxide to the atmosphere. The main non-hydro sources of power are currently municipal solid waste combustion, landfill gas and onshore wind.

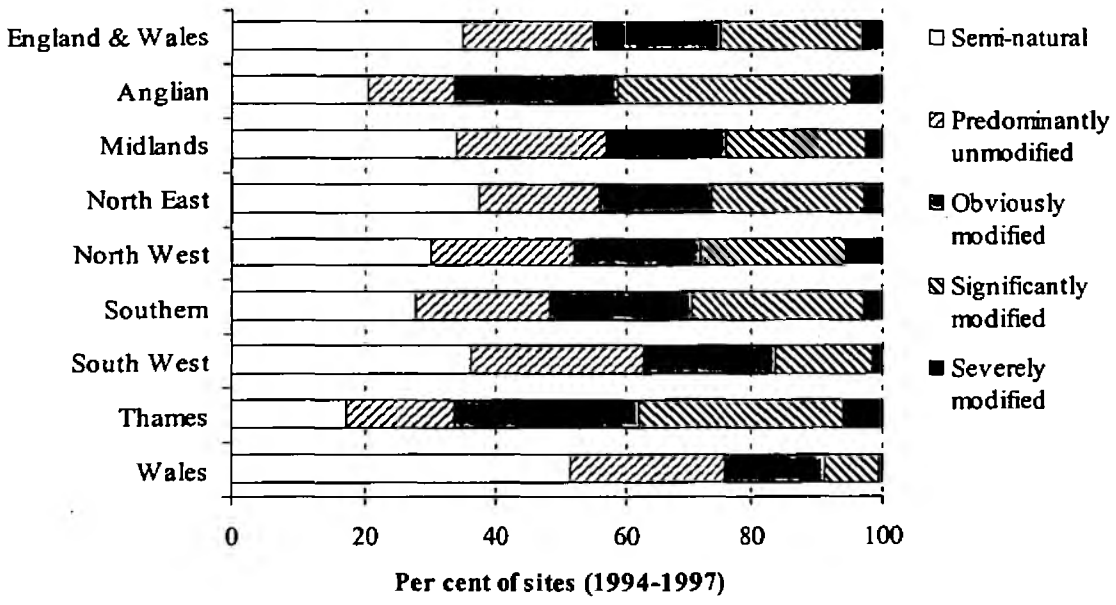
In 1998, 2.5 per cent of the electricity available in the UK was generated from renewable sources, of which 54 per cent was from large-scale hydropower. Electricity generated from non-hydro renewables increased five-fold between 1988 and 1998. Electricity generated from renewable sources has increased since 1988. The fall in 1996 was due to the period of drier than average weather, which resulted in less power from hydro sources. The Government has a target of working towards 10 per cent of all UK electricity being provided from renewable sources as soon as possible, hopefully by 2010. Measures are also in place to ensure that five per cent of all UK electricity will be supplied by renewable sources by 2003.

Renewable sources 1998	**%**
Onshore wind	9
Small scale hydropower	2
Large scale hydropower	54
Landfill gas	13
Sewage sludge digestion	4
Municipal solid waste combustion	14
Other	3

This indicator is taken from the DETR (N4).

Data source: DTI **Update period:** Annual **Data notes:**										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

V1.6 River habitats classification

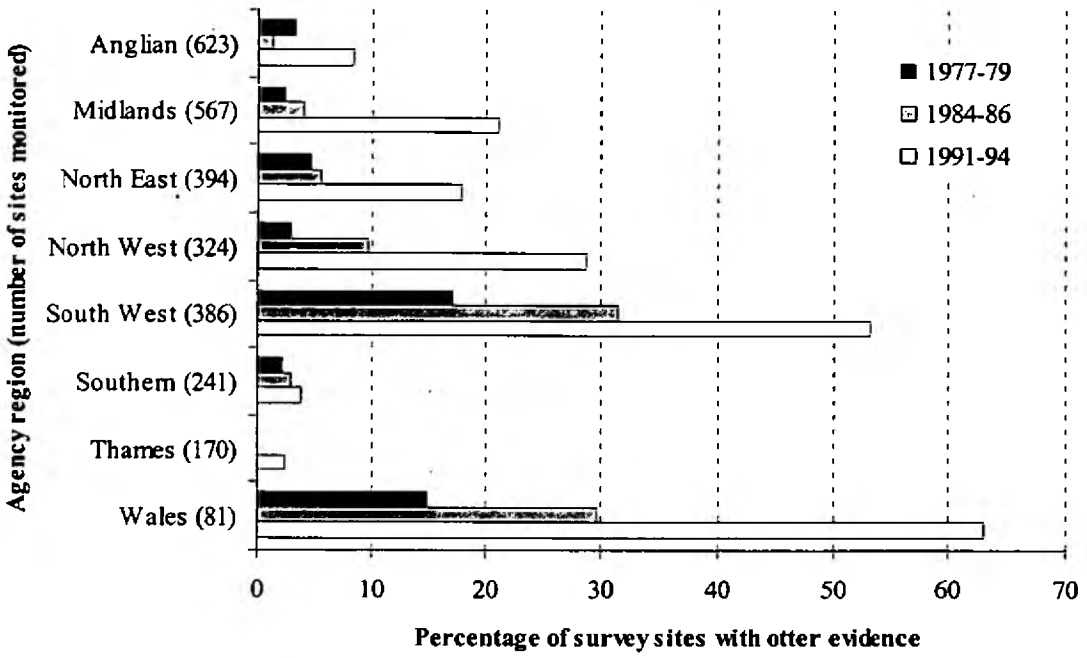


The first national survey of river habitats was carried out over the period 1994 to 1997. This incorporated an assessment of the extent to which habitats have been modified by activities such as flood defence works and navigation channels. Sites were classified into one of five categories ranging from semi-natural to significantly and severely modified habitats. The survey showed how 45 per cent of sites were obviously significantly or severely modified and 35 per cent were semi-natural. The Thames Valley, Wash, Humber, Cheshire Plains and Somerset Levels have the greatest number of modified sites and the most semi-natural habitats (about 50 per cent) are found in Wales.

The survey may be repeated occasionally, perhaps after 10 years, although there is no firm commitment. This will be needed if this indicator is to measure change. There are no national targets to change the extent of modification although there are local habitat restoration schemes.

Data source: Environment Agency **Update period:** Unknown **Data notes:**										
Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

V2.1 Occurrence of otters



The otter *Lutra lutra* is largely a secretive and nocturnal animal and is rarely seen. The presence of otters can be determined by searching for the animal's spraints (faeces) and footprints or other signs. A baseline survey carried out between 1977 and 1979 discovered that of 2,940 sites examined, evidence of otters was found at only 170 (5.8 per cent). This survey provided evidence of a widespread decline in numbers that started in the late 1950s and continued through the 1960s and 1970s. The results of the baseline survey showed that otters were sparsely distributed, or absent over lowland and central England, but still present at many sites in the south west and the Welsh Borders. In northern England, East Anglia and the south coast the population appeared to be small and fragmented. Using standardised techniques, concurrent surveys showed marked overall increases in otter abundance.

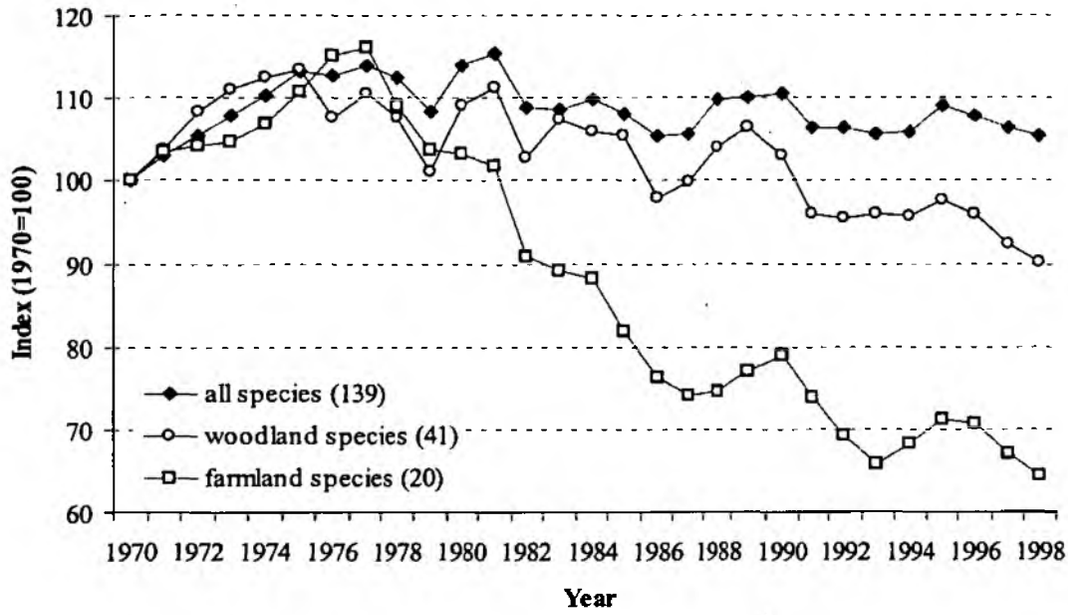
The sharp decline in otter population in the 1970s has been strongly linked to the mainly historic use of persistent organochlorine insecticides and persecution by various groups. The more recent increase in otter populations is attributed to the legal protection of the species, the banning of most organochlorine pesticides and initiatives such as the releasing of captive-bred otters and improvement of habitats.

The comprehensive survey data on otters is collected by the Vincent Wildlife Trust which is supported by charitable funding. It is envisaged that the periodic national surveys will continue.

Data source: The Vincent Wildlife Trust
Update period: Unknown
Data notes: Indicator based on 2,940 survey sites sampled in all three years. The survey included 'non-visited assumed negative' sites in major conurbations.

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

V2.2 Populations of wild birds in the UK



We value wildlife for its own sake and because it is an integral part of our surroundings and our quality of life. Birds are regarded as good indicators of the broad state of wildlife and the countryside because they are wide-ranging in habitat distribution and tend to be at or near the top of the food chain. There are many factors affecting populations of birds and other wildlife species. These include short-term influences such as the weather and a range of longer-term influences such as changes in farming practices, loss of habitats, urban development, road building, climate change, changes to food supplies and pollution.

Farmland and woodland birds have generally been declining since the mid-1970s. Populations of some farmland birds such as the skylark and corn bunting, and of woodland birds such as the song thrush and bullfinch, have fallen by more than half. Although populations of the more common farmland and woodland birds have been declining, populations of other birds, such as open water birds, breeding birds and many rare birds, have been stable or rising.

The target is to reverse the long-term decline in populations of farmland and woodland birds. Specifically there are goals to halt or reverse declines in 26 priority species identified in the UK Biodiversity Action Plan by 2008; 11 of the priority species are farmland or woodland birds included in this indicator, including the skylark, corn bunting, song thrush and bullfinch.

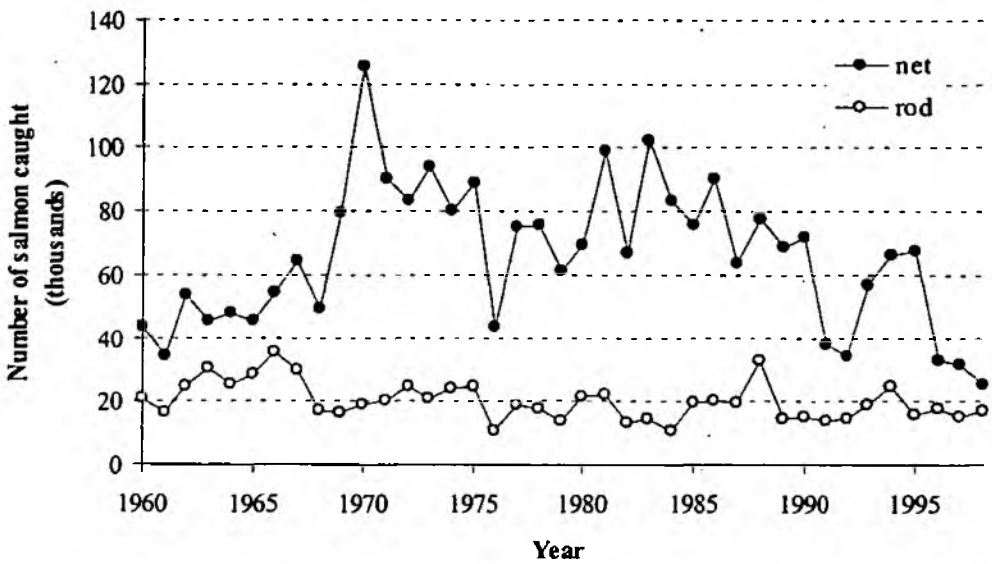
This indicator is taken from the DETR (H13).

Data source: RSPB, BTO and DETR
Update period: Annual
Data notes: This index is based on data for 139 species of more common breeding birds, which are native to the UK. Rarer species have been excluded. This indicator is also used by MAFF (35).

Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

V2.3 Salmon catches

V2.3(a) Rod and net catch of salmon



The Environment Agency manages coastal and freshwater salmon and sea trout fisheries. Direct stock assessments of adult fish returning from their migration are based on a combination of measures including traps, counters and rod and net catches. Catch data are the most extensive and long-term measure, but are subject to errors from variable reporting rates and fishing effort. Net fisheries have been subject to Net Limitation orders and buyouts resulting in a decline in effort. Although there are no restrictions on the number of rod licences sold, angling effort has also seen a general decline due to poor perceived stock size and the imposition of bylaws.

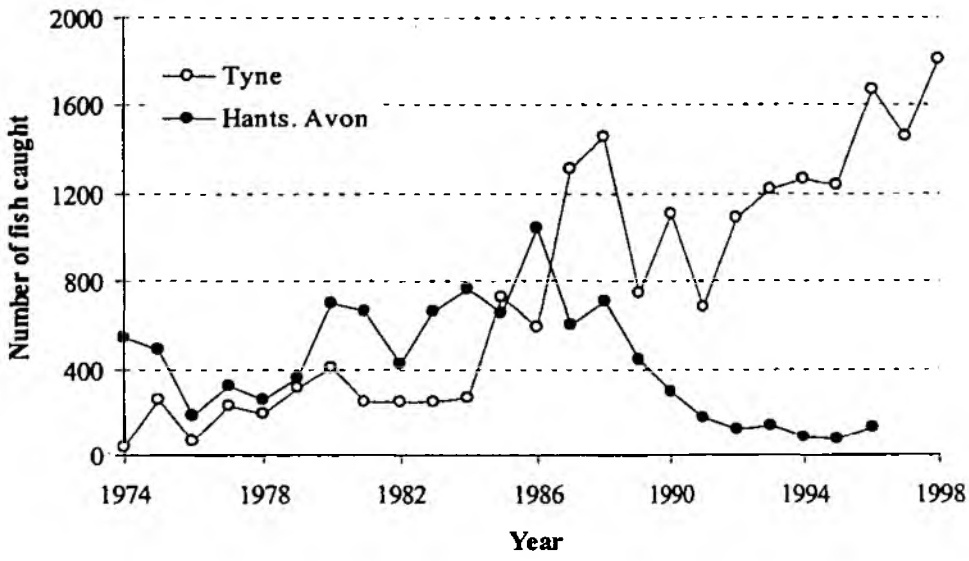
Since the late 1960s there has been a general decline in abundance of salmon in many rivers, which could be linked to conditions at sea, changing conditions in fresh waters, and changes in exploitation. Trends in catches indicate the combined effects of these pressures.

While most rivers have shown a general decline in recent years, some are steadily recovering their salmon and sea trout stocks. These 'recovering rivers', located principally in South Wales and the North East of England have seen catches increasing markedly since water quality improved enough to allow fish migration through the previously polluted estuaries. The River Tyne, for example, was devoid of salmon in living memory, but is now one of the most productive salmon rivers in England. This recovery has been brought about by improvements in water quality combined with a re-stocking programme to help salmon re-establish themselves. Recovery of salmon stocks is river specific and two contrasting examples are shown in **V2.3(b)**.

There have also been changes in the abundance of different stock components. There has been a marked decline in the abundance of the large multi-sea winter fish (those spending two or more winters at sea) which enter rivers before June. While a wide range of factors are undoubtedly contributing to the decline in stocks, the fact that Atlantic salmon stocks in all countries bordering the North Atlantic are in decline suggests that there is a large scale climatic effect impacting all stocks. It is thought that the climate at sea is of particular importance in this decline, and studies reinforce this, suggesting that survival at sea has

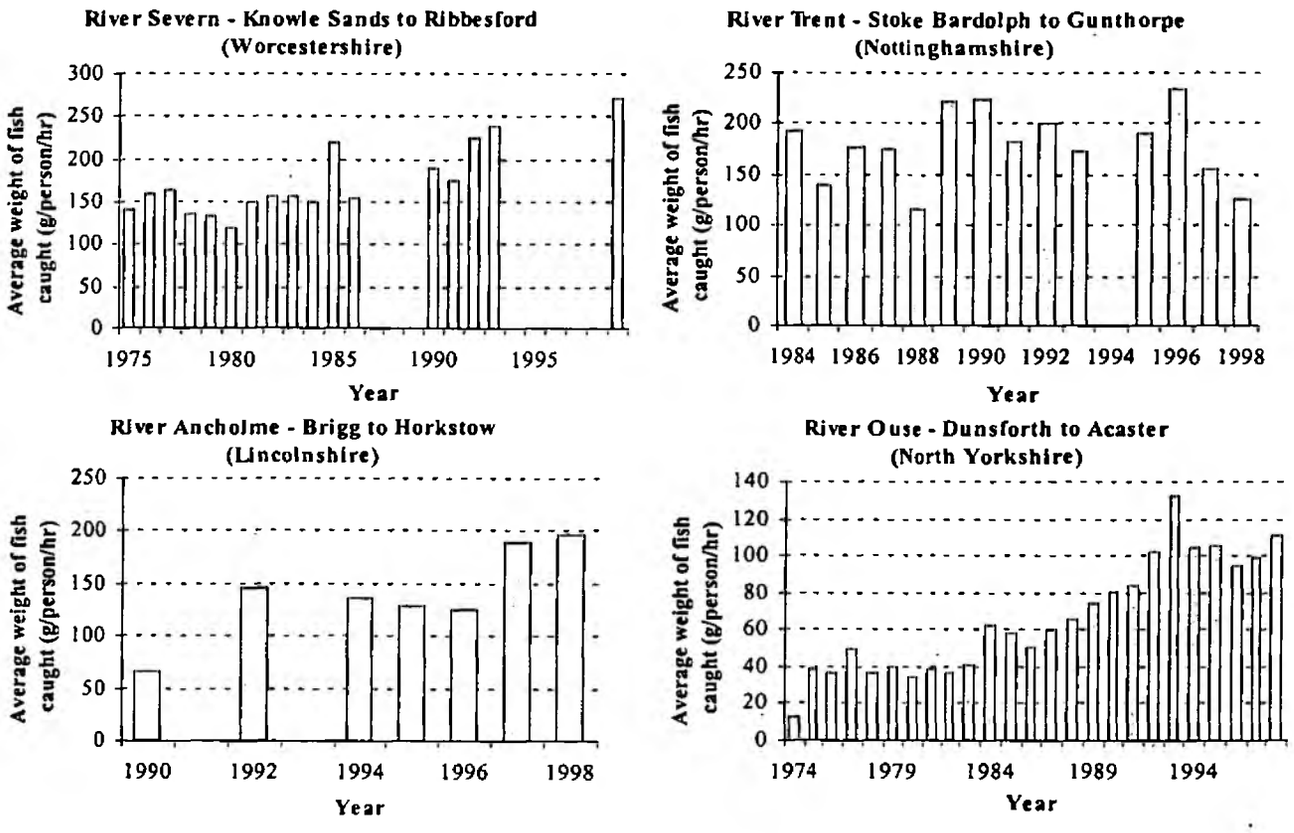
declined. Any effects of the marine environment will have a greater impact on multi-sea winter fish that, by definition, spend a much greater length of time at sea.

V2.3(b) Salmon rod catch on the rivers Tyne and Hampshire Avon



Data source: Environment Agency **Update period:** Annual **Data notes:** Fish catches can be highly river specific and this should be taken into account when considering national trends.										
Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

V2.4 Coarse fish catches



Angler catch data has been used for many years to describe the status and performance, or angling quality, of fisheries. Although in general terms coarse fish communities are ecologically more complex than their salmon and sea trout equivalents, (**V2.3**) (mainly because more species are involved) the principles of angler catch monitoring can be applied equally well to monitor coarse fisheries. In some of the larger rivers in England and Wales, match catch results have been used very successfully to monitor the stock, and more importantly, fishery performance. Angler catch data from several key English rivers are used as the indicator. The figures presented are averages from the reaches represented.

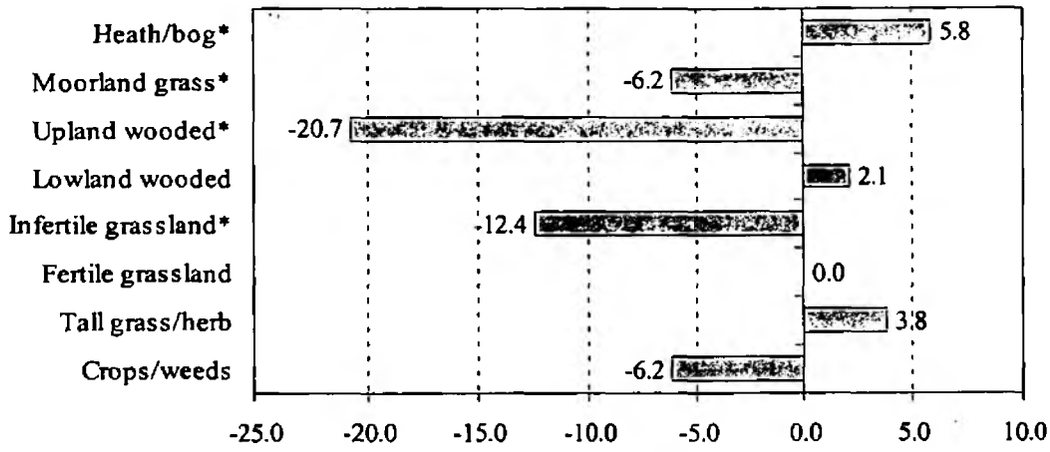
The average weight of fish caught per hour by match anglers during each of the fishing seasons is shown. The indicator can be affected by short-term fluctuations in the catchability of fish, (due to factors such as weather or fish movements) rather than absolute changes to the size of the fish stocks. This is known because monitoring using other techniques, such as electric-fishing, has revealed that fish populations quite often remain stable during short periods when anglers catches are undergoing large fluctuations.

Catches on most rivers have been going through a long phase of improvement but this may be in part due to an increase in skill amongst anglers rather than an increased abundance of fish. The Agency is currently introducing a Fisheries Classification Scheme that will provide information based on surveys across the whole of the country. This will be used to develop a better indicator over the next few years.

Data source: Environment Agency
Update period: Annual
Data notes:

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	local

V2.5 Trends in plant diversity in Great Britain



Percentage change (1978-1990) in mean species numbers within major vegetation groups

The 1990 Countryside Survey examined the changes in the diversity in plant species in the British countryside as a whole since 1978. The vegetation is classified into eight major types based on their species composition. Although species number has sometimes been considered an over-simple measure of biodiversity, a number of experts have emphasised that it is a direct measure, and analysis of the Countryside Survey data has shown that it has real ecological meaning. Changes in plant diversity are associated with agricultural intensification, management of field boundaries and atmospheric pollution.

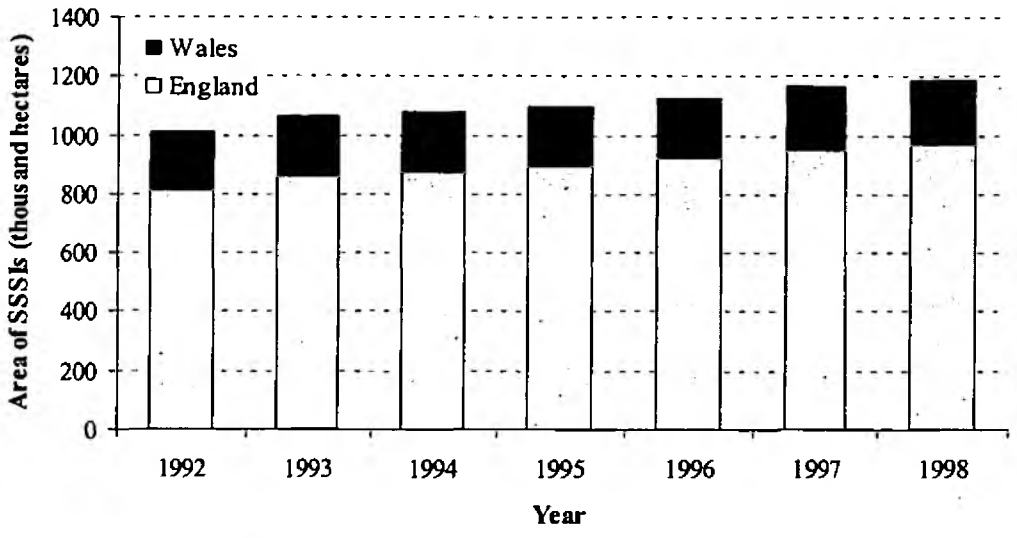
This indicator is based on an aggregation of different types of plots; main plots ($200m^2$) and linear plots (1x10m) along hedges, road verges and streamsides. There are some differences in the changes in mean species numbers in the different plot types, which this aggregation does not show. The results from the Countryside Survey 2000 should be available in late 2000. This indicator may then be refined to show changes in broad habitat types as defined in the UK Biodiversity Action Plan.

Decreases in the average number of species have occurred in fields, woods, moorland, hedges and streamsides, especially in lowland landscapes. The changes in the different types of plants suggest that the decline reflects an overall shift towards more intensively-managed and nutrient-rich vegetation. The increase in diversity in heath/bog vegetation was associated with an increase in grasses at the expense of typical heath and bog plants.

This indicator is taken from the DETR (S3). We have included it because of the need for an indicator on plants, but hope that this will develop further and provide data at regional level eventually.

Data source: Countryside Survey 1990 **Update period:** Unknown **Data notes:** *statistically significant changes P<0.1										
Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	GB

V2.6 Extent and management of Sites of Special Scientific Interest



The countryside in England and Wales has been massively changed in this century. Many natural areas have had their biodiversity diminished as a result of intensification of agriculture and afforestation; some other areas have been lost due to development. Sites of Special Scientific Interest (SSSIs) provide a means of protecting and managing the best remaining sites, most of which are in private ownership. SSSIs are selected according to the importance of their biological features (e.g. habitats or species) and/or their geological features (e.g. landform, mineralogy etc.). A site may contain more than one feature of interest. They represent the best examples of these features in England and Wales and are managed to conserve them. The areas of land designated as SSSIs have increased over the last decade.

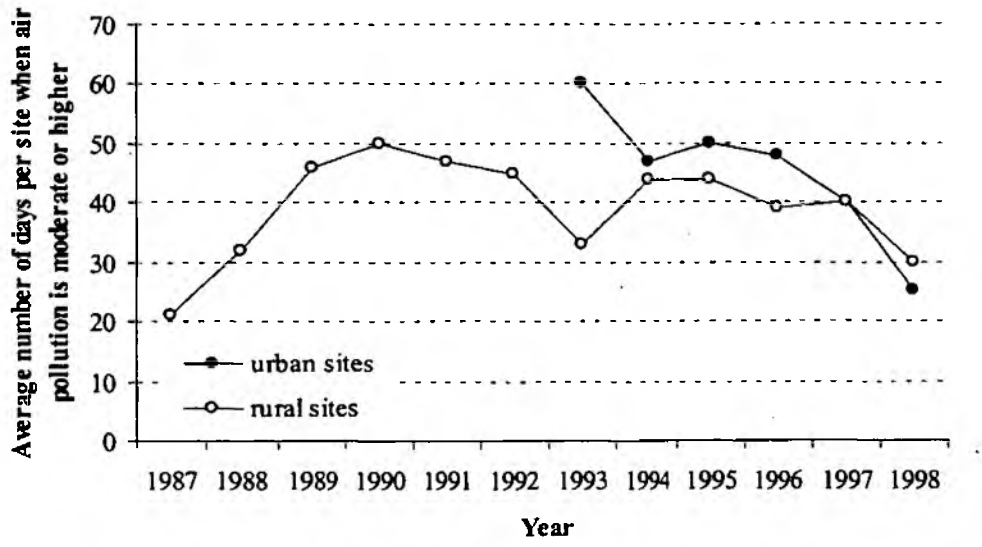
An assessment of the condition of each feature on each site has been made at about half of all features/sites in England. The preliminary results show that just over half of features/sites are in a 'favourable' condition and a further 15 per cent are 'unfavourable (recovering)'. No previous assessment of condition has been made so the trends are not known. An indicator based on these condition assessments is being developed and in future it will be the key indicator relating to SSSIs. This indicator is modified from DETR (S6).

Assessment of SSSIs in 1997/8 in England	**(percentage)**
Favourable condition	56
Unfavourable (recovering)	15
Unfavourable (no change)	16
Unfavourable (declining/destroyed)	13

Data source: English Nature, CCW
Update period: Annual
Data notes: Years refer to financial years (e.g. 1992=1991/92)

Scales of possible use	UK	*	E&W	*	Agency Region		Local Govt.		Other	

V3.1 Days when air pollution is moderate or higher in the UK



This indicator measures the average number of days per site on which pollution levels were above National Air Quality Standards. The Standards represent defined levels, which avoid significant risks to health. As levels increase above the Standard, the likelihood of effects on health increases. For example, levels of ozone in the 'high' band may cause coughing and discomfort on deep breathing during exercise in some people.

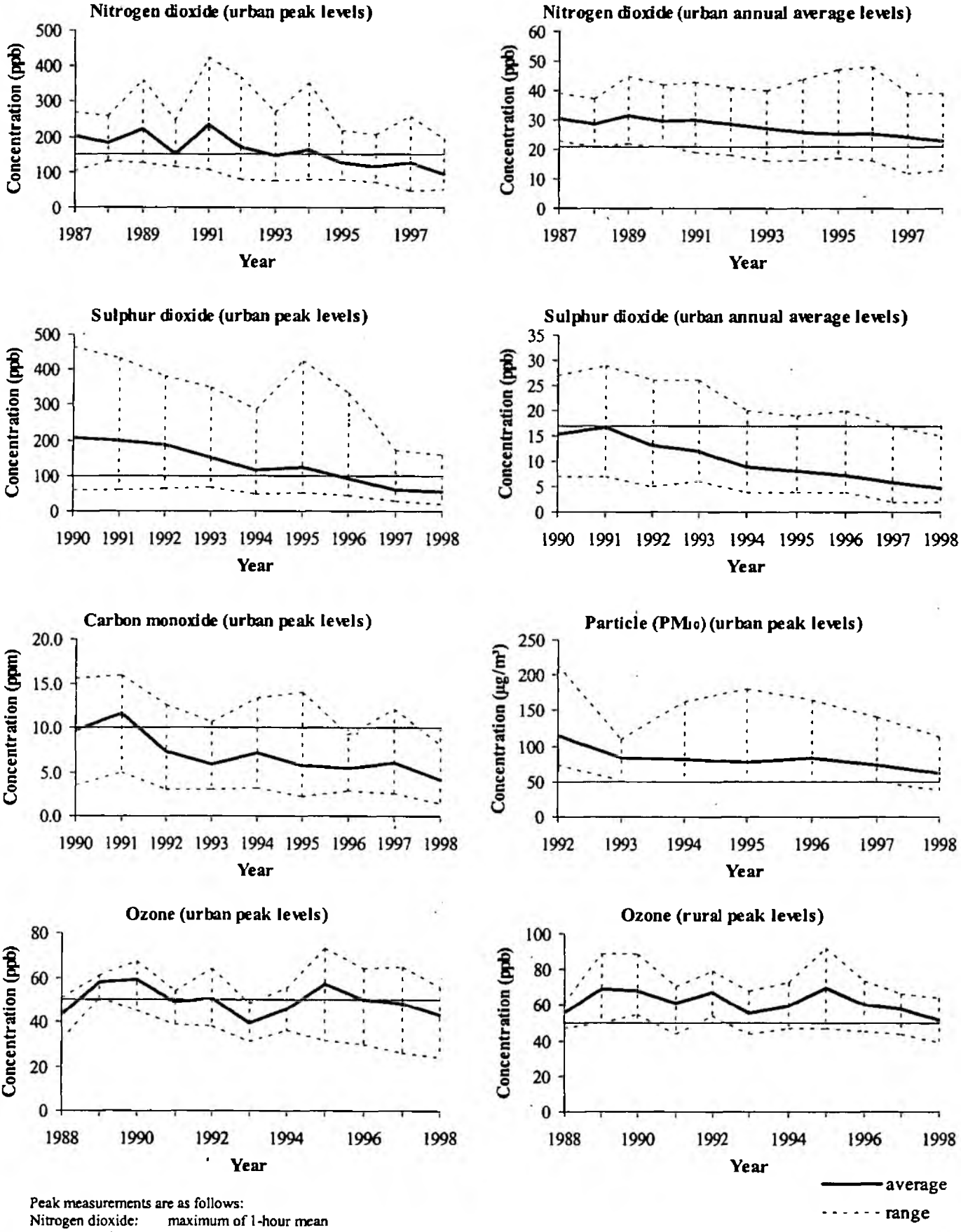
In urban areas, the average number of days per site when air pollution was recorded as moderate or higher fell from 60 days in 1993 to 25 days in 1998. In rural areas the average number of days per site has fluctuated between 20 and 50 days per year between 1987 and 1998. Between 1993 and 1998, days of pollution at urban sites caused by particles fell by about two-thirds and those caused by sulphur dioxide fell to low levels. By 1998, the main causes in urban areas were particles and ozone. In rural areas the main cause was ozone. Production of ozone is affected by the weather, which can also lead to ozone and the pollutants which cause it, being blown over from mainland Europe. Lower concentrations are generally recorded in urban areas where ozone undergoes chemical reactions with oxides of nitrogen to form nitrogen dioxide.

The UK National Air Quality Strategy sets out national air quality objectives to be achieved by 2005 for individual pollutants. When these are met there will still, however, be some days of moderate or higher air pollution.

This indicator is taken from DETR (H10).

Data source: NETCEN and DETR **Update period:** Annual **Data notes:**										
Scales of possible use	UK	•	E&W		Agency Region		Local Govt.		Other	

V3.2 Concentrations of selected air pollutants



Peak measurements are as follows:

Nitrogen dioxide:	maximum of 1-hour mean
Sulphur dioxide:	99.9th percentile of 15-minute means in year
Carbon monoxide:	maximum of running 8-hour means in year
Particulates (PM_{10}):	99th percentile of daily maximum running 24-hour means
Ozone:	97th percentile of daily maximum running 8-hour means

This indicator compares the concentration of air pollution, at both peak and average levels, with the National Standard Levels averaged over sites. They also show the range (minimum and maximum) values for all sites. Nationally, concentrations of nitrogen dioxide, sulphur dioxide, carbon monoxide and particles (PM_{10}) have declined during the past decade. Concentrations of ozone have fluctuated and show no trend. The national objective is for air quality to be below the standards by 2005.

In 1998, levels were below the National Standard at all sites included in the indicator for urban peak carbon monoxide and urban annual average sulphur dioxide (where the WHO guideline is used). The national average level was above the standard for urban annual average nitrogen dioxide, urban peak particles (PM_{10}) and rural peak ozone. In addition, levels of peak nitrogen dioxide, sulphur dioxide, and ozone at urban sites were above the standard at some sites. Concentrations of nitrogen oxides, carbon monoxide, and particles at urban sites are likely to fall in future reflecting falls in road transport emissions.

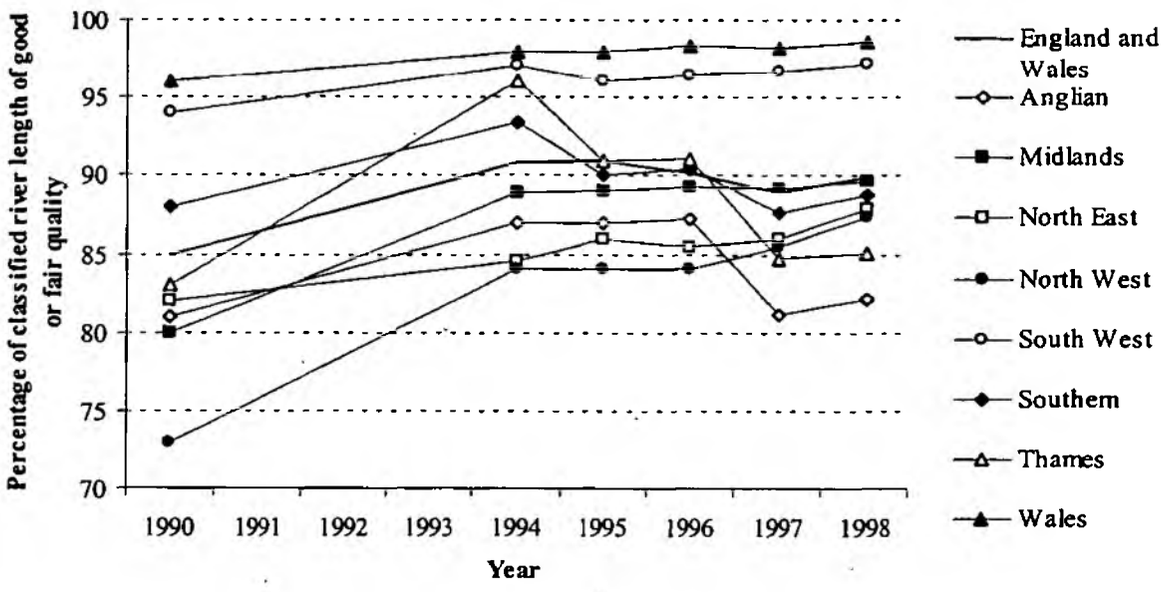
This indicator is taken from DETR (P1).

Data source: NETCEN
Update period: Annual
Data notes:

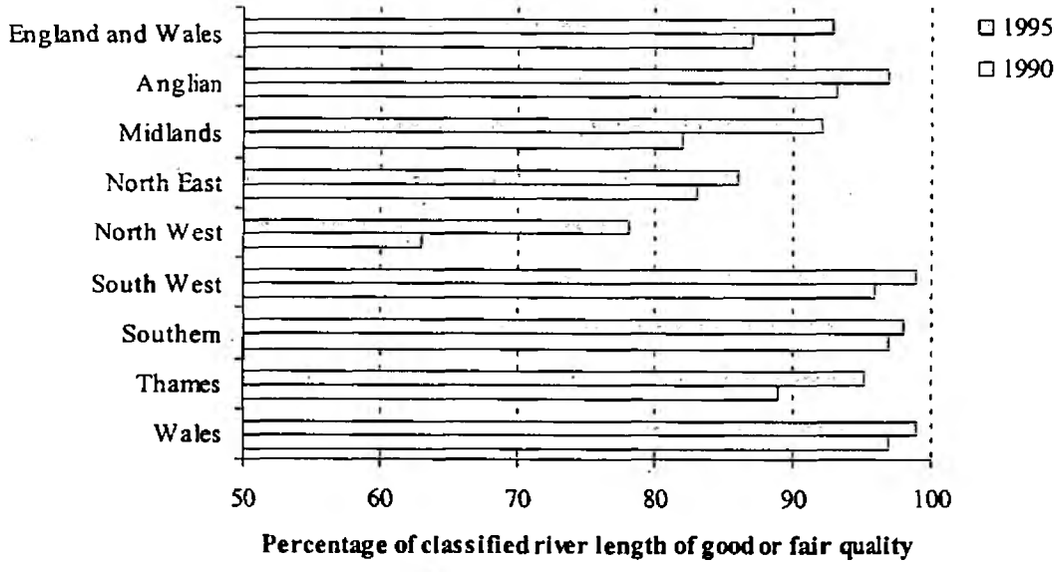
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.	*	Other	

V3.3 Rivers of good or fair quality

V3.3(a) Rivers of good or fair chemical quality



V3.3(b) Rivers of good or fair biological quality



The Agency uses a General Quality Assessment (GQA) scheme to classify river quality into six grades from Grade A (very good) to Grade F (bad). Results are based on a rolling three-years of sample results. These results are compared with the baseline 1990 value. The general quality chemical assessment of rivers is based on three determinands: dissolved oxygen, biochemical oxygen demand and ammonia. These are used because they are good, simple indicators of the extent to which rivers are affected by waste water discharges and runoff and drainage from farms. Assessments are made annually based on rolling data from three years and rivers are classified in six categories ranging from very good to bad.

Biological assessments are made every five years. They are based on the range of macroinvertebrates present in a river and compared with the number expected for the physical conditions. For clarity of the indicator the six categories have been combined into two groups.

In general, chemical and biological river quality improved during the 1990s. In England and Wales the percentage of river lengths which were of good chemical quality rose from 48 per cent in 1990 to 59 per cent in 1998. The slight decline in quality between 1995 and 1997 was mainly due to a prolonged period of low rainfall that caused lower river flows in some parts of England.

There are significant regional differences in this indicator. Wales and the South West have the greatest percentage of river lengths classified as good or fair. In contrast, over 20 per cent of river lengths in the North West are still poor or bad biologically.

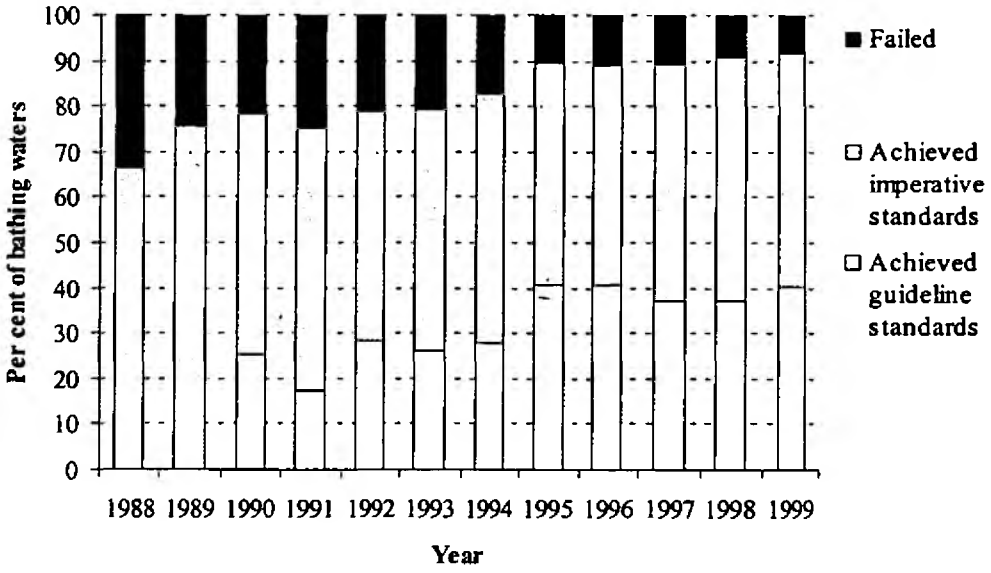
A similar indicator is also used by DETR (H12)

We hope to have more data in future, which will allow more frequent reporting on the biological GQA.

Data source: Environment Agency
Update period: Annual for chemical GQA, quinquennial for biological GQA.
Data notes:

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

V3.4 Compliance with the Bathing Waters Directive



Water quality is monitored every summer at designated bathing waters around the coast of England and Wales (over 400 beaches). There are a number of factors that effect bathing water quality and compliance with Directive standards, but the most important are the presence of sewage discharges and the level of treatment applied to those discharges. Most of the analyses carried out are for bacteria associated with these discharges. Before 1990, monitoring for Guideline standards was not carried out on a routine basis by Agency regions so compliance with these can only be presented for England and Wales from then.

There is a clear and continuing trend with time showing that, when inter-annual variability and chance variations are taken into account, compliance of bathing waters improved significantly across England and Wales from 1988 to 1999. The aim is to raise consistent compliance with mandatory coliform standards of the European Bathing Waters Directive to at least 97 per cent by 2005 and to achieve significant improvement in compliance with its guideline standards.

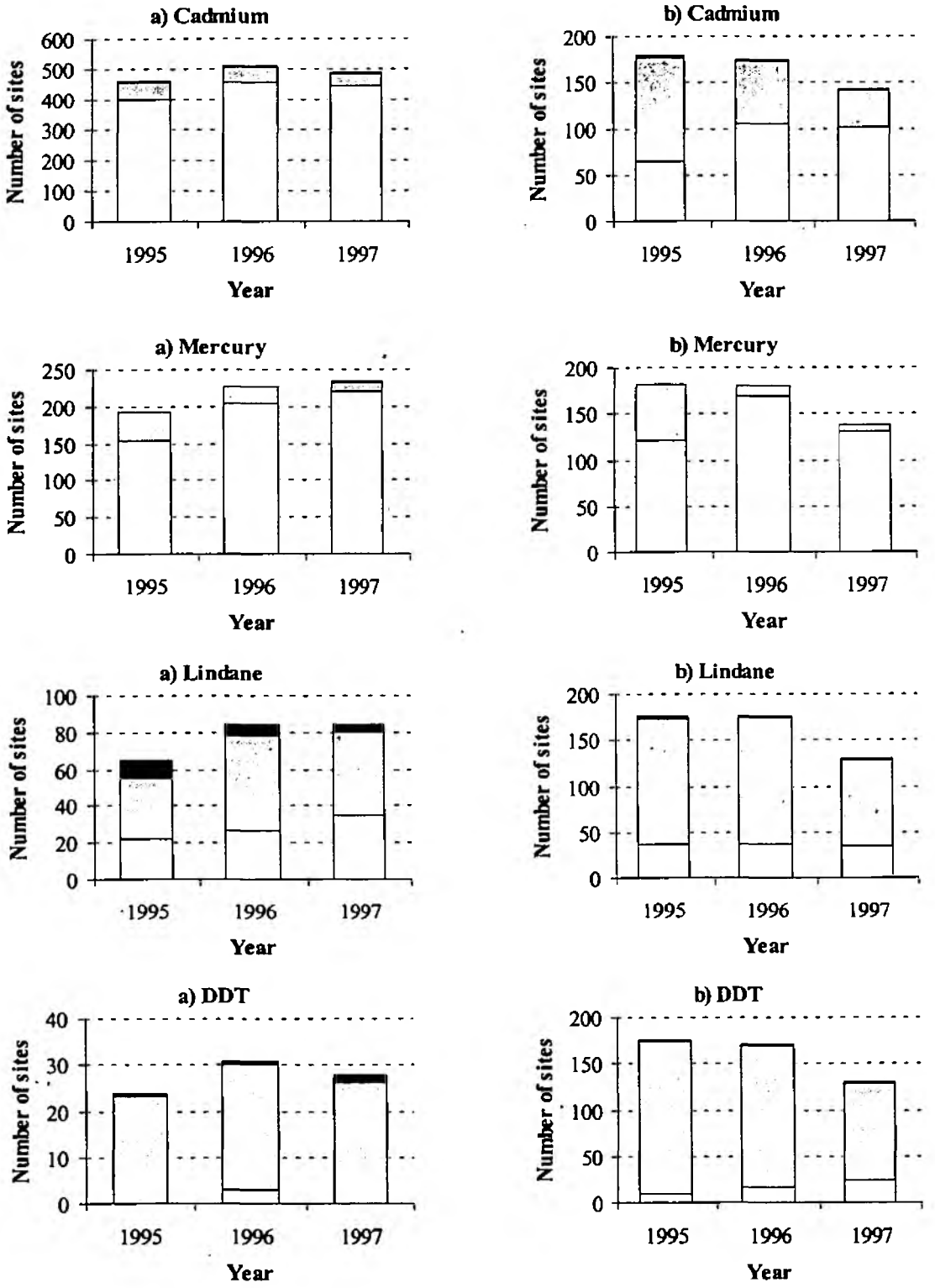
Improvement in bathing water quality is due to the improvement of sewage treatment works at many sites around the coast. This investment is continuing and further improvements are likely to be observed in the future.

A similar indicator is also used by DETR (R2).

Data source: Environment Agency **Update period:** Annual **Data notes:**										
Scales of possible use	UK	*	E&W	*	Agency Region	*	Local Govt.		Other	

V3.5 Dangerous substances in water

Exceedances of Environmental Quality Standards for selected List I substances



a) Sites below discharge points
b) National Network Reference sites

A key environmental objective is to reduce the levels of pollutants such as some pesticides and heavy metals that are very persistent and may be bio-accumulative. Standards for List I substances are set by the EC Dangerous Substances Directive. The List I substances shown in the indicator are those which most commonly exceed their Environmental Quality Standards.

The number of national network reference sites monitoring List I substances is under review, and was reduced between 1996 and 1997. There are no consented discharges of DDT because it is a banned substance. The general levels of other pesticides in surface fresh waters are presented in (**V4.3**). For cadmium and lindane at National Network Reference sites the standards used in the charts are more stringent than the EQS.

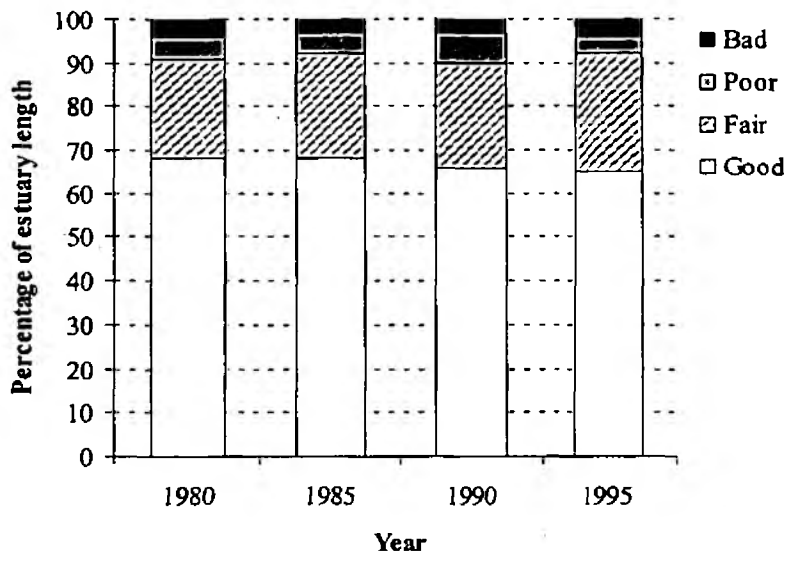
In 1997, exceedances for cadmium, mercury and DDT were limited to one or two sites, with no exceedances for mercury at National Network Reference Sites. The loads of some of these substances to coastal waters are shown in (**S4.4**).

This indicator is taken from DETR (M2). The Agency is looking at further development of this indicator using a range of data.

Data source: Environment Agency
Update period: Annual
Data notes: Sites for England, Wales and Northern Ireland. At National Network Reference sites, cadmium and lindane are measured against more stringent standards than their EQSs. The number of sites below points discharging DDT is very small (31 or less).

Scales of possible use	UK	*	E&W	*	Agency region	*	Local Govt.		Other	GB

V3.6 Estuary water quality



This indicator gives an assessment of the quality of estuaries based on biological, aesthetic and chemical quality. It classifies estuary stretches as good, fair, poor or bad. The system is based on an objective assessment of dissolved oxygen concentrations and an expert judgement of aesthetic and biological quality.

Classifications have been made by the Agency and its predecessors every five years since 1980 and will also be done in 2000. Over 90 per cent of estuaries are classified as good or fair. There has been a slight increase in the number of poor and bad quality lengths over the 15 years of record, even though many estuaries, for example the Tyne (**V2.3(b)**) and Thames, have seen a return of migratory salmon during these 15 years.

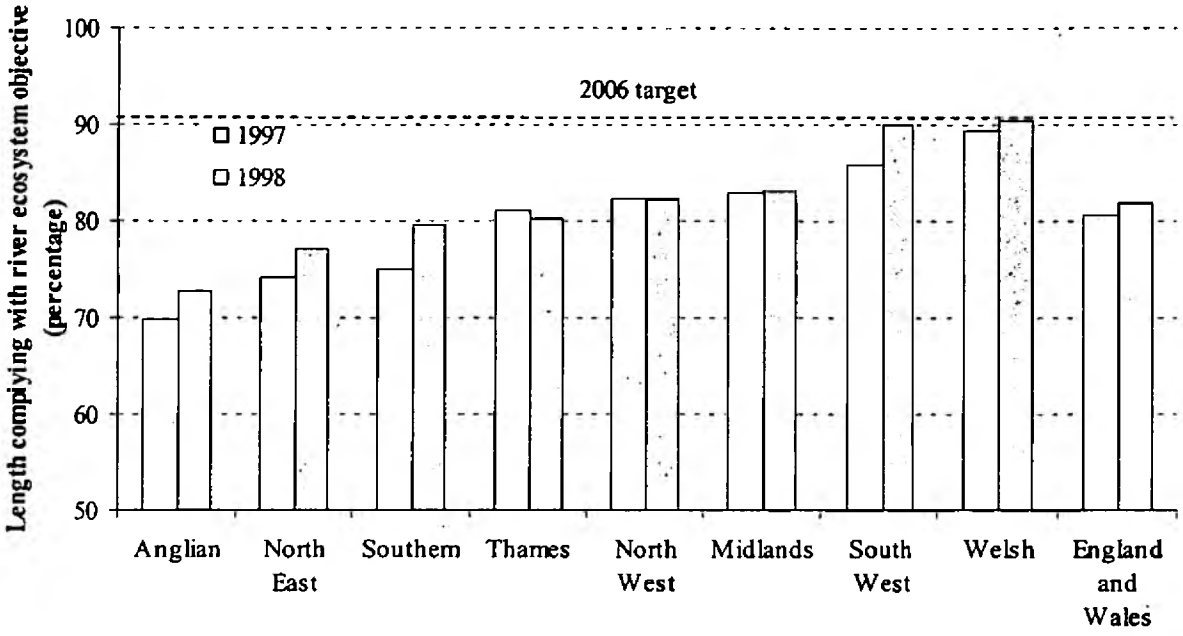
There are plans to change the system to a more objective and comprehensive scheme, which should be more sensitive to change, but this is not yet in place. A project is currently underway to develop the new classification scheme and this should be implemented (subject to funding) from 2001.

A similar indicator also used by DETR (R1).

Data source: Environment Agency
Update period: Every five years
Data notes: This indicator will be replaced with the new estuary classification scheme if it becomes available.

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

V3.7 Compliance with River Ecosystem Objectives



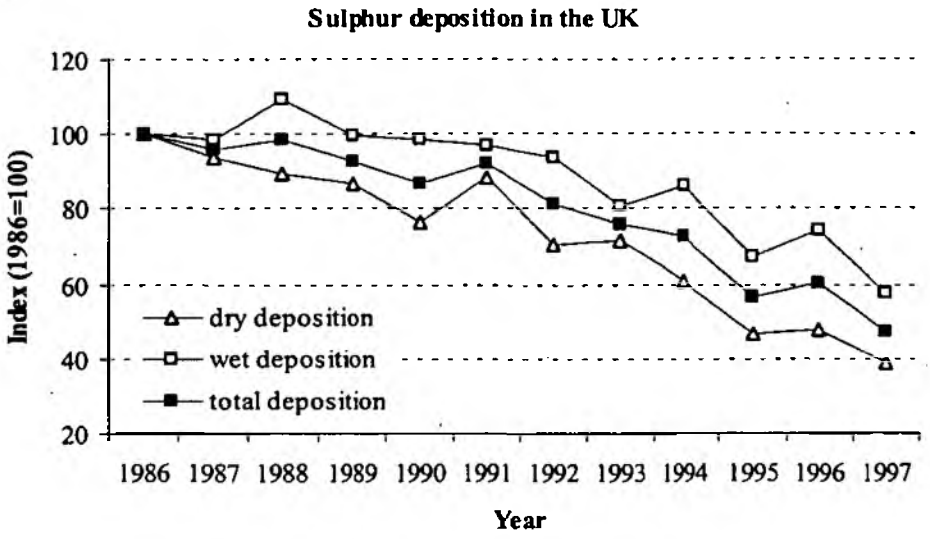
Classified stretches of river have an objective to meet a certain target water quality depending on the uses for which that river stretch should be suitable. In reality, rivers are used for many purposes, so as a surrogate, if the quality is suitable for a certain type of 'river ecosystem' then it is likely that the other uses will also be met.

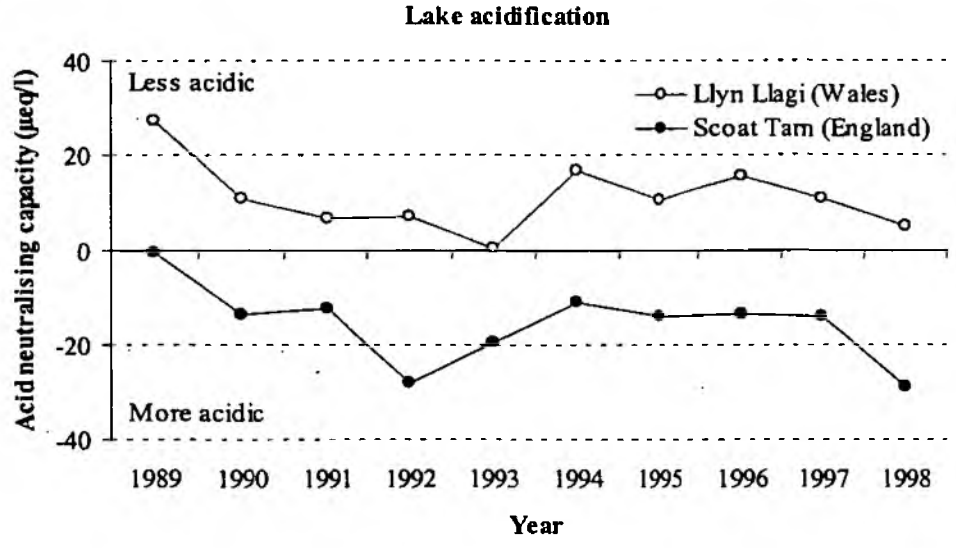
There are five river ecosystem classes, from RE1 (excellent water quality) to RE5 (poor water quality). The objective for each river stretch must be met at all times and compliance is reported on an annual basis. Where river quality does not meet the objective set, then a clear improvement plan must be made. To meet this improvement it may be necessary to make improvements to discharges to the river. Many improvements have been agreed in the current round of asset management planning (AMP) with the water companies.

The target for this indicator is that all rivers will eventually comply with their objectives within timescales that have been negotiated in AMP. A few rivers have a long-term objective of a higher class than is currently met, in which case staged improvement plans should be in place. Factors affecting compliance are complex and include interactions between natural and anthropogenic effects. Some of these are not directly controllable. Achievement of 100 per cent compliance is, therefore, unlikely but it is possible to improve from the current baseline. The Agency has been given a target by Government of at least 91 per cent compliance by 2006.

Data source: Environment Agency **Update period:** Annual **Data notes:**										
Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

V4.1 Acidification in the UK





Acid deposition, resulting from emissions of sulphur dioxide, nitrogen oxides (**S4.5**) and ammonia, damages soils, vegetation, fresh waters and buildings. Lakes on rocks sensitive to acidification have become increasingly acidic since the onset of industrialisation, with the possible exception of sites in the far north west of Scotland where acid deposition has always been low. Despite recent sulphur emissions reductions (**S4.7**) there is no evidence of sustained recovery from acidification in these systems.

The amount of acid deposited varies with rainfall and the concentrations of acidic gases in the atmosphere. Different receptors in the environment have different sensitivities to acid deposition. In England and Wales high deposition areas include Cumbria and Snowdonia, which are also areas of acid sensitive soils. The 'critical loads' approach measures the quantity of pollution that a part of the environment can tolerate without harmful effects appearing.

In response to a fall of 58 per cent in sulphur dioxide emissions between 1986 and 1997, dry sulphur deposition fell by over 60 per cent and wet sulphur deposition by 43 per cent.

The majority of areas with substantial exceedance of critical loads are the high rainfall uplands where soils are poorly buffered. The slow response in wet deposition to falls in sulphur dioxide emissions is therefore of concern. Lake and stream acidification provides evidence for the acidification of soils in the surrounding area and presents a direct threat to their aquatic systems. Acidification has led to the loss of species at all levels of the food chain and has resulted in a reduction in biodiversity of these systems.

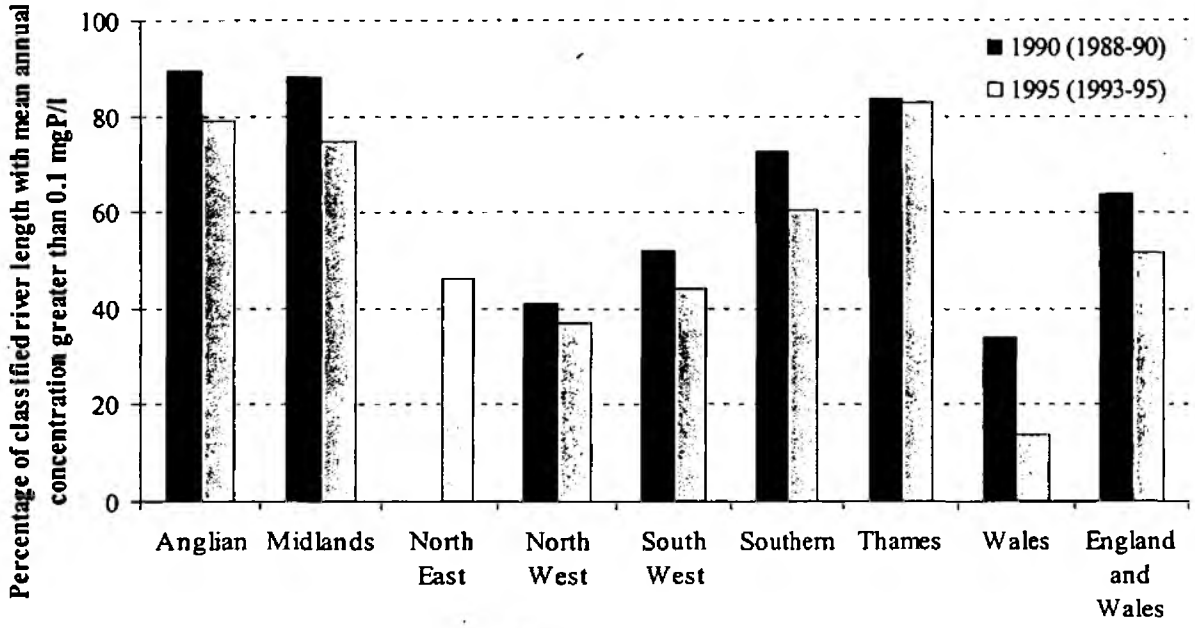
This indicator is taken from DETR and modified (P4).

Data source: Sulphur deposition: NETCEN and ITE
Update period: Annual
Data notes: For individual sites, the greater the negative value of the Acid Neutralising Capacity (ANC), the more severe the acidification; damage to fish populations is unlikely to occur above an ANC of 20μeq/l.

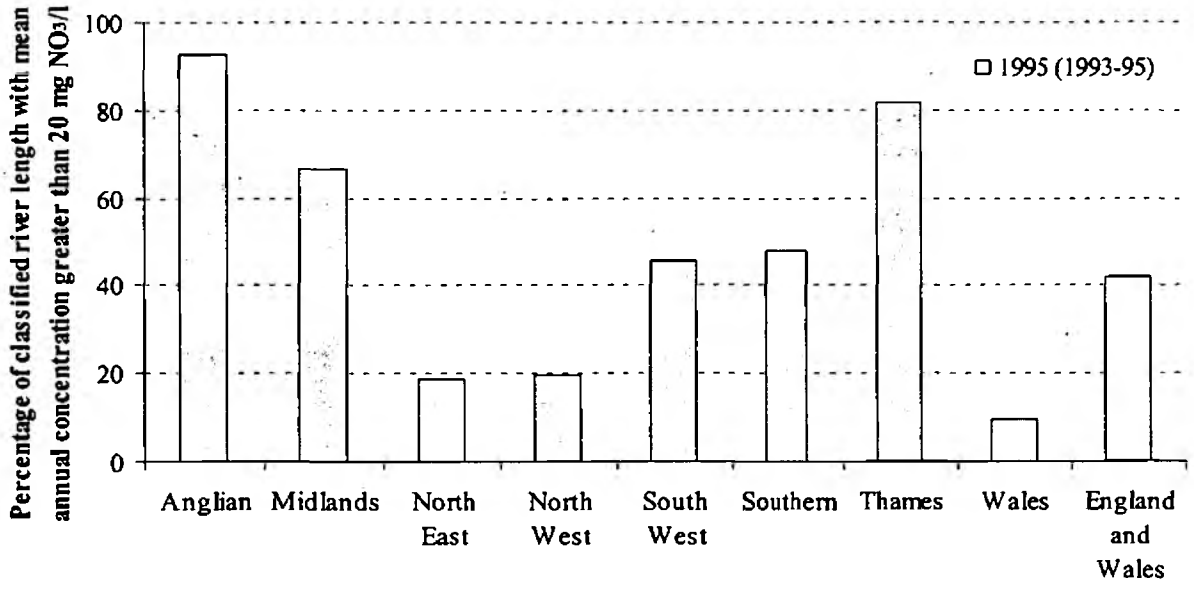
Scales of possible use	UK	*	E&W	*	Agency Region		Local Govt.		Other	

V4.2 Nutrients in rivers

V4.2(a) Orthophosphate concentration in rivers[1]



V4.2(b) Nitrate concentration in rivers[2]



Eutrophication is the process of nutrient enrichment, which in waters results in the stimulation of a range of changes, including increased production of algae and/or higher plants, which may negatively affect water quality and the uses to which the water may be put. The impacts of accelerated eutrophication, where waters are enriched by nutrients derived from human activities, have for many years posed significant water quality problems across the world. In England and Wales eutrophication has had a high profile since the late 1980s when the widespread occurrence of blue-green algal blooms in standing and slow-flowing waters gave rise to considerable public concern.

In temperate freshwater systems phosphorus is generally the key nutrient limiting productivity, but for other waterbody types, for example coastal waters, nitrate may be limiting. Nutrients present in waters originate from a number of sources both point and diffuse. The main sources of nutrients are sewage effluents and run-off from agricultural land.

Eutrophication can have both temporary and more irreversible effects on aquatic ecosystems, for example fluctuating dissolved oxygen levels can result in the death of invertebrates. Certain algal species, particularly blue-greens, can produce toxins that can seriously effect the health of exposed mammals (including humans), fish and shellfish. Other problems in affected waters can include seriously reduced biodiversity, and problems for water abstraction, livestock, water-sports, and angling.

In addition to possible marine eutrophication, nitrate can be a concern for drinking water abstractions where there can be health implications. Data for the 1998-2000 survey will enable trends in nitrate concentrations to be presented.

It is difficult to identify an indicator that will give an accurate picture of the problem of eutrophication. Ideally, measures of both biological response to nutrient status and chemical water quality itself should be incorporated.

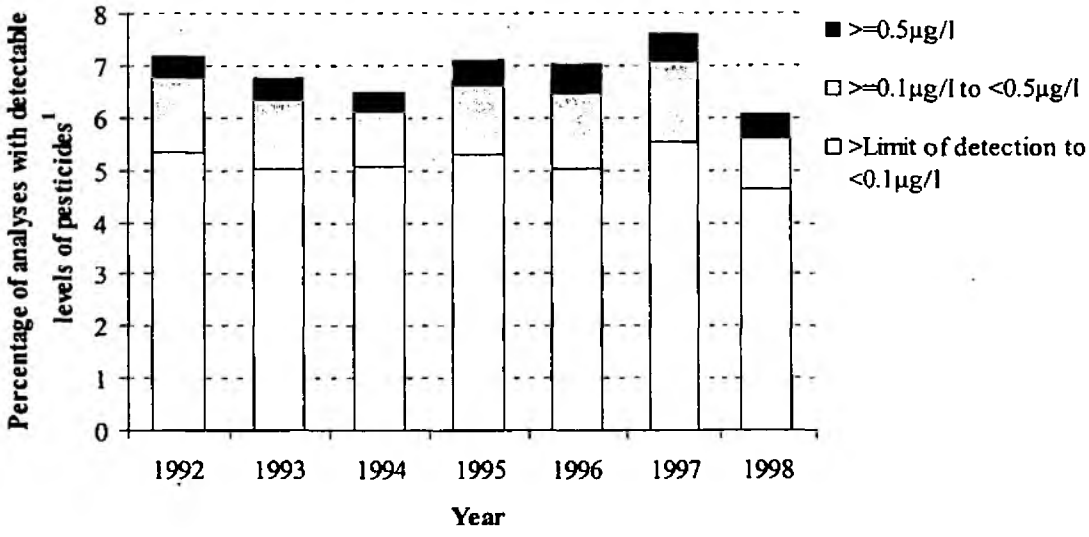
This indicator is also used by DETR (Q1).

Data source: Environment Agency
Update period: Annual (based on three year rolling reporting cycle)
Data notes: There are no orthophosphate data for North East Region for the 1990 reporting period. [1]Data based on three year periods (1990 is an average for the period 1988-90 and 1995 is for 1993-95). [2]Data based on the three year period 1993-95. More data will be available in 2000.

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

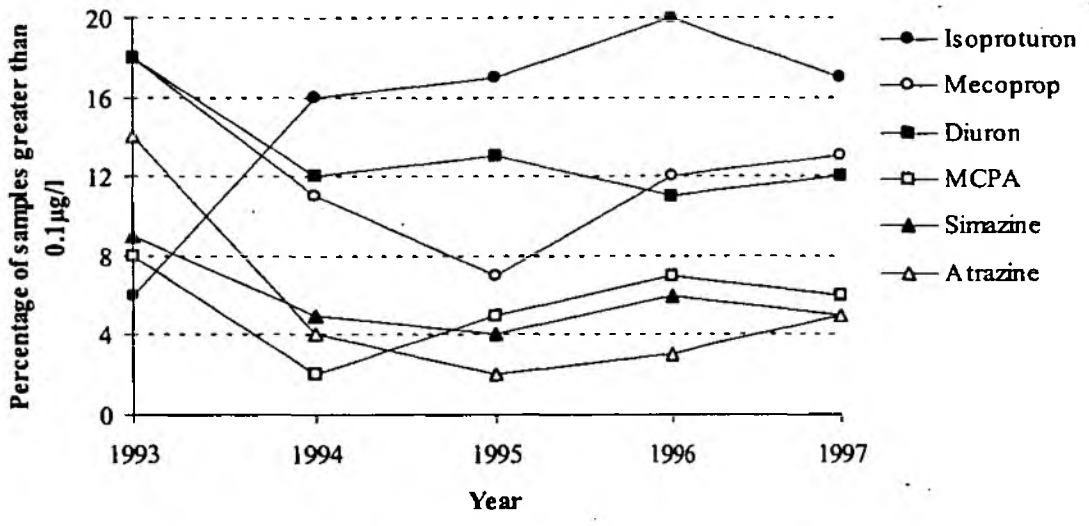
V4.3 Pesticides in rivers

V4.3(a) Frequency of detection of pesticides



[1]Several pesticide chemical suites are usually analysed in one water sample. A total of around 170 different pesticides are analysed at over 3000 locations, commonly at a frequency of four or twelve times a year giving over 200,000 determinations. Many monitoring points have a limited range of analyses depending on the reason for monitoring.

V4.3(b) Trends in occurrence of some frequently found pesticides



Pesticides in environmental waters come from both point and diffuse sources. In some catchments the main source will be agriculture, whilst in others it may be industrial discharges, sewage treatment works or urban areas.

Pesticide concentrations in environmental waters are monitored routinely by the Environment Agency. Samples are taken from a range of sources; fresh waters, groundwaters, marine waters, trade effluents and sewage discharges. Pesticides are monitored for both statutory and non-statutory purposes and the pesticides analysed at a particular point can vary between years. For most pesticides a fixed monitoring point network does not exist but the monitoring programme in surface fresh waters is large and can be used as an indicator of the levels of monitored pesticides. The groundwater and marine water monitoring programmes are much

smaller and do not lend themselves to use as indicators so well because of the effects of small sample numbers and the limited range of analyses.

Indicator (a) is an analysis of the Agency's pesticide monitoring as a whole and does not represent the possibly greater trends in individual pesticides, which can be seen in (b). The trends in (b) are specific to the individual chemicals involved, which can be affected greatly by regulatory decisions regarding their usage. There may be a need to alter the pesticides presented with changes in approvals or in the market place in the future, to represent the most up to date monitoring information.

The two concentrations of 0.1µg/l and 0.5µg/l for many pesticides have no toxicological significance but are useful for trend analysis. 0.1µg/l is the standard for any pesticide specified in the EC Drinking Water Directive and therefore is relevant to treated supplied drinking water rather than environmental waters. Generally over 90 per cent of determinations for pesticides are below the limit of determination (LOD), but some pesticides can be toxic at very low levels, possibly at or below their LOD. The LOD may vary between pesticides and also by sample media and analysis method. Further indicators on chemicals and their environmental effects are proposed for future development (Appendix I).

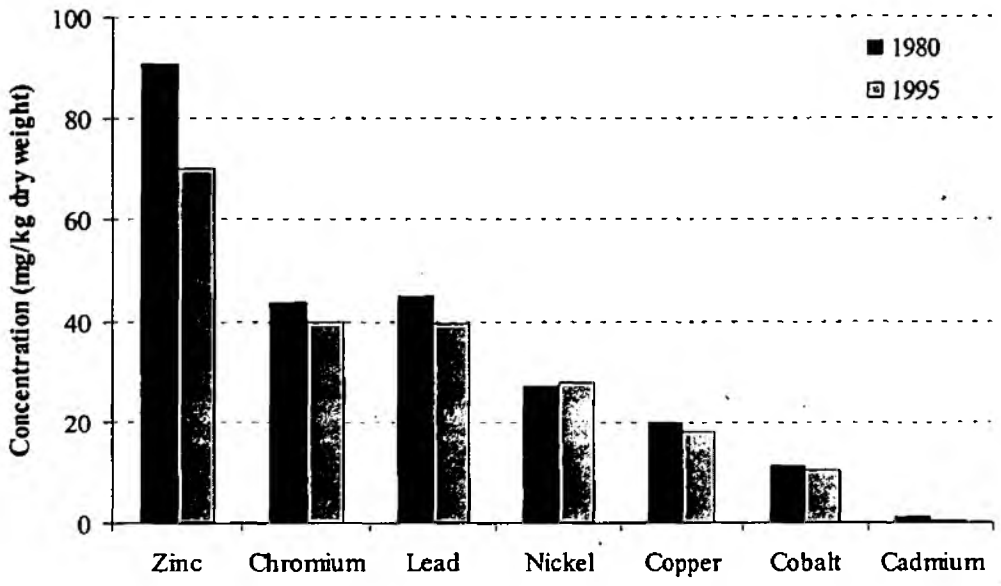
The Agency and other organisations have many initiatives aimed at reducing pesticide levels but agricultural and horticultural pesticide usage has not fallen in recent years (**S4.2**).

MAFF uses an indicator similar to **V4.3(b)** (13).

Data source: Environment Agency
Update period: Annual nationally but usually more frequently at a regional level
Data notes: The number of analyses, pesticides, sites monitored and limits of determination (LOD) may vary to some extent between years. Data from known pollution incidents are excluded. 1998 data are provisional (25/01/00). LOD is now reported as the 'minimum reporting value' (MRV).

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

V4.4 Heavy metals in agricultural topsoil



Some heavy metals are essential trace elements for plants and animals but high concentrations can have adverse effects on human, animal and plant health. Metals may originate from the geological substrate of the soil or from man-made inputs such as agro-chemicals, soil conditioners, animal manure, sewage and other sludge and atmospheric deposition. Heavy metals have a tendency to accumulate in soils, for example with repeated applications of sewage sludge to land as they are not easily leached or taken up by plants. No specific targets have been identified for the levels of these metals in soils.

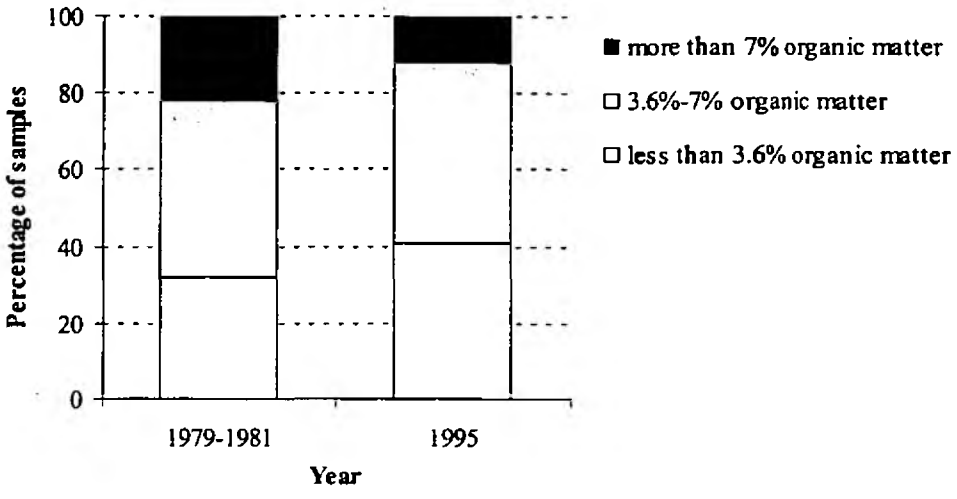
The latest data were collected from 904 sites out of the National Soil Inventory to investigate any changes in heavy metals concentrations in the 1980 to 1995 period. National trends of concentrations are very difficult to identify due to the highly heterogeneous nature of soils, but the following were observed:

- total topsoil zinc has decreased;
- copper has increased in some light soils and decreased elsewhere;
- cobalt and nickel have remained broadly stable;
- chromium levels have only shown significant change in organic soils, where the levels have risen.

This indicator is taken from MAFF (27).

Data source: Soil Survey and Land Research Centre and MAFF **Update period:** Unknown **Data notes:**										
Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

V4.5 Organic matter in agricultural topsoils



Soil organic matter in agricultural topsoils is derived from crop residues, organic manures, microbial biomass and soil microflora and fauna. Organic matter plays a key role in maintaining the quality of soil in aspects such as fertility, structural stability, water holding capacity and buffering capacity. The loss of soil organic matter from soils can lead to a decrease in structural stability and an associated increase in vulnerability to erosion. Organic matter is the main source of the capacity of the soil to adsorb and degrade organic contaminants (through the action of associated microbial biomass) such as pesticides. The loss of soil organic matter from soils could therefore potentially decrease the ability of the soil as a buffer for the wider environment, especially water against contaminants and also lead to increased soil erosion risk and associated environmental problems.

Management of soil can have a major impact on the levels of soil organic matter. Soil organic matter contents tend to move towards an equilibrium for a particular land-use or soil type, for example, soils in continuous cereals are likely to have a relatively low organic matter content when compared with permanent grassland soils. Over the 15 years between surveys, organic matter levels have generally decreased in the 904 arable or ley-arable soils re-sampled from the National Soil Inventory by a mean of 0.49 per cent.

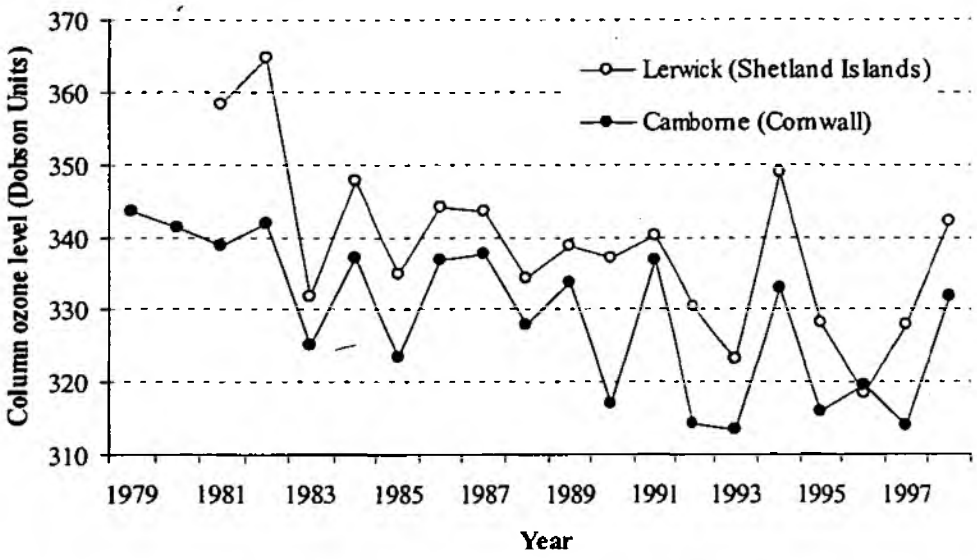
Significant changes in organic matter concentrations are likely to be detectable only over long periods. Soils that have been under long-term arable management have generally stable or very slowly declining organic matter levels. The largest declines have been on grasslands ploughed up for arable use, and on cultivated peaty or organic soils.

This indicator is also used by MAFF (26) and DETR (S2).

Data source: Soil Survey and Land Research Centre and MAFF
Update period: Unknown
Data notes: Data from the National Soil Inventory for non-humic mineral arable and short-term grassland topsoils. The soil organic matter content is expressed as organic carbon percentage.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

V4.6 Ozone depletion in the UK



Emissions of substances containing chlorine and bromine decrease the stratospheric ozone layer, thus increasing the amount of ultraviolet radiation from the sun reaching the earth's surface, which can have consequential effects on both environment and health. The chlorine loading in the stratosphere more than doubled from 1974 to a peak in 1994, before starting to decline. Column ozone measurements in the UK have fluctuated, but have generally decreased since the early 1980s.

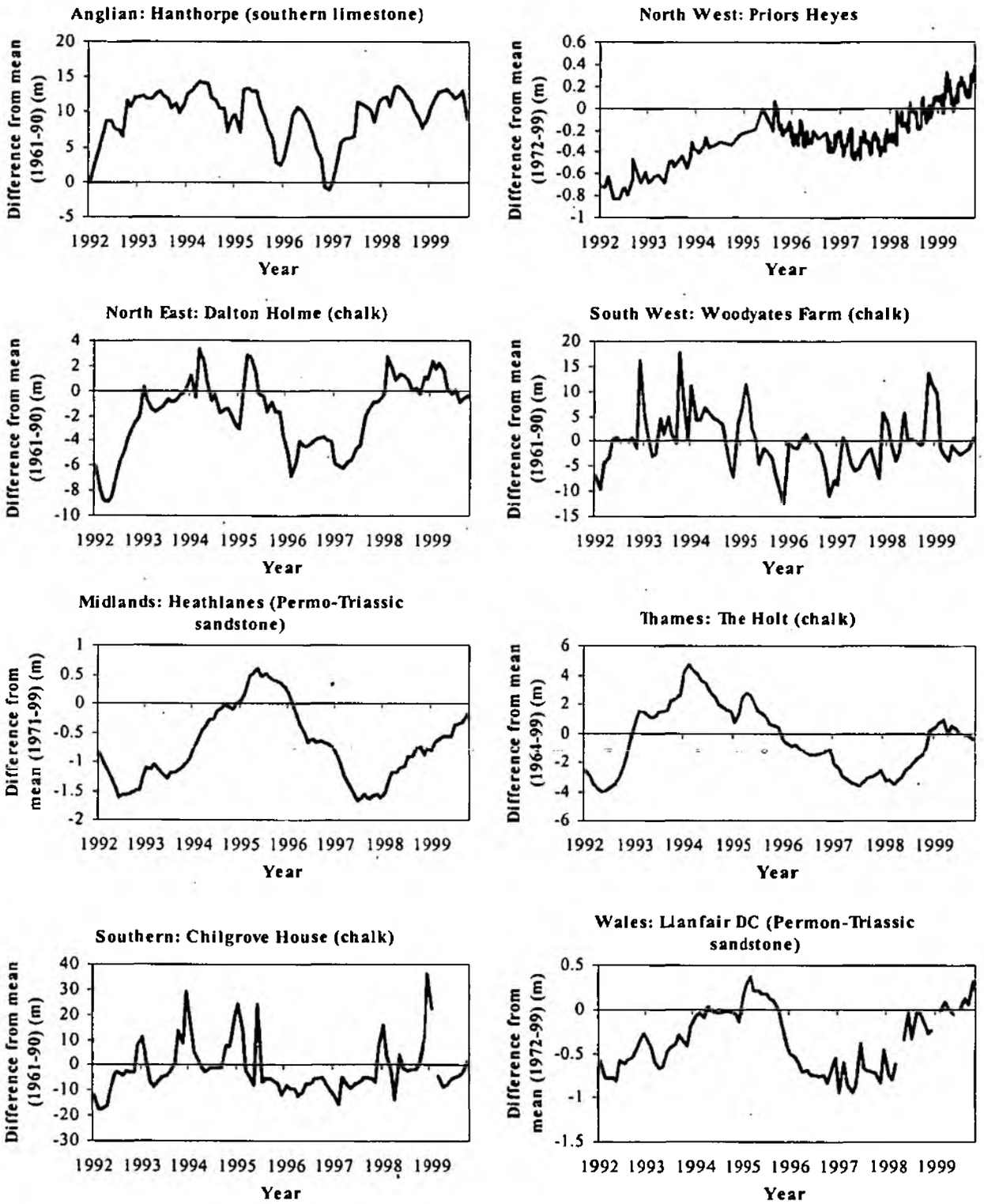
Under the Montreal Protocol on Substances that Deplete the Ozone Layer, significant progress has been made in the protection of the ozone layer. Since its adoption in 1987, total levels of chlorofluorocarbons (CFCs) in the lower atmosphere have peaked recently and are now declining. It takes several years for ozone depleting substances to reach the stratosphere however, so although chlorine loading is falling the actual damage to the ozone layer is not expected to peak until early this century. If all countries meet their obligations, the ozone layer is expected to recover fully by 2050.

Under the Montreal Protocol production and consumption of CFCs, halons, carbon tetrachloride and methyl chloroform is already banned in developed countries, excluding essential uses. Current Montreal Protocol targets for developed countries cut production and consumption of methyl bromide by 2005 and hydrochlorofluorocarbons (HCFCs) by 2030.

This indicator is taken from DETR (P5)

Data source: The Met Office **Update period:** Unknown **Data notes:**										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

V5.1 Difference in groundwater levels from the long-term average at eight selected sites



Aquifers provide natural storage of freshwater resources and provide about 18 per cent of the total amount abstracted in England and Wales. Some 35 per cent of potable supply is abstracted from groundwater and many rural populations depend heavily on groundwater sources for domestic water supply (**S3.1**).

Groundwater levels vary in response to rainfall, amounts abstracted and aquifer characteristics. Sites across England and Wales in some of the main aquifers have been selected as indicator sites. The difference between the actual levels and the long-term mean (various time series) are plotted.

The indicator shows the greatest seasonal variability in the limestone and chalk aquifers and less variability in sandstones. Most of the aquifers in England and Wales, particularly in the south and east, had below average water levels for substantial periods in 1992, 1996 and 1997, but the majority of boreholes recharged to near maximum levels in 1998 and 1999. The exceptions to this are the sandstone aquifers in the Midlands and North West which respond more slowly to changes in rainfall patterns.

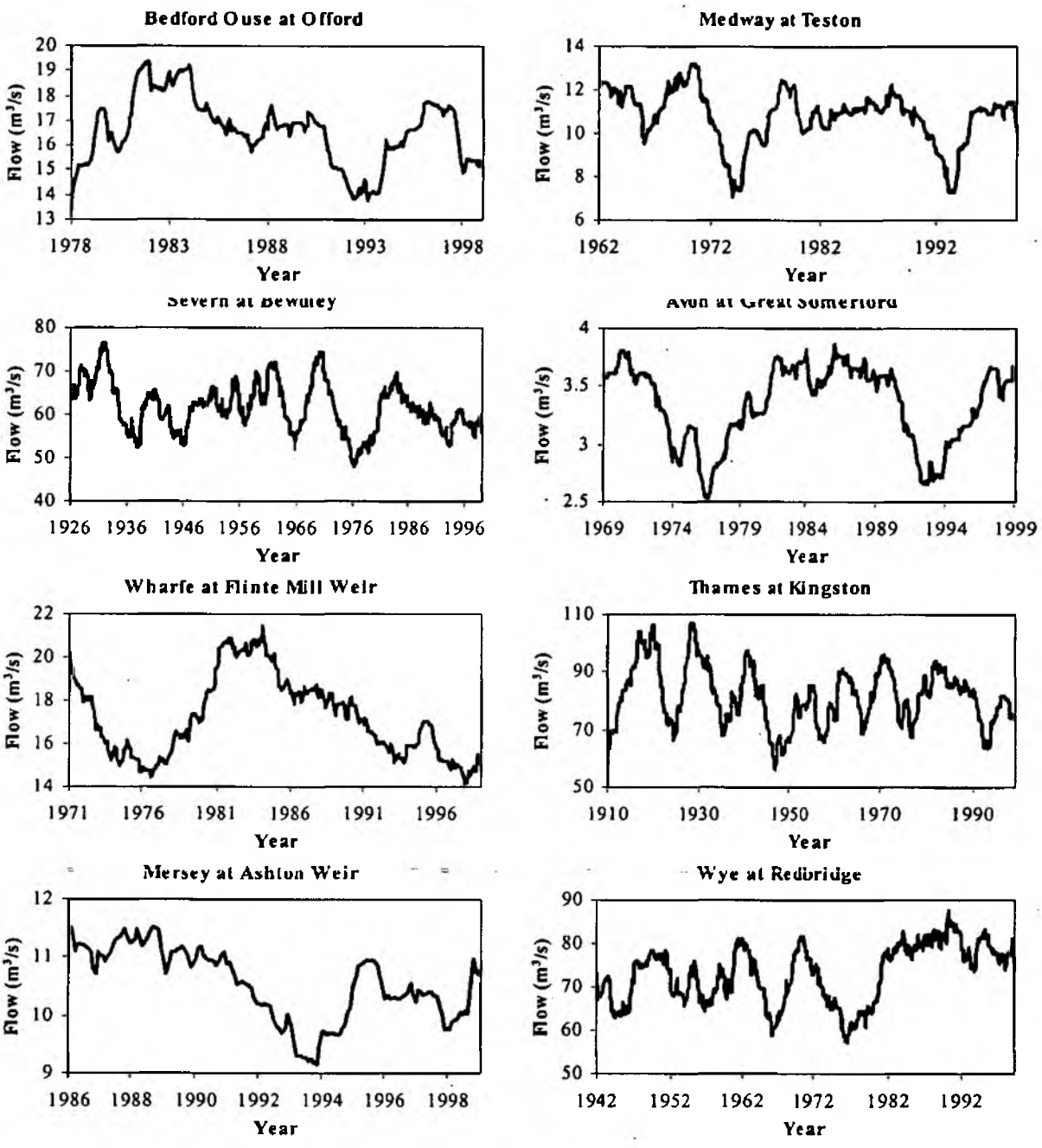
Long-term trends could indicate the impact of climate change or changes in abstraction policy and licensing.

This indicator is limited to a few sites and there could be significant regional and local differences.

Data source: Environment Agency
Update period: Various
Data notes: Period on which the 'long-term' mean is calculated is indicated on each chart.

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.	*	Other	local

V5.2 Monthly mean river flows of eight selected rivers

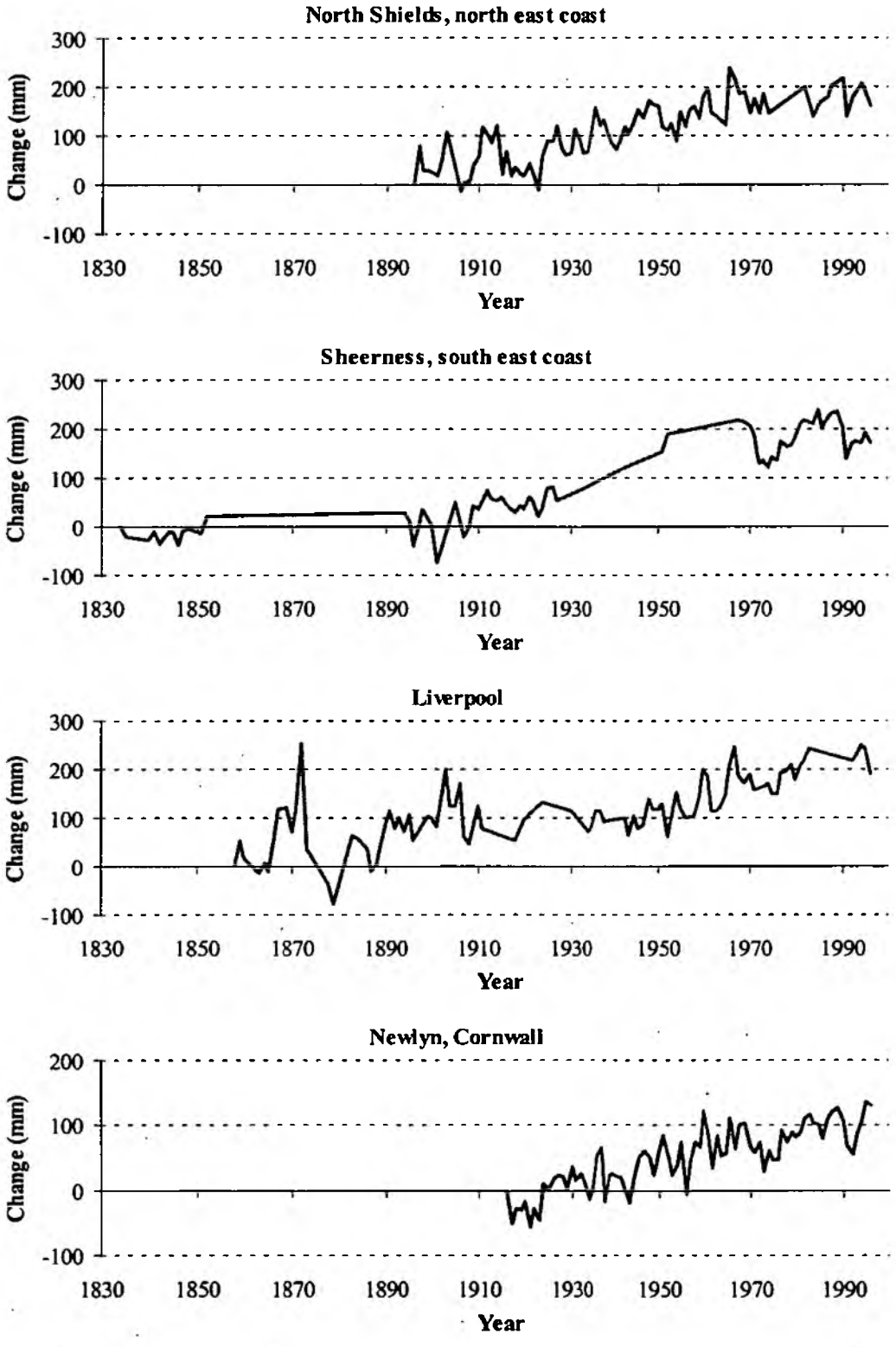


River flows vary naturally in response to rainfall with marked seasonal and year-to-year variations. They are also affected by abstractions and discharges. Around 65 per cent of potable supply is abstracted from rivers, although this varies significantly between regions (**S3.1**). Maintenance of flows is essential in maintaining river uses, including ecosystems, fisheries, recreation and navigation. This indicator allows periods of low flows to be detected at the indicator sites. The indicator should respond to climate change and any changes in abstraction policy. There could be significant regional and local differences not represented by the eight indicator sites.

Data source: Environment Agency
Update period: Continuous monitoring
Data notes: Data are 60 month moving means

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.	*	Other	local

V5.3 Sea level change



It is anticipated that climate change will lead to a rise in global mean sea level, primarily because of thermal expansion of ocean water and land glacier melt. Coastal areas could face a significant risk of increased flooding, inundation and erosion as a result of sea level rise, with or without more frequent and severe storm surges.

England and Wales are vulnerable to a rise in sea levels and to other potential changes in storm frequency and intensity. Over eight per cent of the land area of England, including 50 per cent of grade one agricultural land, parts of several major urban centres and areas of internationally-designated environment sites, are protected by river and coastal defences. Whilst climate change is unlikely to change significantly the total area at risk of flooding, it will increase the risk to which these areas are exposed.

All the sites shown indicate a rise in historic mean sea level by up to 2.2mm per year. This reflects a real sea level rise of approximately 1mm per year combined with geographic differences due to long-term geological movements under which the south and east are sinking and the north rising.

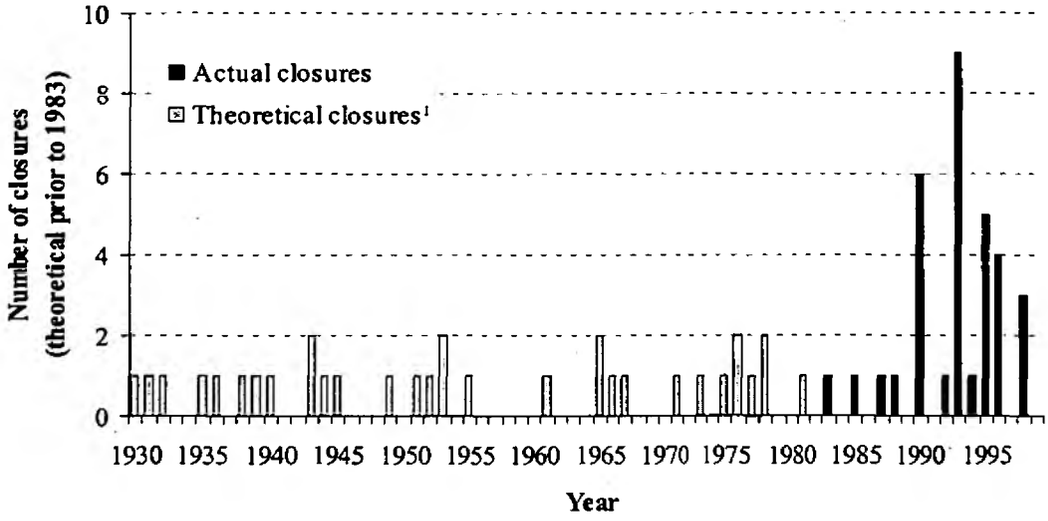
Global mean sea level has increased by 1.0 to 2.5mm per year during this century. Best estimates predict a rise above 1995 levels of about 25cm by the 2050s and 50cm by the 2090s. These rises could be supplemented by up to 1.5mm per year of long-term land level subsidence in the south east of England.

This indicator also used by DETR (N2).

Data source: Proudman Oceanic Laboratory
Update period:
Data notes: Actions by the Agency to address climate change are presented in S1.1.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

V5.4 Thames Barrier closures against tidal surges



The control of flooding in the lower Thames, where the main threat is from the sea, is an important responsibility of the Environment Agency. Without effective defences, when the surge enters the Thames Estuary there is a danger of flooding along most of the tidal river as far as Teddington. Such a flood could engulf much of central London with very serious consequences. Under certain weather conditions surge tides occur and these can present a major threat when combined with a high 'spring tide'. The main defences are a number of movable floodgates, the most notable of which is the Thames Barrier. There are also sea walls upstream of the barrier and 32km of embankments downstream.

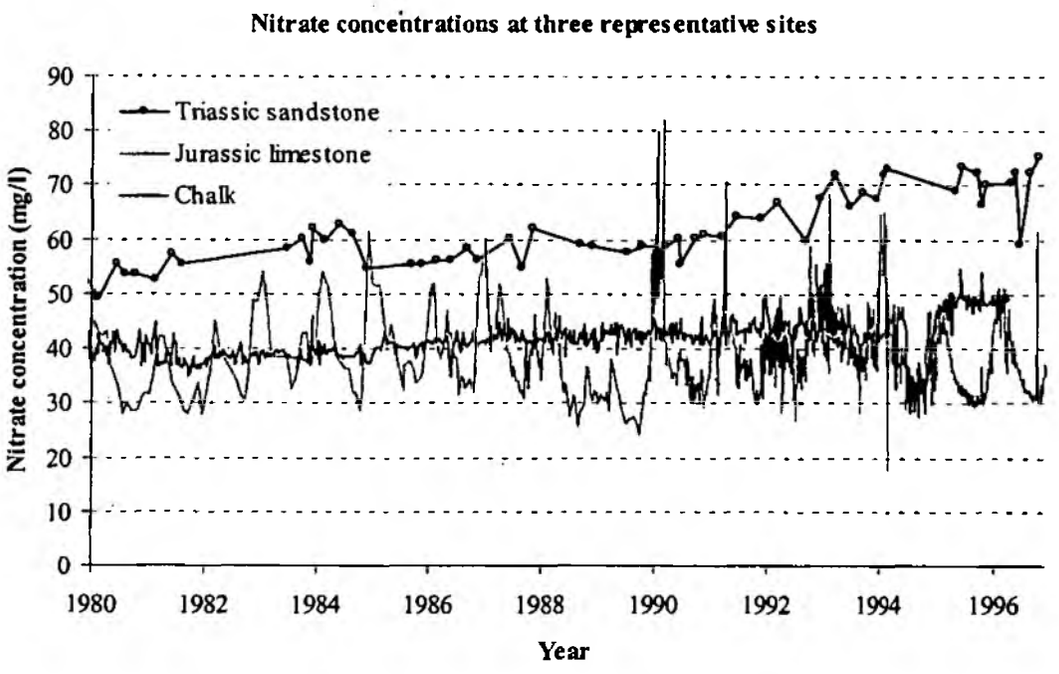
The Barrier is closed when the forecast level of the tide at Southend reaches a critical level. The Barrier has been closed 33 times to protect London from tidal flooding between 1983 and 1999 and the trend appears to be towards more frequent closures. Measurements of the tide levels at Southend go back many years and this indicator shows the number of Barrier closures that would have occurred if it had been built prior to 1983 along with those that did actually occur (1983 and after). The picture is complicated slightly because changes over time in the width, profile and in the fluvial flow conditions of the river may have affected the levels and subsequent decisions on closure. High tide levels in central London are rising by some 60cm each century. Increased tide levels are being caused by a combination of factors resulting from climate change including rising sea levels, increasing storminess and tidal variation. The slow downward tilting of the south east corner of England and the settlement of London on its clay bed also play a role.

A similar indicator was presented in *Indicators of climate change* (DETR, 1999).

Data source: Environment Agency
Update period: Annual
Data notes: The Thames Barrier was commissioned in 1983. [1]Data for closures are theoretical prior to this date and are based on the forecast tide level at Southend. This measurement is used to trigger barrier closures today.

Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	local

V5.5 Long-term groundwater quality trends (in development)



Groundwater provides about 35 per cent of potable water supplies in England and Wales but this can be as high as 75 per cent in some regions. In addition to large scale public supplies, it supplies industry and agriculture as well as being the source of supply for numerous rural communities. Groundwater also maintains baseflow to rivers and supports wetland environments.

Groundwaters are vulnerable to contamination from a wide range of human activities. These include agricultural practices, urbanisation, industrial processes, disposal of wastes and spillages of chemicals. The threat can be from single sites or from a widespread activity. The implementation of European Directives and UK legislation has led to the Agency having increased powers to protect groundwater. The Agency is currently developing its groundwater-monitoring network to meet national needs.

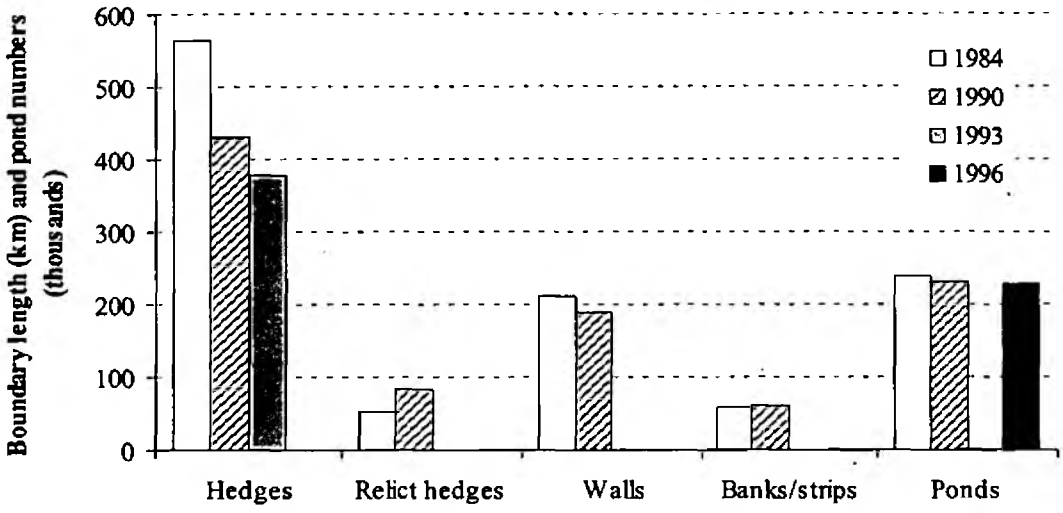
Nitrate has been selected as a general indicator of groundwater quality because it is one of the few determinands with long data records. Three sites have been selected from different aquifers to represent some of the range in nitrate trends. Nitrate is largely derived from agricultural sources and is subject to controls under the EC Nitrate Directive. Nitrate vulnerable zones (NVZs) have been defined for the protection of groundwater sources. Within these zones changes in agricultural practice may lead to a reduction in nitrate leaching into groundwater and hence, potential improvements in groundwater quality. The reduction of nitrate in NVZs is included as a development indicator in Appendix I.

This indicator will be used until the Agency's groundwater monitoring network is implemented. It will be developed in the future to include other contaminants and sites.

Data source: Environment Agency, water companies
Update period: Annually
Data notes:

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.	*	Other	local

V6.1 Landscape features



Hedges, walls and ponds can be attractive landscape features of the countryside, sometimes being of historical importance. They provide a valuable habitat for wildlife; for example, ponds collectively support at least two-thirds of Britain's freshwater plants and animal species. Hedges and walls continue to serve their original purpose of land demarcation and livestock control and can help reduce soil erosion.

As farming has become more intensive, hedgerows in some areas have been removed in order to facilitate the efficient use of machinery. In June 1997 government regulations came into force to protect important hedgerows in England and Wales.

Between 1984 and 1993 there was a major decline in our hedgerows. In England and Wales, the length of managed hedgerows decreased by nearly a third in that period. In the latter part of the period, the decline had slowed with the rate of new planting of hedgerows exceeding the rate of outright removal between 1990 and 1993. The number of relict hedges increased rapidly after 1984.

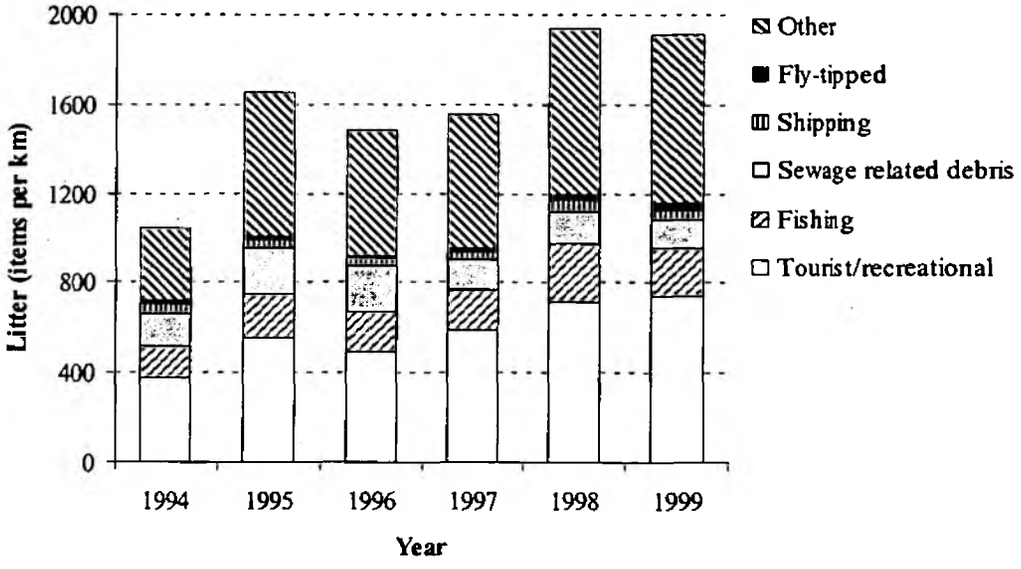
Walls have also been declining. The main cause of the decline in field boundaries is lack of appropriate management. Overall numbers of lowland ponds have declined slightly, losses being largely compensated by new ponds. The UK Biodiversity Action Plan target is to halt all loss of ancient and species-rich hedgerows and to achieve favourable conservation management of 50 per cent of such hedges by 2005.

This indicator is also used by DETR (S5) and MAFF (32).

Data source: DETR, Lowland pond survey (1996), Countryside Survey (1990), Hedgerow survey (1993)
Update period:
Data notes: Indicator data and information supplied by DETR . Data for hedges are England and Wales. Other data are for Great Britain.

Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	

V6.2 Beach litter in the UK



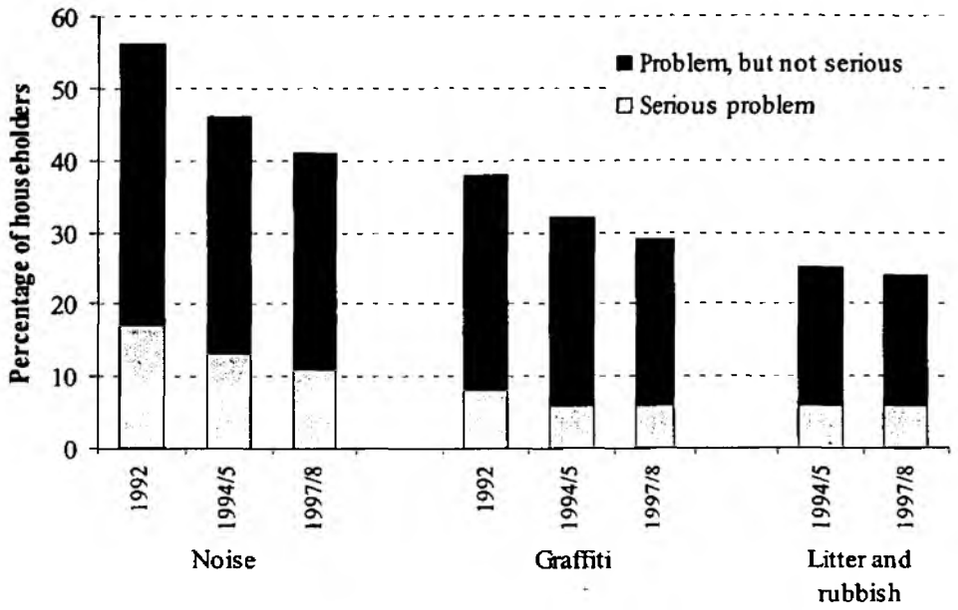
The type and quantity of litter distracts from the aesthetic quality of our beaches and coastline and is one measure of pollution of the coastal environment. Some types of litter, such as sewage-related debris, harmful litter, oil and dog excrement, are of greater concern to beach users than other types. The different types of litter found indicate pressures from different sources. For example, 39 per cent of litter in the 1999 'Beachwatch' survey came from tourism, 11 per cent from fishing and seven per cent from sewage discharges.

The quantities of litter will be dependent on when sampling is carried out. The quantity and type of litter following a hot bank holiday weekend would be different from that found after a rainy day. Overall, however, this indicator provides a useful estimate of types of litter, but care must be taken when considering trends.

The Marine Conservation Society collects data once a year in 'Beachwatch', their annual beach clean and survey. In 1999 they surveyed 171 beaches in the UK. Coastwatch UK also do an annual survey as part of the wider Coastwatch Europe project. In order to standardise the approach, the National Aquatic Litter Group developed guidance in 1998. Based on this, the Agency has developed a monitoring protocol and classification scheme for the assessment of the aesthetic quality of coastal and bathing beaches. This scheme grades beaches from Very Good (A) to Poor (D) based on quantity and types of litter within a standard sampling unit. It is hoped the protocol and classification scheme will be used by other organisations. The Agency is currently planning a survey at all EC Bathing beaches in the year 2000, subject to resources being available. This indicator may be developed if additional monitoring data become available.

Data source: Marine Conservation Society **Update period:** Annual **Data notes:**										
Scales of possible use	UK	*	E&W	*	Agency region		Local Govt.	*	Other	local

V6.3 Quality of surroundings in England



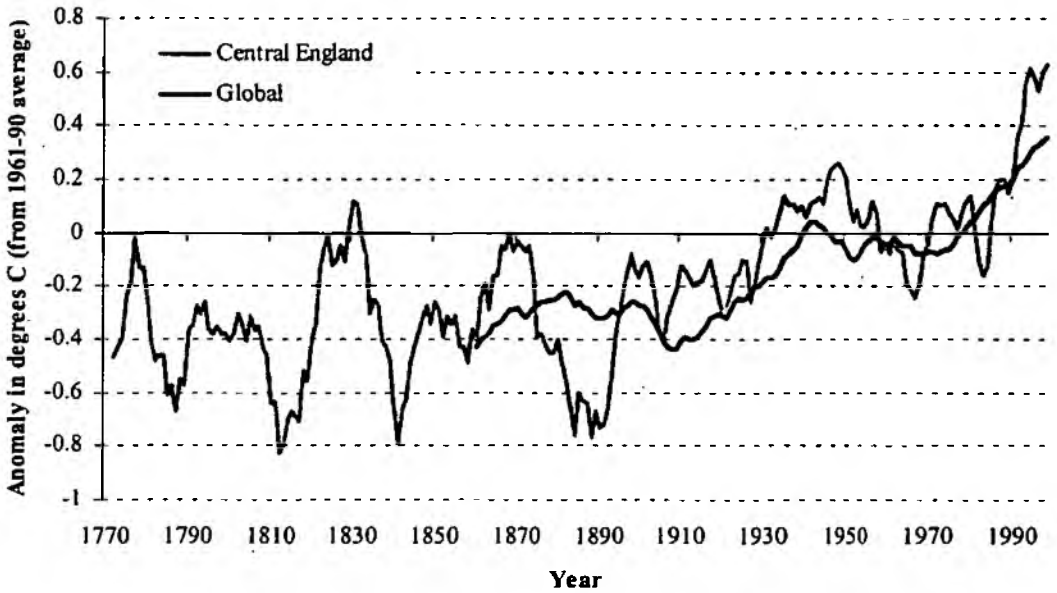
The Quality of surroundings is fundamental to a good quality of life. Noise, litter, graffiti and vandalism may be symptoms of wider problems, but can themselves promote a spiral of degradation, which may lead to crime, social exclusion and decline.

This indicator shows that the proportion of householders in England saying that litter, graffiti and noise are problems has decreased between 1992 and 1997/8, although 41 per cent still consider litter and rubbish to be a problem.

A better quality of life is one of the aims of the Environment Agency and this indicator, from DETR (K6), helps to quantify progress towards this. But it needs to be developed to include other aspects that could help to assess progress towards this aim at a national, regional and local level.

Data source: DETR **Update period:** Three years **Data notes:**										
Scales of possible use	UK		E&W		Agency region		Local Govt.		Other	England

S1.1 Annual average surface temperature in central England



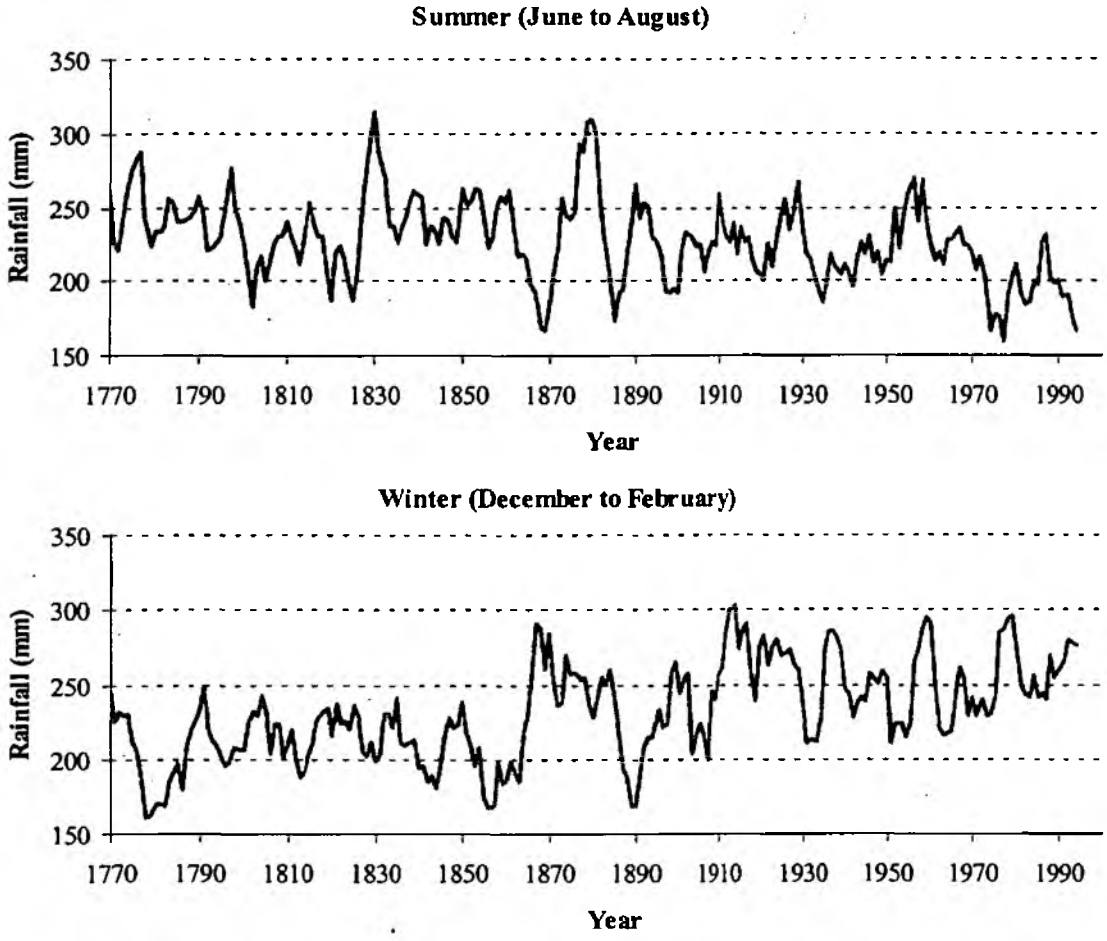
Climate change is recognised as one of the greatest environmental threats facing the world today. In the UK possible impacts include loss of habitats and species, sea level rise and increases in storm damage, droughts and flooding. During this century the annual mean Central England temperature has warmed by about 0.6°C. Three of the five warmest years since 1772 were in the 1990s.

Globally, it is expected that the temperatures will rise between 1.5 and 3°C by the end of the 21st century. The change in global temperatures is consistent with the expected increase in temperature estimated to result from increasing emissions of greenhouse gases. Average global surface temperature has increased by 0.4 to 0.7°C since the late 19th century. 1998 was the hottest year since global records began in 1860 and seven out of the ten hottest years on record were in the 1990s. The Agency's Environmental Vision recognises climate change as a key issue with an action plan to play a part in mitigating its impact.

This indicator is also used by DETR (N1).

Data source: Hadley Centre for Climate Prediction and Research **Update period:** Annual **Data notes:**										
Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	

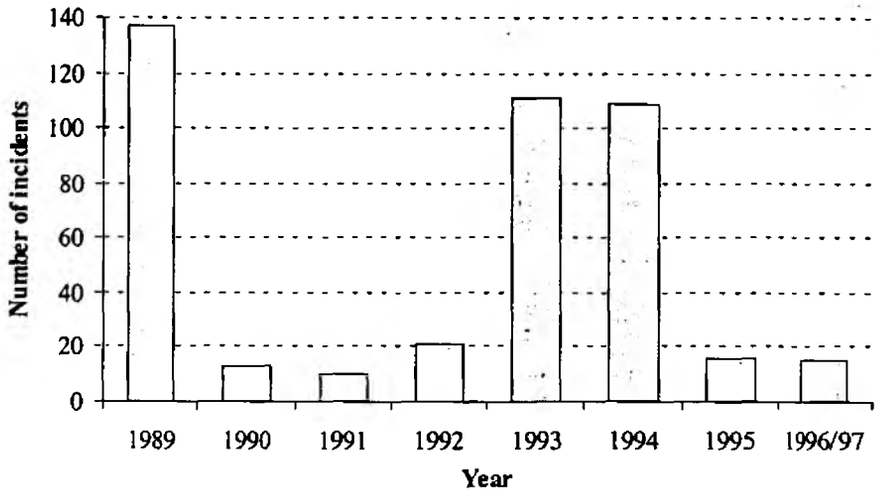
S1.2 Summer and winter rainfall



There is much natural variation in rainfall from year to year and from season to season. Comparing present day patterns with long-term averages and records can give some indication of changing patterns, which could have implications for many environmental parameters including water resources availability and water quality. There are significant regional differences in rainfall. The 30 year average effective rainfall (rainfall minus evapo-transpiration) in Wales provides 18,700Mm^3 of water per year, whereas in south east England it is 3,480Mm^3 per year. This impacts on the amount of water available for all the uses for which it is needed (**S2.4** and **S3.1**). Recent trends in rainfall show the driest 28-month sequence since the 1850s occurred in the period 1988 to 1992. When this ended in the summer of 1992, it was followed by the wettest 32-month sequence. June to August 1995 was the driest summer in 229 years, with less than 15 per cent of the average rainfall for July and August. Overall, since 1970, there have been more distinct rainfall differences between summer and winter with less rainfall in the summer. This continues the trend from 1760, although there have been periods in the past with similar ratios of summer to winter rainfall as in the 1990s. This indicator should reflect changes in rainfall related to climate change due to both natural causes and human-induced change.

Data source: Institute of Hydrology **Update period:** Annual **Data notes:**										
Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

S1.3 Major flooding incidents



Flooding can cause considerable damage and occurs naturally in response to heavy rainfall and tidal surges. Development in flood plains has increased the risk of flooding in some places. Nearly 5,000km^2 of land in England and Wales are below sea level and are protected from inundation by natural or artificial defences.

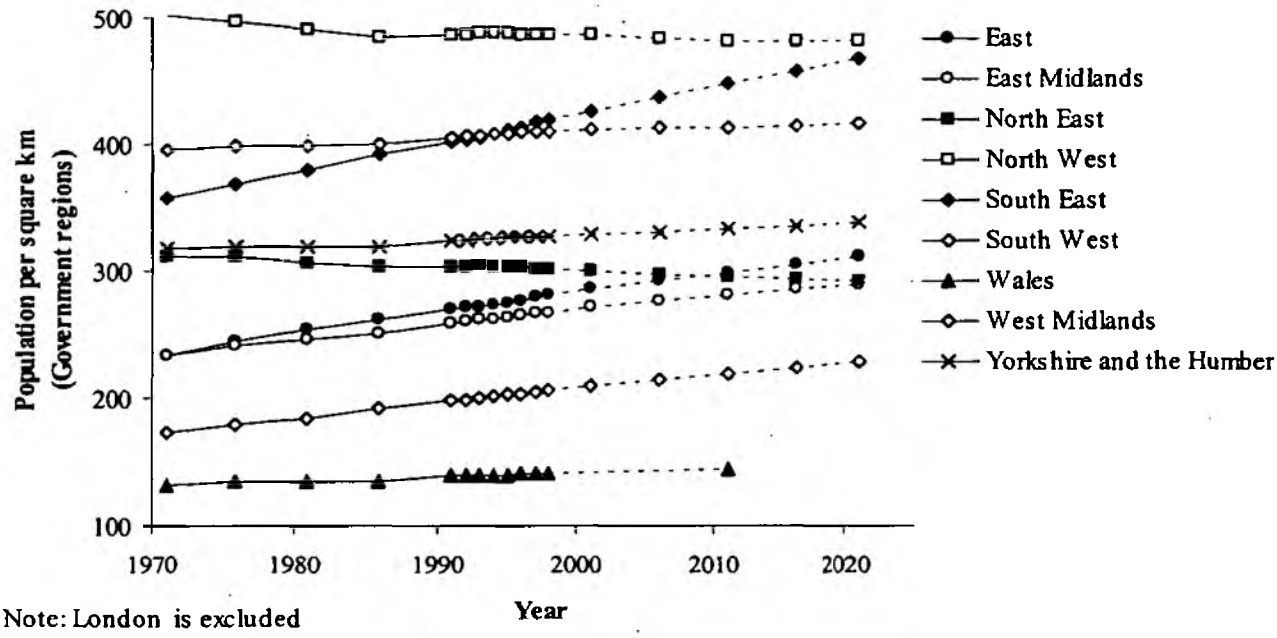
Major flooding incidents vary considerably from year to year. The majority of incidents are related to inland waters, with relatively few due to breaches of coastal defences. Trends in this indicator are difficult to interpret and have to be considered over a long timescale. An increase in the number of incidents could mean more severe storms, or the failure of flood defences. There are no appropriate targets for this indicator but there are levels of service set for flood defences. This indicator is currently limited in its value and will be developed or replaced when further development work has been carried out (see Appendix I). A major flood incident is defined as one that resulted in death or serious injury caused by flooding or, flooding of intensively developed urban areas due to:

- extensive inundation;
- overtopping of flood defences;
- unpredicted breach or collapse of a flood defence;
- deliberate or accidental damage or interference with a flood defence;
- authorised works;
- unauthorised construction of or carrying out of works;
- inadequate maintenance.

Data source: Environment Agency
Update period: Annual
Data notes: Data quality is not consistent due to varying definitions of 'major incident'

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

S2.1 Population density



Note: London is excluded

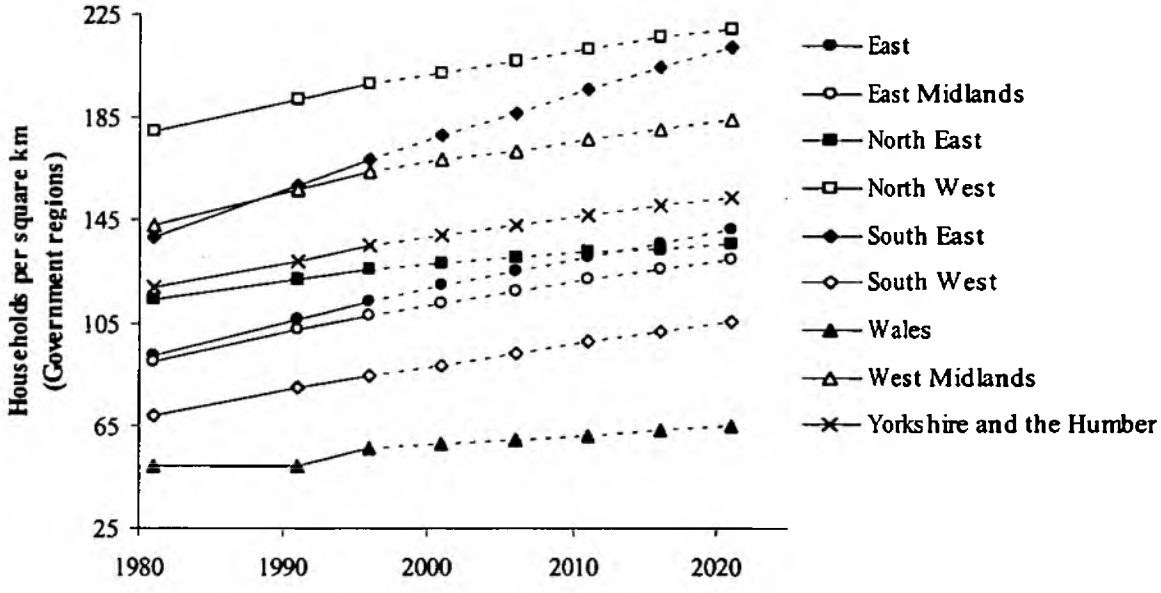
The pressure on all resources potentially increases as the population density increases. The population of England and Wales was estimated to be 52 million in 1996, and is projected to rise gradually to 56 million by 2031 and then decline.

Projections are made by rolling forward the existing population each year, adding births and net in-migration, and subtracting deaths. They therefore depend on the assumptions chosen for each of these factors and become less certain the further into the future they are projected.

There are significant regional differences in the estimated population projections and hence densities. Population densities are expected to show a downward trend in the North East and North West and a rise in all other regions. The number of households is rising at a greater rate than the population due to changes in the structure of families and an increase in the number of single person homes **(S2.2)**.

Data source: Office for National Statistics **Update period:** Annual **Data notes:** Projected data are based on 1996 estimates. London is excluded because of a very high population density makes it difficult to present on the same chart as other regions.										
Scales of possible use	UK	*	E&W	*	Agency Region		Local Govt.	*	Other	

S2.2 Household density



Note: London is excluded

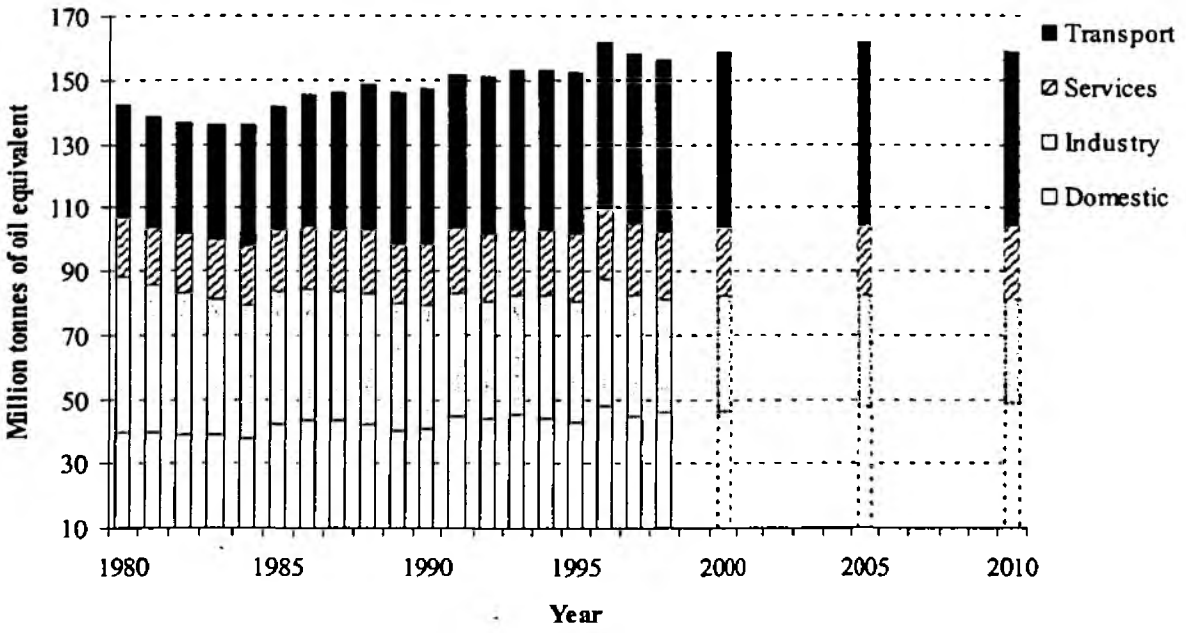
Households cause pressures on the environment in which they are situated because of demands for water, energy, land and waste management. Growth in the number of households has outstripped population growth for many years so this indicator is used in conjunction with **S2.1** to represent general demographic pressure on the environment.

The number of households in England and Wales is projected to rise by 19 per cent between 1996 and 2021. The main reason is the change in the size and age structure of the population, but changing family structures and lifestyles also play an important part. There are large regional variations, with projected increases of about 25 per cent in the south but only 10 per cent in the north of England. Household numbers are still projected to rise in most areas even where the population is falling. An increasing proportion of people who live by themselves has supplemented the historic trend of decreasing family size. The proportion of one-person households was under one-fifth in 1971 and is projected to rise to around a third by 2021. Migration patterns contribute to differential household growth across the country. These are demographic projections, based on assumptions that past trends (in household formation, marital status, and population) continue into the future.

Data source: Office for National Statistics
Update period: Annual
Data notes: Data are estimates with future projections. London is excluded because of a very high population density makes it difficult to present on the same chart as other regions.

Scales of possible use	UK	*	E&W	*	Agency Region		Local Govt.	*	Other	

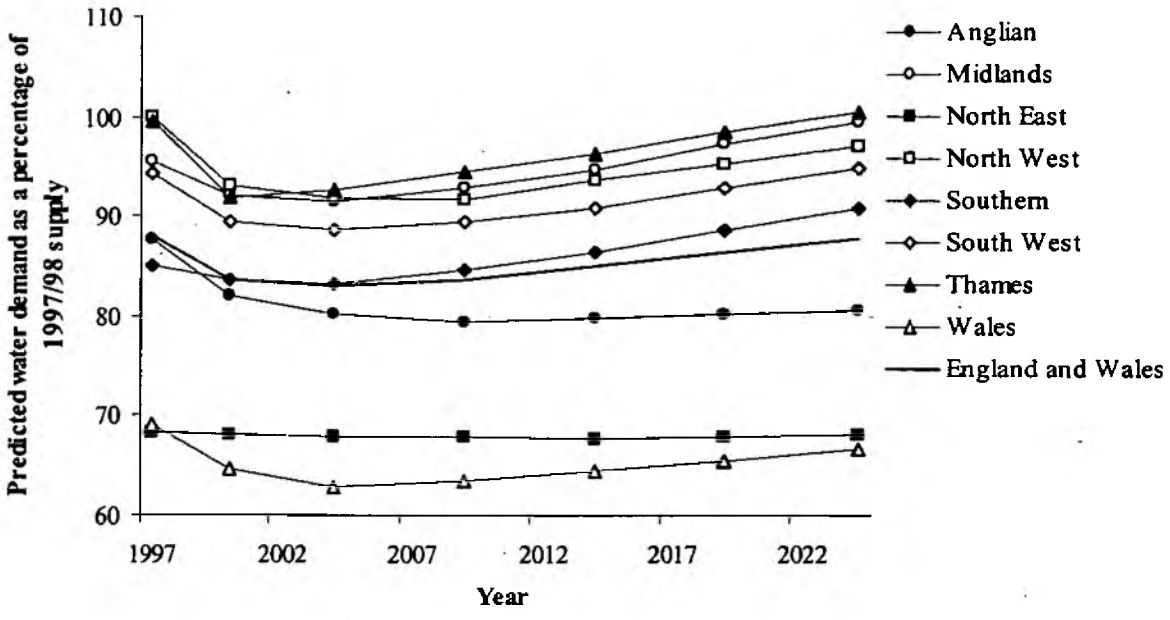
S2.3 Final energy consumption in the UK



Energy efficiency and reduced consumption of energy derived from fossil fuels is a key requirement for tackling climate change, so we need to know trends in final energy consumption. The total final energy consumption in the UK was 156 million tonnes of oil equivalent in 1998. The majority was for transport (34 per cent), domestic use (29 per cent) and industry (22 per cent). Final energy consumption increased by 2.6 per cent between 1995 and 1998. The change in energy use by different sectors has varied considerably between 1980 and 1998. Industrial energy use fell by 28 per cent, which reflects a decline in more energy-intensive industry and increased energy efficiency. Energy use by the service sector has grown slightly. The large increase in passenger transport (**S2.5** and **S2.7**) over the same period has led to a 51 per cent rise in energy use for transport. Less than one per cent of primary energy consumption in the UK was from renewable sources in 1996 (**V1.5**). This indicator is presented as a background indicator of resource use by the different sectors.

Data source: DTI and Cambridge Econometrics (forecasting figures) **Update period:** Annual **Data notes:**										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S2.4 Water demand and availability



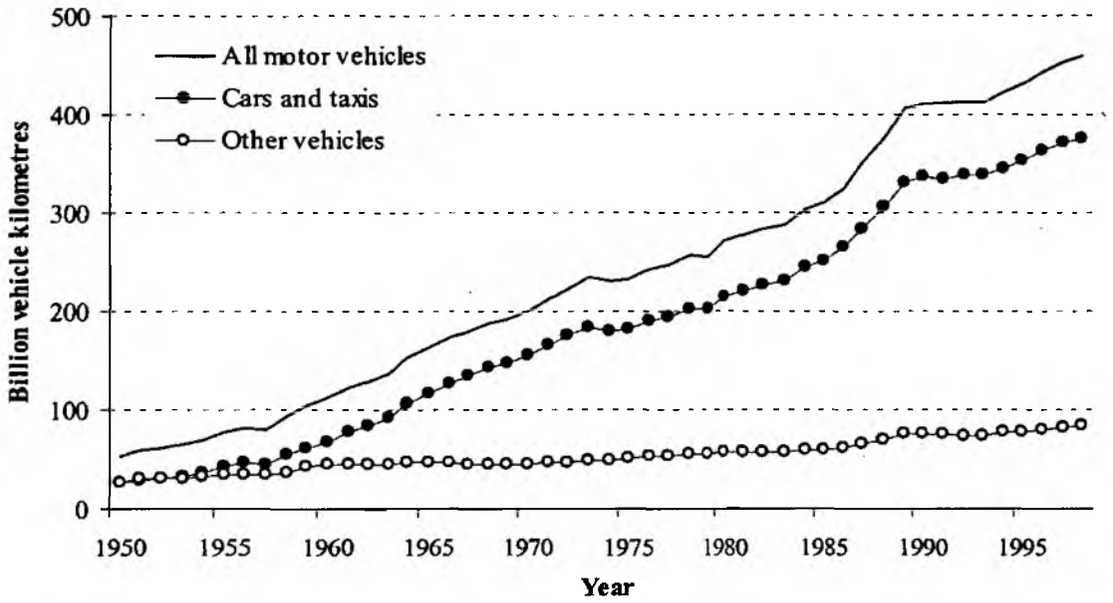
Water companies supply water to households and industry by abstracting water from rivers, boreholes and reservoirs. Pressures leading to greater demand for public water supplies include increasing numbers of households, growing demand for non-essential uses of water (e.g. power showers, swimming pools), garden watering and new commercial ventures. Projections are based on predictions of population and numbers of households, forecasts of distribution losses, and predicted demand from household and commercial customers with planned demand management measures in place. Public water supply accounts for about half of total water abstracted (**S3.1**).

Water is a renewable resource that is vital for public health and the environment. A key sustainable development objective is to safeguard our water resources and ensure we have affordable public water supplies provided in ways that protect the environment. Comparison of actual performance against predictions in future revisions of this indicator would help show whether that objective is being met.

This indicator is also used by DETR (Q2).

Data source: Environment Agency **Update period:** Annual **Data notes:**										
Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

S2.5 Road traffic by type of vehicle in Great Britain



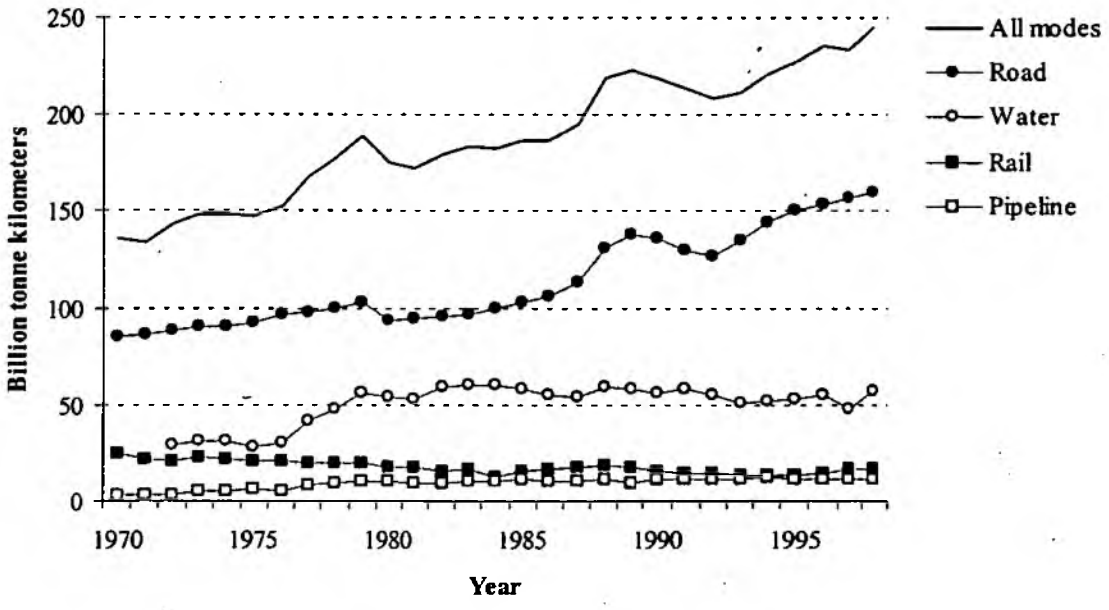
Road traffic is one of the fastest growing contributors to greenhouse gas emissions (**S4.9, S4.10** and **S4.11**), which cause climate change. It also adds substantially to local air pollution (**V3.1**) and to noise levels. Estimates suggest that the cost of congestion runs into billions of pounds each year. Motor vehicle traffic in 1998 was more than eight times that in 1950, and car traffic in particular has increased by more than fourteen times. Over the last 20 years, the number of kilometres travelled by car per head of population has grown by 65 per cent. If no action was taken, road traffic could increase by more than a third over the next 20 years.

The key objective is to strike the right balance between transport's role in helping the economy progress and allowing people to travel wherever they need to go, while at the same time protecting the environment and improving quality of life. At present emissions from cars contribute about two-thirds of the nitrogen oxide emissions (**S4.5**) attributed to road transport.

This indicator is taken from DETR (H11).

Data source: DETR **Update period:** Annual **Data notes:**										
Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	GB

S2.6 Freight transport by mode in Great Britain



There has been a strong growth in road haulage influenced by changing patterns in logistics, in production procedures, in the use of just-in-time, and in the centralisation of warehousing and distribution facilities. It is argued that rail freight had traditionally not been able to provide the level of service required by a modern manufacturing industry or retail chain, in terms of flexibility, response time and cost.

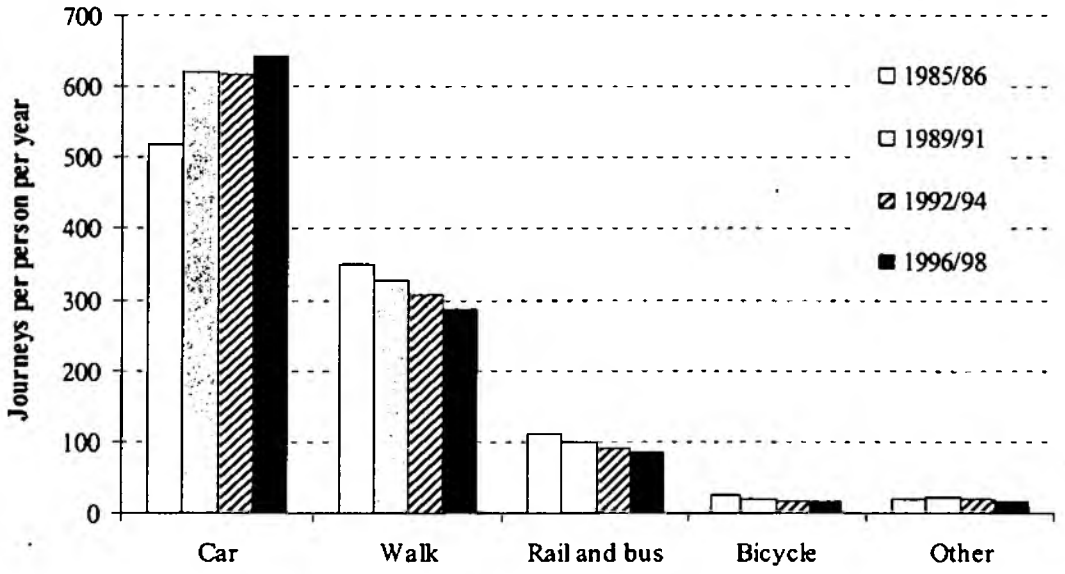
Total freight moved increased by 80 per cent between 1970 and 1998. The proportion of freight moved by road remained around 65 per cent, whilst that moved by rail fell from 18 per cent to seven per cent, although there has been a small recovery in recent years.

Freight distribution supports economic growth but it also contributes about two-thirds of the particulate emissions attributed to transport **(S4.8)** and a third of the nitrogen oxides **(S4.5)** from road transport. More efficient use of the lorry combined with a modal shift to rail and water is necessary to reduce congestion, pollution, climate change, accidents and disturbance.

This indicator is taken from DETR (D20).

Data source: DETR **Update period:** Annual **Data notes:**										
Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	GB

S2.7 Passenger travel by mode in Great Britain



The number of households with access to a car, the number of households with two or more cars, and the number of people holding a full driving licence all increased between 1985/86 and 1996/98, making it more likely that people would use a car.

The number of journeys per person per year by car increased by 20 per cent in the second half of the 1980s, but by only a further four per cent between the surveys of 1992/94 and 1996/98. Journeys by public transport, bicycle and on foot all fell significantly over the period. Between 1985/86 and 1996/98 the number of journeys that were mainly on foot fell by 18 per cent and the number of bicycle journeys by 36 per cent. There was little change in the total number of journeys each person made.

A key Government objective is to encourage people to walk, cycle or use public transport more and their cars a little less, and to reduce the need to travel through better land use planning.

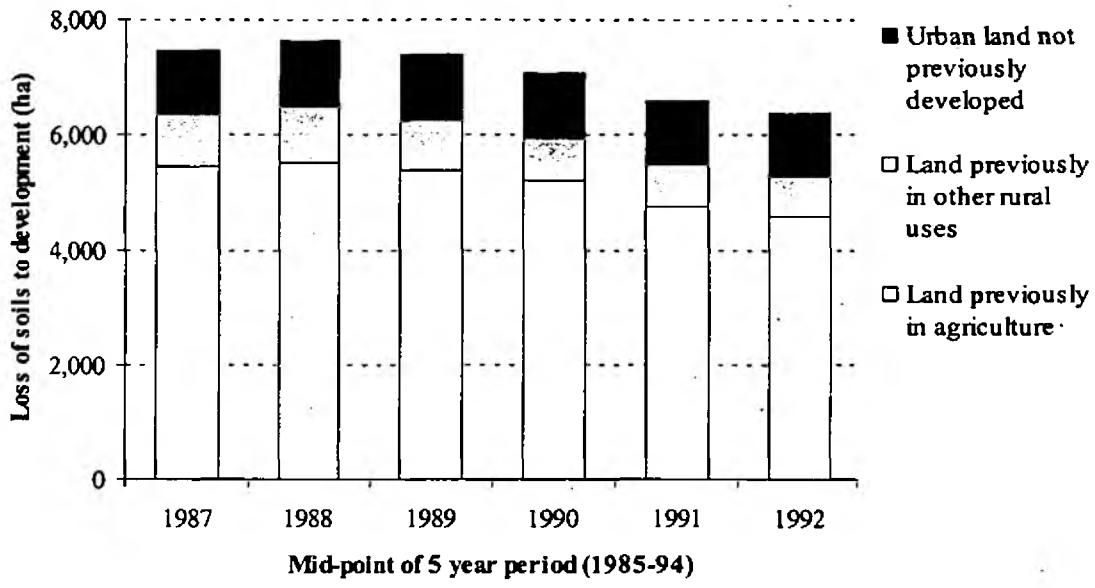
There is a target to achieve a 15 per cent increase in the number of rail passenger miles in Great Britain between 1997/98 and 2001/2. There also is a National Cycling Strategy target to double bicycle use in the UK between 1996 and 2002 to 32 bicycle journeys per person per year.

The number of rail journeys is now increasing after decades of little change and bus journeys have stabilised after a long decline.

This indicator is also used by DETR (G1).

Data source: DETR **Update period:** Unknown **Data notes:**									
Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	GB

S2.8 Net loss of soils to development in England



Soils in rural use are under continuing pressure for new housing, commercial, industrial and infrastructure development. It was estimated that, in 1991, around 10 per cent of the land area of England was in urban use. The area of urban land has increased by about half a percentage point, or 70,000ha, during the ten-year period 1985-1994.

Development can have adverse effects on both the biological and physical properties of soil and can limit its future uses. The sustainable use of soil requires that a sufficient quantity of greenfield soils is retained for present and future needs: for example, ecosystem support, food and fibre production and the protection of cultural heritage.

In England, between 1990 and 1994, there was a net change of around 6,500ha of land a year to developed use. Most of the land becoming developed was previously used for agriculture, though around a quarter had other rural uses, such as forestry or outdoor recreation, or was vacant undeveloped land in urban areas.

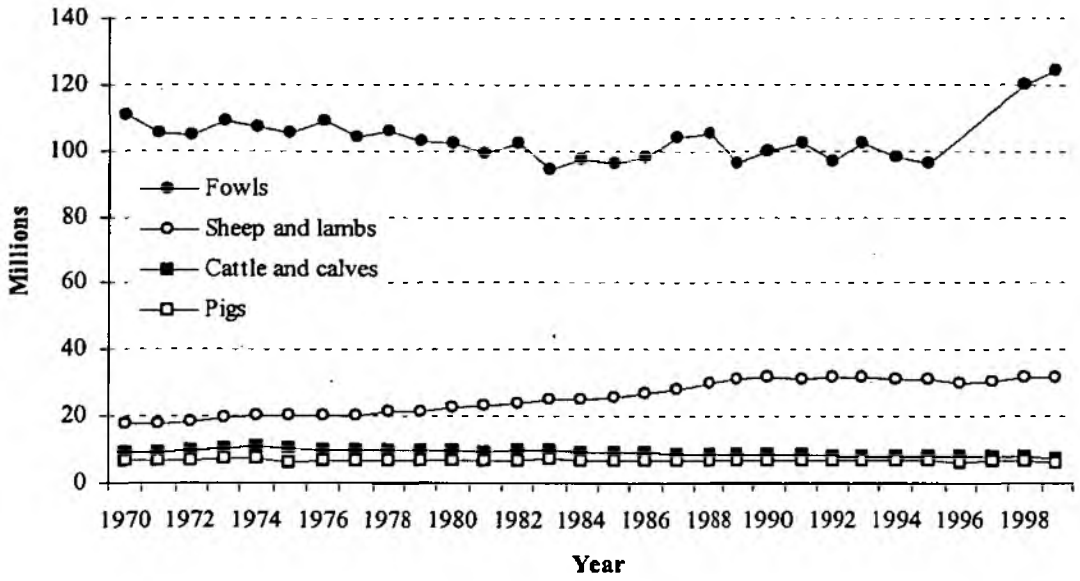
The indicator uses land area loss as a proxy for soil loss. The chart is based on data from 1985 to 1994, but there is considerable fluctuation in the annual figures reported, and so five-year moving averages have been used. There is evidence of a gradual reduction in the amount of greenfield land used for development during the period. The data illustrated are net figures and take account of the small amounts of land that changed from developed to other uses.

Further indicators in the area of soil and land are proposed for development (Appendix I).

This indicator is taken from DETR (S1). MAFF use a similar indicator relating to agricultural land only (29).

Data source: DETR **Update period:** Every five years **Data notes:** Year is mid-point of 5-year period.										
Scales of possible use	UK		E&W		Agency Region		Local Govt.		Other	England

S2.9 Livestock on agricultural holdings



Over 70 per cent of land in England and Wales is used for agriculture, around 40 per cent of which is grass and is used predominantly for livestock grazing (**V1.2**).

The numbers of animals has remained roughly constant for cattle and pigs but almost doubled for sheep since 1970. The pressure caused by livestock on the environment (grazing animals) will depend on the stocking density and farming practices and not just on the number of animals. High stocking density increases the grazing pressure and risk of soil erosion. Some animal production systems, for example outdoor pigs can have a high impact on the land and are increasing in popularity in response to livestock welfare concerns.

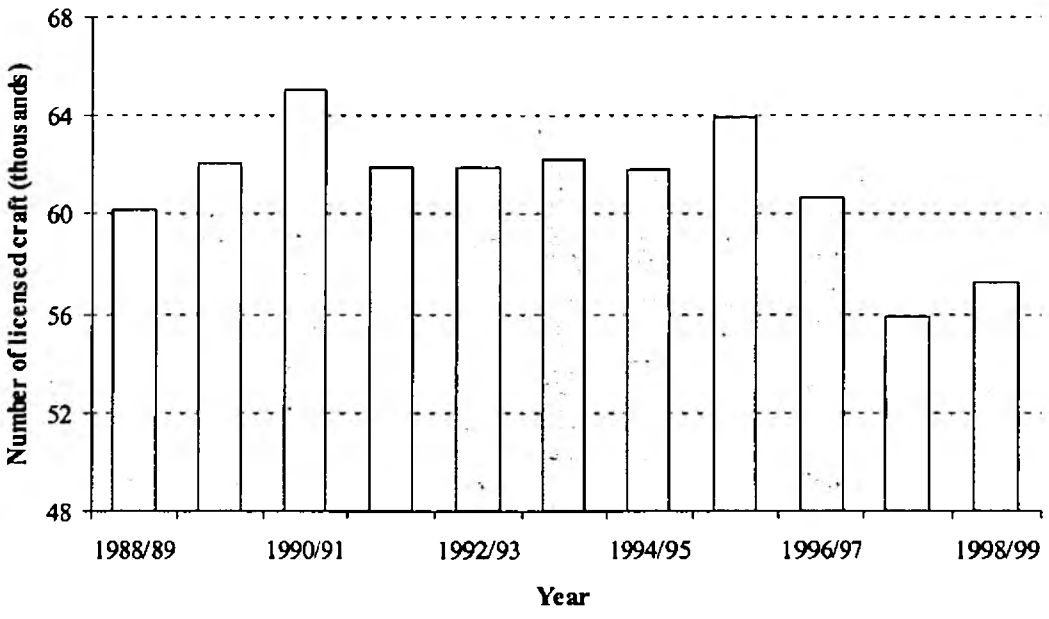
Inappropriate management of livestock waste is one of the causes of pollution incidents from farms, but these have declined since 1991. In addition to livestock waste, sheep dips are a major cause of water pollution incidents in rural areas (**S6.1**).

This indicator could be developed further to show regional splits in the data.

Data source: MAFF
Update period: Annual
Data notes: Respondent confidentiality prevents reporting at very small scales. Data for fowls excludes ducks and geese but includes all other birds used for egg and meat production and breeding. Data are usually supplied based on a MAFF Region but other areas may be possible.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.	*	Other	*

S2.10 Craft on inland navigable waterways



The licence numbers for craft on inland waterways managed by the Environment Agency and British Waterways can be used as an indication of the level of boating activity on these waters. The statistics given for navigation show a fairly constant level of licensing over the period 1988/89 to 1998/99.

There are limitations in using these data to indicate the level of activity:

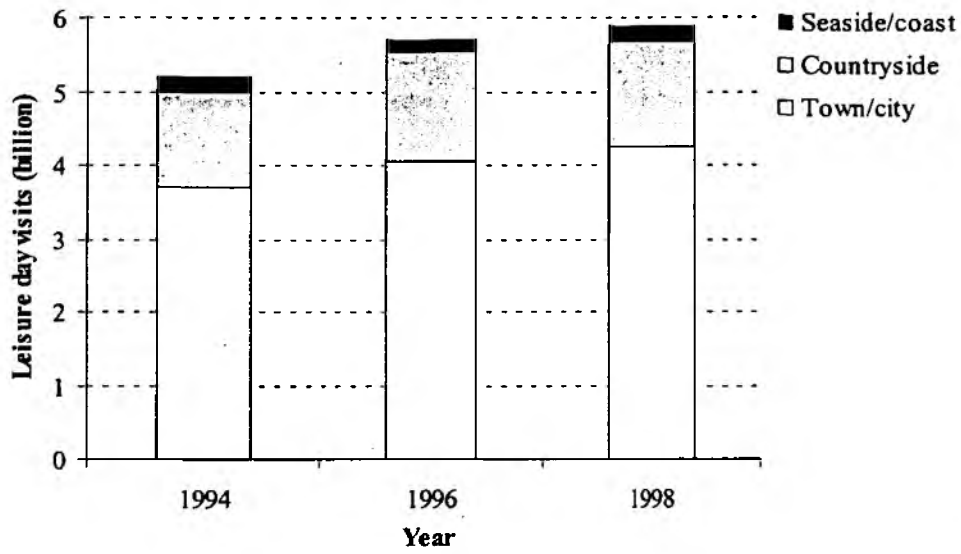
- although the Agency and British Waterways manage a considerable proportion of inland waters, rivers and canals, there are other inland navigation authorities responsible for managing other inland water stretches from which no statistics have been obtained;
- tidal reaches of many rivers have a public right of navigation, where no licences are required, and no attempt to gauge these numbers have been made here;
- the indicator assumes that all vessels with a licence are in use and this may not be so. Use of licensed vessels may vary, and is no indication of seasonality is given.

This indicator has been included in our framework as a pressure from society on the environment. There are some local pressures from boating that can be reduced by management. It is also an activity that contributes to the quality of life for many people.

Data source: Environment Agency and British Waterways
Update period: Annual
Data notes: Figures include licence statistics for British Waterways and the Environment Agency Navigations (Agency navigations include Thames, Southern and Anglian Regions.) British Waterways figures include licences for powered and unpowered long term licences. Agency figures include all licensed vessels.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

S2.11 Leisure day visits in the UK



The Agency is one of a consortium of national agencies with recreation and tourism responsibilities that has commissioned research on Leisure Day Visits in the UK in 1994, 1996 and 1998. The research was undertaken to measure the extent of participation in leisure day visits by adults resident in Great Britain and to estimate the scale and value of these visits. The indicator data give the number of UK day visits made in the years 1994, 1996 and 1998. The number of day visits made increased between 1994 and 1996. There is no statistically significant increase between 1996 and 1998.

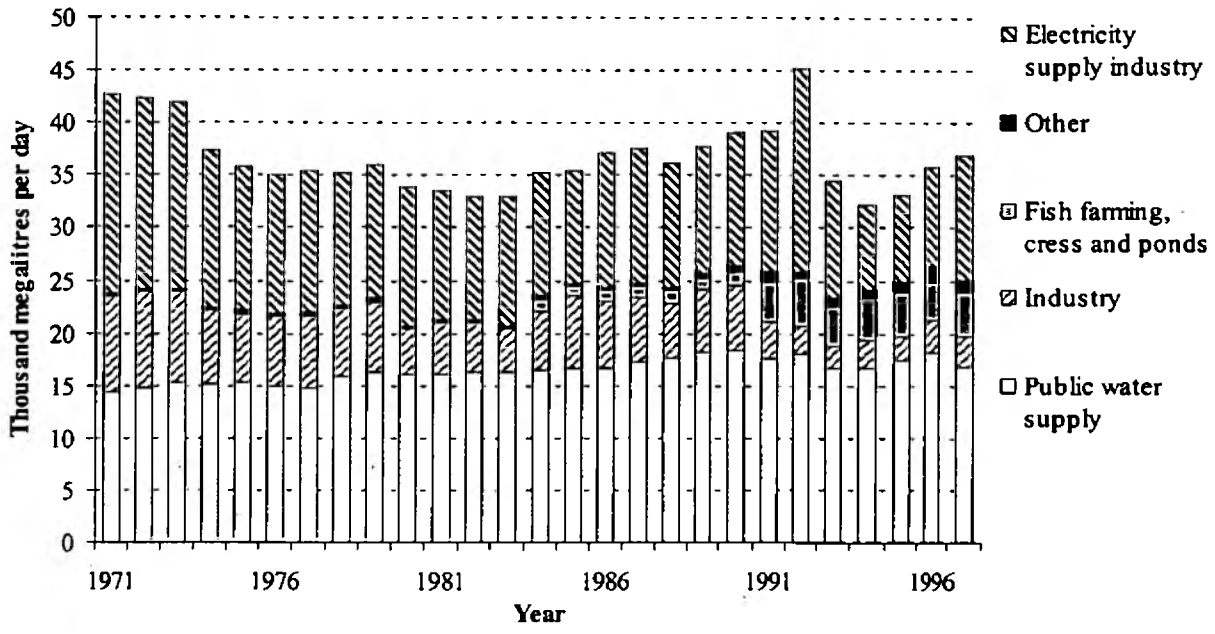
Visits made were categorised into those made to town/city, countryside and seaside/coast. In 1994, 25 per cent of all visits (approx. 1.3 billion visits) were made to the countryside and four per cent of all visits were made to the seaside or coast. In 1998 the proportions of visits made to countryside and coast remained similar, at 24 per cent and four per cent respectively.

The transport used to make leisure day visits may be considered an environmental pressure. In 1996, the car was the dominant form of transport, accounting for 57 per cent of trips followed by walking (30 per cent of trips). It was noted in 1996 that public transport was seldom used. In 1998, the main means of transport used to make day visits were found to be similar to 1996, with no significant change. Local authorities and countryside organisations are promoting initiatives to reduce the dependency on the car for recreational visits to the countryside. Leisure trips are recognised as contributing to the quality of life for many people.

Data source: UK Day Visits Survey
Update period: under review
Data notes: Leisure day visits are defined as 'round trips made from home within the same day for leisure purposes, to locations anywhere in the UK'.

Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S3.1 Abstraction from fresh waters



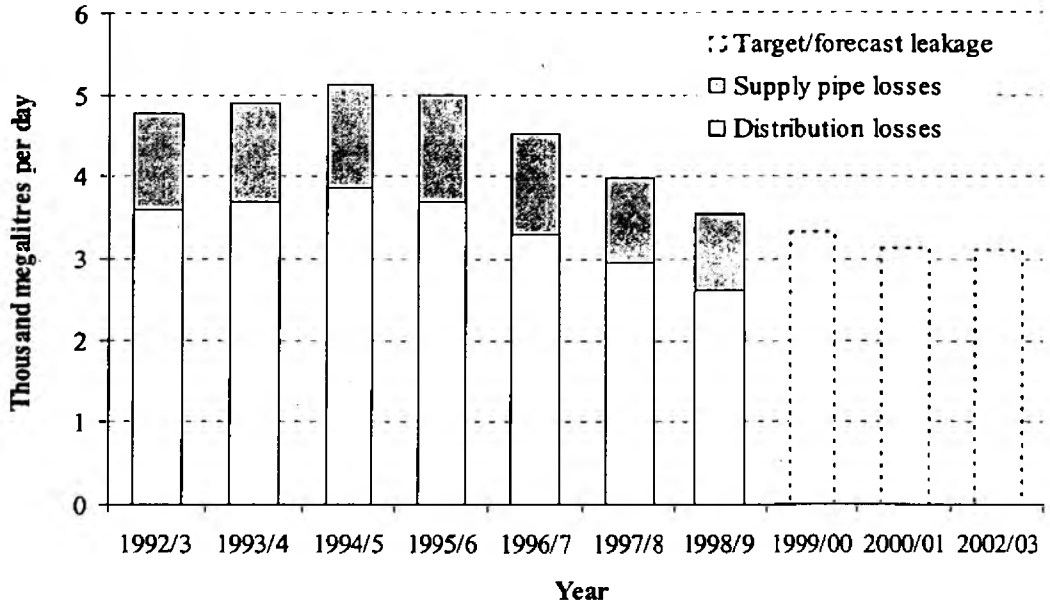
About 37,000Ml/day was abstracted from freshwater sources (surface and groundwater) in England and Wales in 1997. Water for public supply accounts for about half of water abstracted. Quantities abstracted for public water supply have increased over time whilst that used by industry has decreased. Groundwaters provide 35 per cent of abstractions used for potable supply although this varies regionally (over 70 per cent in the Southern Region). They are also a particularly important resource for rural communities. Uses by agriculture are low at present (less than one per cent) but are predicted to rise with climate change. As these are consumptive, careful management is required.

The seasonal timing of abstractions can be critical to the stress on the environment and the balance between abstractions and storage is crucial. Water supplied for domestic use has decreased in the last few years due to significant decreases in the amounts lost through leakage. Even after significant improvements a quarter of water supplied was lost in leakage in 1997/98 (**S3.2**). Over-abstraction has been linked to low flows in some rivers and has affected some SSSIs (an indicator for this issue is proposed for development (Appendix I)).

A similar indicator is used by DETR (Q5)

Data source: Environment Agency/Water Industry UK/Office of Water Services **Update period:** Annual **Data notes:** Data collected before 1991 are not strictly comparable with those for later years.										
Scales of possible use	UK		E&W		Agency Region	*	Local Govt.		Other	

S3.2 Water leakage



A proportion of the water abstracted and put into the public supply (**S3.1**) is lost through leakage from pipes. In 1998/99, 3,552 megalitres (Ml) per day of water put into the supply by water companies in England and Wales was lost through leakage. This compares with 5,112Ml per day in 1994/95, a fall of 31 per cent. In 1998/99, leakage levels reported by water companies were 22 per cent lower than in 1996/97.

Water lost through leakage is not permanently lost from the environment because it will eventually flow back to rivers or groundwaters, but the time delay in this process generally means that it is lost as a water resource and cannot be used. More water than is necessary is therefore abstracted from the freshwater environment. Also, the water will not generally be returned to where it was abstracted from, causing local resource problems.

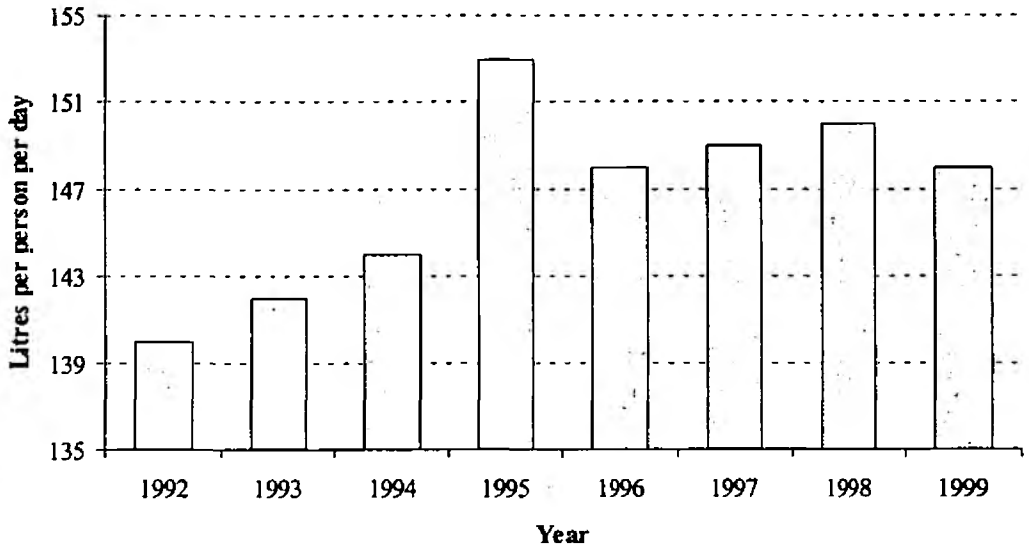
Mandatory leakage targets for water companies in England and Wales were set which required leakage to be reduced by 26 per cent by 2000, compared with 1996/97 levels. The companies forecast a further nine per cent reduction by 2002/03.

This indicator is taken from DETR (Q4).

Data source: Office of Water Services
Update period: Annual
Data notes: Figures for 1992/93 and 1993/94 are on a different basis and slightly underestimate leakage. 1999/00 and 2000/01 figures are targets. 2002/03 figure is a water company forecast as supplied in company business plans.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

S3.3 Household water use



Water consumption per head in households increased by 5.5 per cent between 1992 and 1999 in England and Wales. In 1995, the average and peak demands for public water supply were higher than in other years because of the unusually hot, dry weather that year, and because of progress in improving water efficiency made since then (**S2.4**).

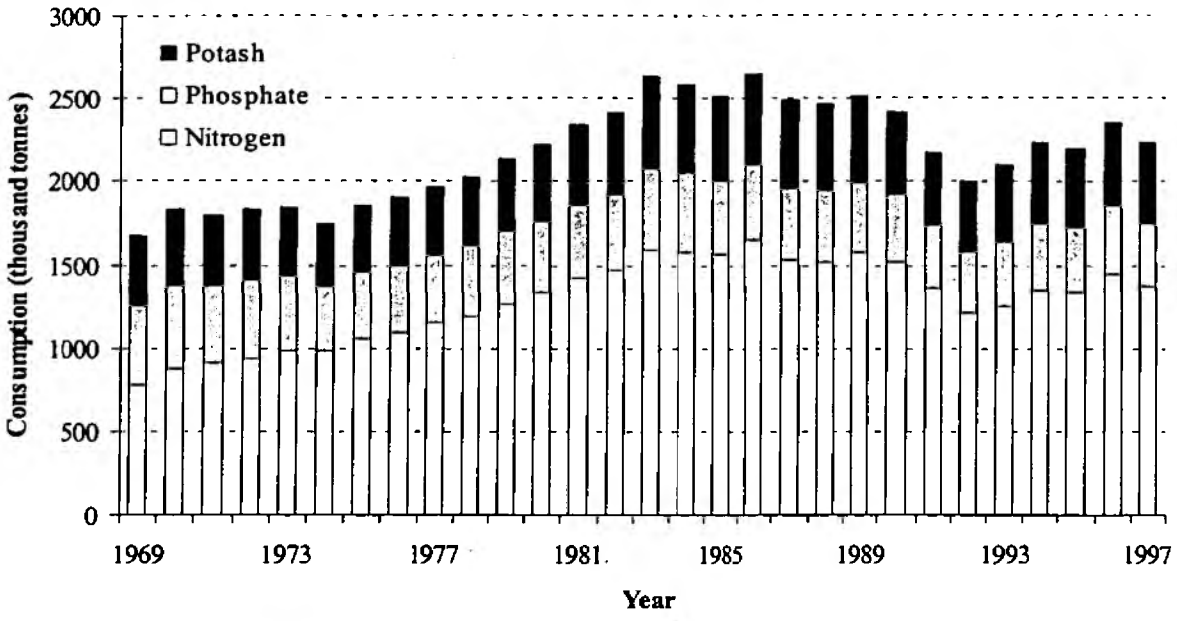
Water is a renewable resource that is vital for public health and the environment. Water use is growing and safeguarding our resources is essential for sustainable development.

Factors leading to increased consumption per head include increasing numbers of households; increasing use of domestic appliances and warmer weather.

A similar indicator is used by DETR (D7).

Data source: Office of Water Services **Update period:** Annual **Data notes:**										
Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

S4.1 Consumption of inorganic fertilisers in the UK



Fertilisers have contributed to a great increase in crop productivity over the past 50 years. Use of fertiliser in excess of the needs of the crop can lead to movement into groundwaters and surface waters. Nutrient enrichment from agriculture and other sources can cause problems for water users and aquatic life.

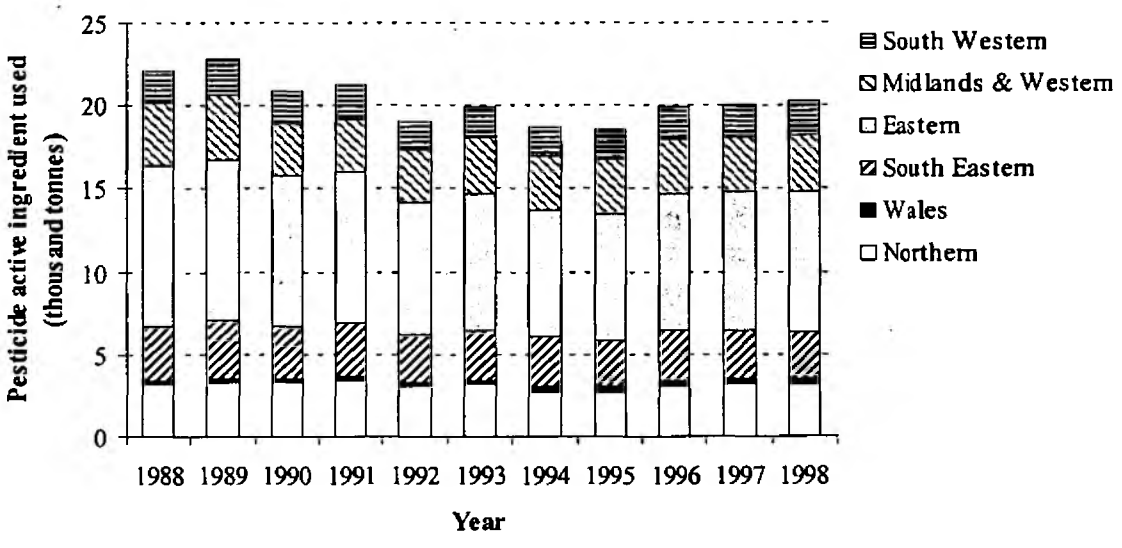
In 1997/98, 1.37 million tonnes of nitrogen, 0.38 million tonnes of phosphate and 0.48 million tonnes of potash fertiliser was used in the UK slightly reversing the downward trend in consumption evident from the mid-1980s. Following on from a steady increase in fertiliser usage in the 1970s and early 1980s with a peak usage in the mid-1980s, fertiliser use has now returned to late 1970s levels.

The quantity of fertiliser used does not necessarily reflect its environmental impact. The timing, method of application and the form in which the fertilisers are used can make a big difference to their pressure on the environment. Excess nutrients may leach into rivers and cause eutrophication (**V4.2**). Nitrate tends to reach peak levels in rivers in the autumn, especially after dry summers, which can cause difficulties at drinking water abstraction points. Where this has been a particular problem, policy initiatives such as designation of nitrate vulnerable zones are attempting to address the issue.

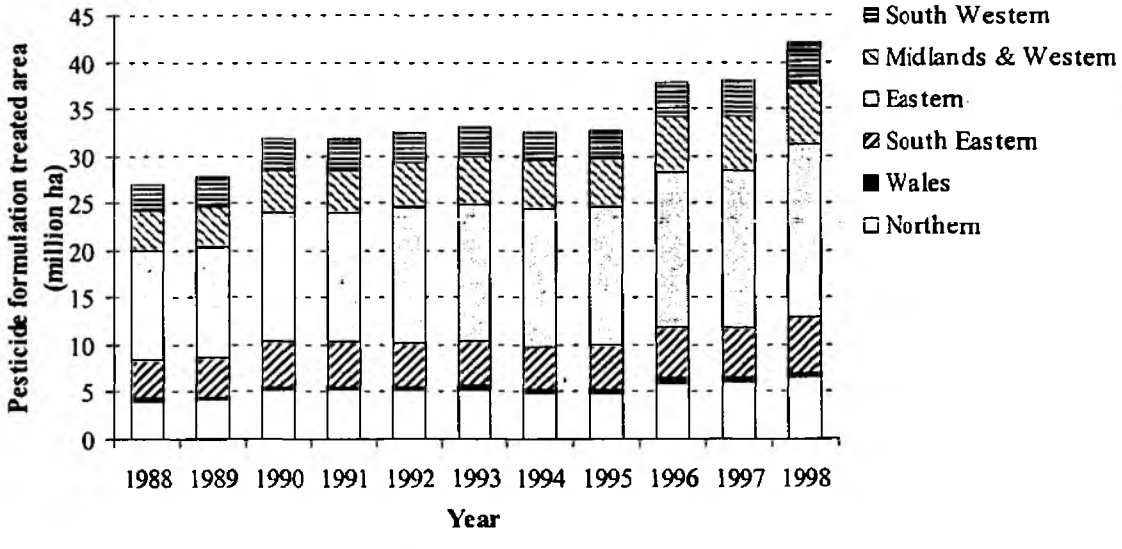
Data source: Fertiliser Manufacturers Association **Update period:** Annual **Data notes:** the years presented refer to financial years (e.g. 1997 refers to 1997/98)									
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S4.2 Usage of pesticides in agriculture and horticulture

S4.2(a) Weight of pesticide active ingredient used



S4.2(b) Pesticide formulation treated area



Pesticides are used to kill pest species in a wide range of situations. The agriculture and horticulture sectors are major users of pesticides but they are also used widely in other situations such as amenity land, for public hygiene uses, as wood preservatives, boat anti-fouling paints or veterinary medicines. The manufacture, sale and use of pesticides is highly regulated but even so pesticides can be detected widely at low levels in many parts of the environment. The levels of pesticides found in the environment are not necessarily in proportion to their usage. A complex range of factors including physico-chemical properties, soil types and weather affect the transport of a pesticide from its site of application. The environment can be especially at risk from the misuse of chemicals or accidents that can cause serious environmental damage **(S6.1)**. Pesticides can contaminate river waters **(V4.3)** and groundwaters even through approved uses.

Data on usage of pesticides in sectors other than agriculture and horticulture, for example amenity usage, have been available sporadically. Data on the usage of pesticides in non-agricultural situations (timber treatment, paint, public hygiene uses and others) are not available.

This indicator shows that a decline in the weight of pesticides used has occurred in the past decade. This is in part due to the development of newer, more effective pesticides, which has resulted in much smaller quantities being required to achieve the same effect, and in part due to a change in agricultural methods of pesticide application. The total amount of pesticides used is not necessarily in proportion to the potential threat to the environment, because some pesticides used in small quantities may be more toxic than others used in larger quantities. So it is not a very good indicator and further consideration is needed in the future.

The formulation area treated is calculated by multiplying the area treated by the number of sprays it receives. This indicator has been chosen to represent the average intensity of pesticide use on farmland. 'Spray area' has increased over time, reflecting a gradual move towards more frequent treatments and more complex tank mixtures of chemicals.

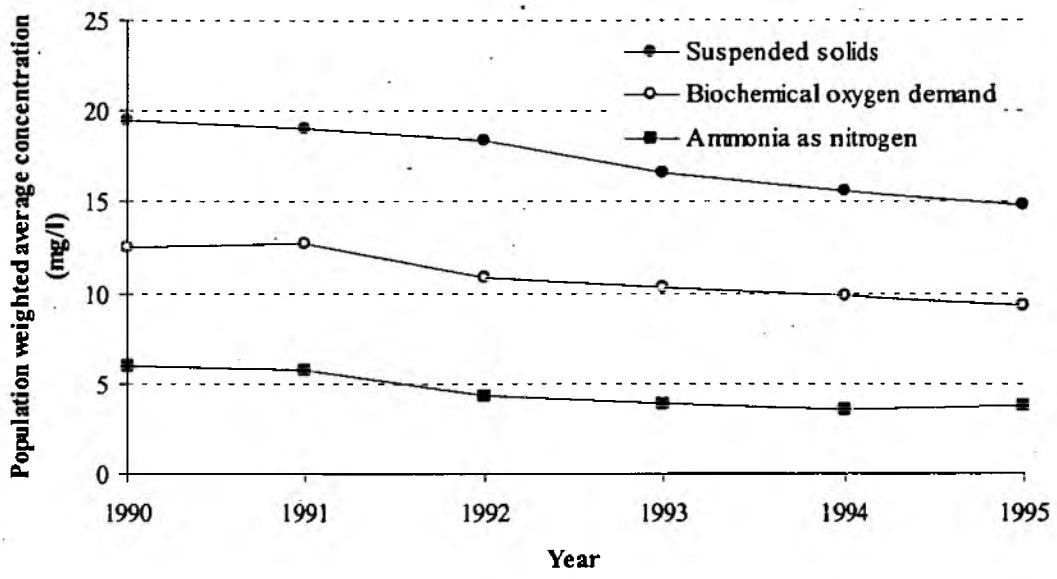
There are significant regional differences in the use of agricultural pesticides. They are largely used in the arable areas of the East, Midlands and Southern England with less usage in Wales, the south west and the north west, although sheep dip chemicals (not included in these data) are likely to be more significant than agricultural chemicals in some of these areas.

Similar indicators also used by MAFF (15/16) but are presented for Great Britain.

Data source: Central Science Laboratory, Pesticide Usage Survey, MAFF
Update period: Main survey is biennial with supplementary surveys in the interim years
Data notes: Data usually available at scale of MAFF Region or England and Wales/ Great Britain. Sulphuric acid is excluded from the analysis. There are slight differences between regionally split figures and England and Wales totals because some minor uses cannot be disagregated.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	MAFF

S4.3 Pollutants from sewage treatment works



Most of the 70,000 consented discharges to fresh waters in England and Wales are from sewage treatment works (STWs) (over 80 per cent). Discharges from STWs represent a pressure on the environment and may contain a range of pollutants. The three principal consented limits are for suspended solids, biochemical oxygen demand and ammonia but a range of other substances may be limited depending on the discharge.

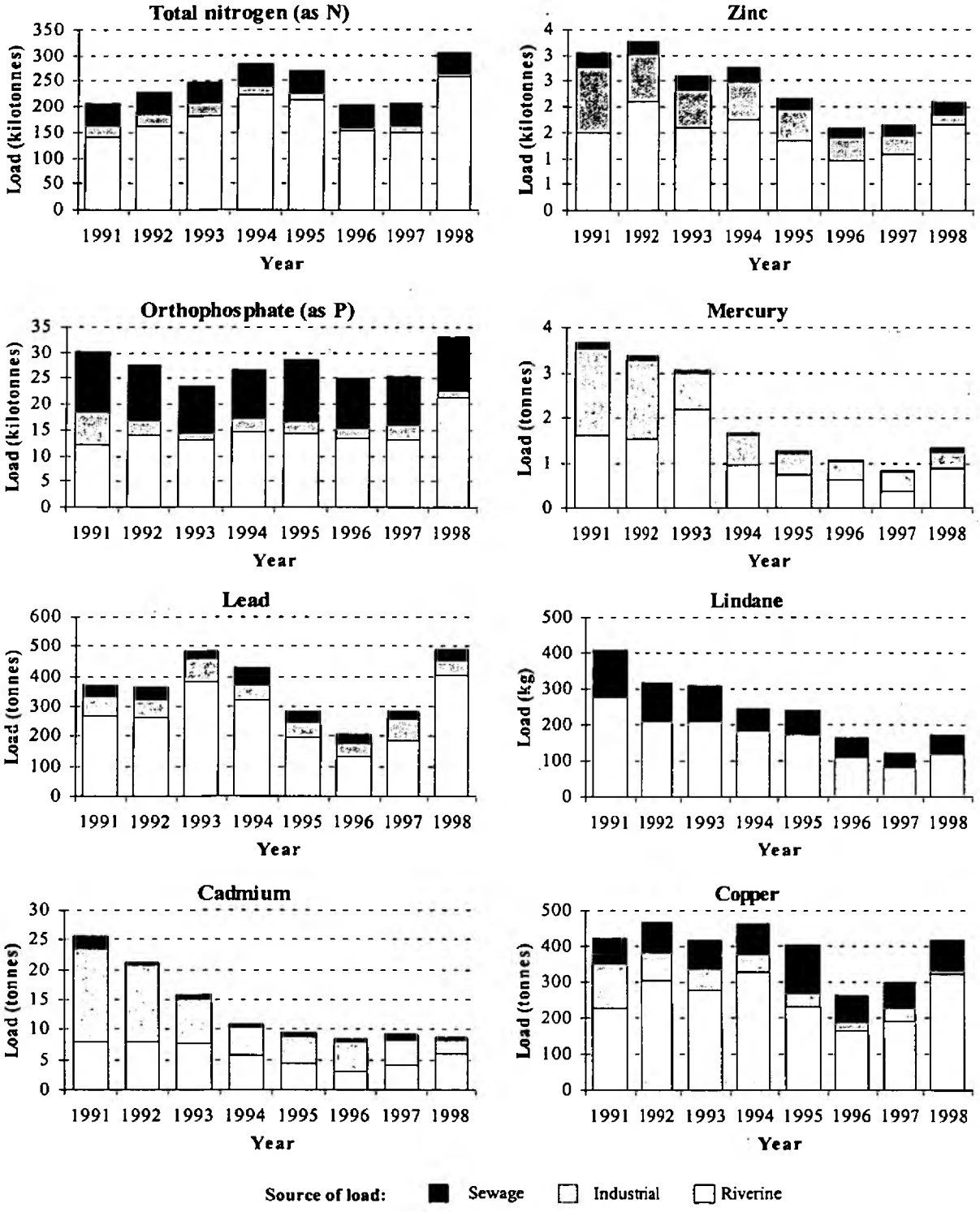
Many of the discharges are small and only about 1,600 serve population equivalents greater than 2,000, with around 700 serving population equivalents of greater than 10,000. Many industrial sites discharge liquid waste to STWs, effluent from which are then consented by the Agency.

Pollutant loads from STWs have reduced since 1990 due to substantial investment by the water companies. Further reductions are expected under the second and third investment programmes and the indicator should show the results of these. Some other water quality indicators should also reflect the environmental benefits of improvements in discharges from STWs (**V3.3**, **V3.7** and **V4.2**).

This indicator has been difficult to update. We are currently reviewing data collection methods and we hope to extend the range of determinands and provide a regional breakdown in due course.

Data source: Environment Agency **Update period:** Annual **Data notes:** Data are currently being collated for the years 1996 to 1999.										
Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

S4.4 Loads of major contaminants to coastal waters



At several 'North Sea conferences' in the 1980s, ministers agreed to reduce the quantities of pollutants, particularly hazardous substances and nutrients, entering the sea. Monthly monitoring data from sewage treatment works and industrial sites which discharge directly to estuaries and coasts are used to calculate pollutant loads, together with the loads from riverine sources, which are mainly measured at the Harmonised Monitoring sites. This combined data set is known as the 'OSPAR' (Oslo and Paris Conventions) data.

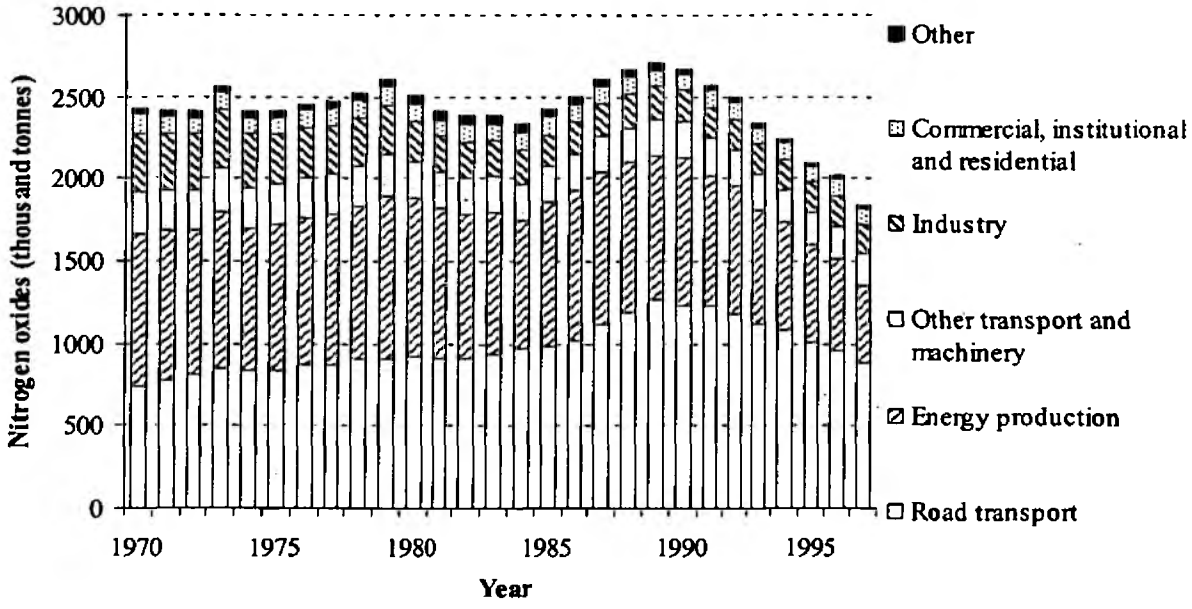
Since 1990, there have been substantial reductions in hazardous substances discharged to the sea, particularly with regards to mercury, cadmium, lead and lindane. The trends for nutrients are less clear. From 1986 to 1993 phosphate loads showed a decreasing trend, but marked annual variations have been recorded since. The observed reduction in orthophosphate loads since the mid 1980s is a consequence of reductions in the amounts of phosphate used in detergents, which in 1993 was about half of the quantity used in the early 1980s.

The targets set by North Sea ministers were to reduce the inputs of 36 substances from rivers and direct discharges by 50 per cent between 1985 and 1995. Total inputs, including atmospheric, of dioxins, mercury, cadmium and lead were to be reduced by 70 per cent. The UK set these targets for inputs to all its coastal waters collectively (not just England and Wales). These were achieved for 24 of the substances. There are now new targets for hazardous substances of achieving concentrations near to background values for naturally occurring substances and close to zero for synthetic substances by 2020.

Data source: Environment Agency
Update period: Annual
Data notes: based on PARCOM low load estimates (i.e. readings at limit of detection taken to be zero)

Scales of possible use	UK	*	E&W	*	Agency Region	*	Local Govt.		Other	

S4.5 Aerial emissions of nitrogen oxides (NOx) in the UK by sector

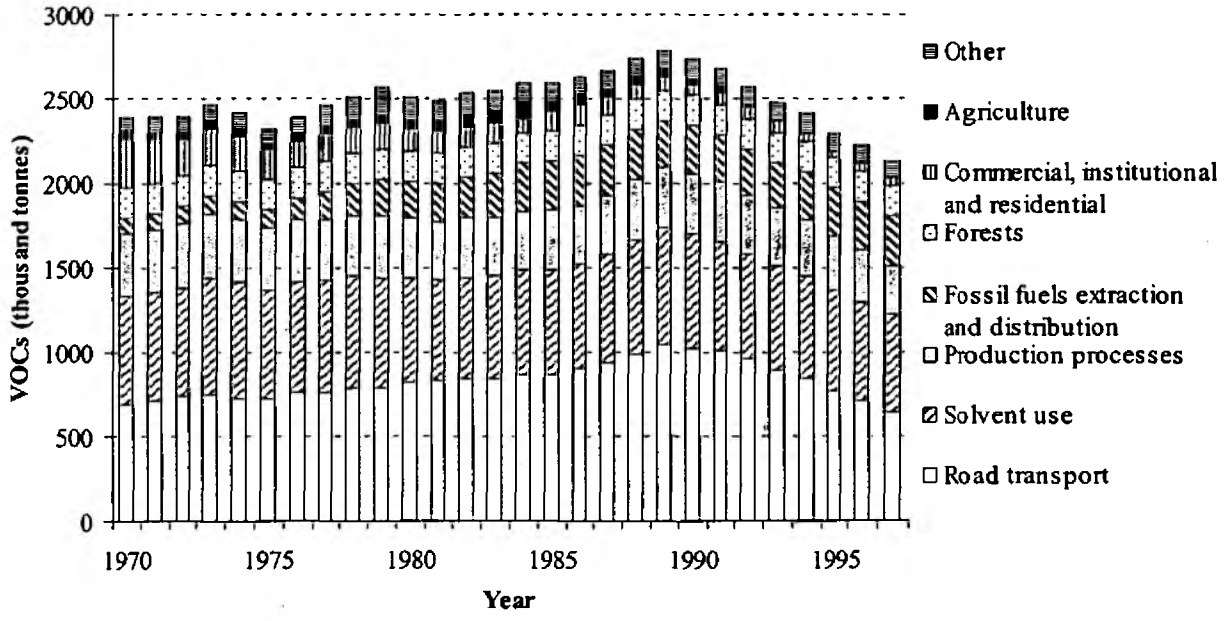


Nitrogen oxides, mainly nitric oxide (NO), are formed during combustion from nitrogen in the air and to a small extent from nitrogen in fuels. Nitric oxide is rapidly converted to nitrogen dioxide (NO_2) in the air by reaction with ozone and other oxidants. Nitrogen oxides are toxic to plants and nitrogen dioxide can cause breathing difficulties. Nitrogen oxides together with VOCs (**S4.6**) are also the main precursors of ground-level ozone. Deposition of oxidised nitrogen causes acidification (**V4.1**) and eutrophication (**V4.2**). Emissions are dominated by road transport, with power stations the second most important source. In urban areas traffic emissions dominate human exposure.

Nearly 90 per cent of UK emissions are exported, about ten times the amount received by the UK from other European sources. UK road traffic emissions of nitrogen rose by over 70 per cent between 1970 and their peak in 1989. They declined during the 1990s, particularly after the introduction of catalytic converters in 1993. The Auto-Oil programme and other Government measures should reduce traffic emissions to about one-quarter of their 1990 level by 2010. Progress may not be as great if diesel takes a greater share of the market. The contribution from heavy goods vehicles and buses which run on diesel is currently about one-third of nitrogen oxide emissions and this source should halve by 2010. The 'dash for gas' and investment in low nitrogen oxide burners reduced power station releases of nitrogen by over 40 per cent between 1990 and 1996. Current projections are that UK emissions of nitrogen oxides from all sources will fall by about half between 1995 and 2010 to about 1,200kt.

Data source: NETCEN **Update period:** Annual **Data notes:** 1 Kilotonne (kt) = 1000 tonnes.									
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S4.6 Aerial emissions of volatile organic compounds (VOCs) in the UK by sector

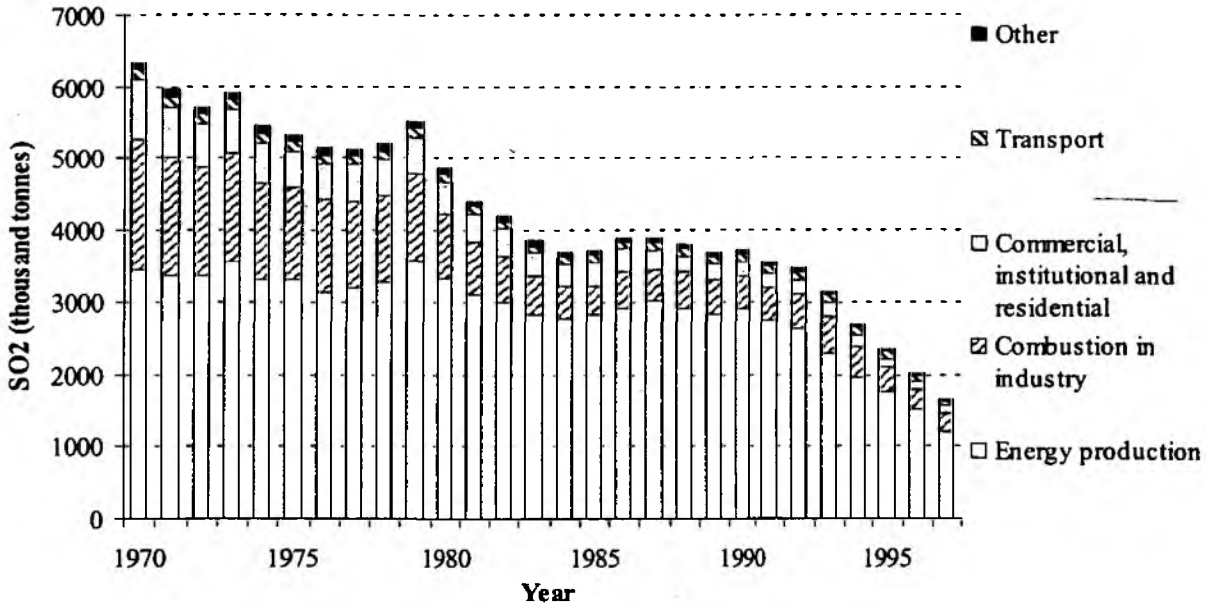


VOCs and nitrogen oxides are the main precursors of ozone, and some VOCs, like benzene and 1,3-butadiene, are toxic to humans. Road transport and solvent use each account for nearly a third of UK emissions of non-methane VOCs, with additional contributions from other manufacturing processes and the distribution of petroleum. Petrol engine cars without catalytic converters, or when cold, emit more VOCs than diesel cars but emissions from warm petrol engines with catalytic converters are similar to those from diesel. VOC emissions from traffic peaked in 1989 and fell 36 per cent by 1996. Emissions from solvent use have changed little over the past 25 years though the emissions figures have a high margin of error. Ships also release VOCs and other gases whilst loading, unloading and tank purging, and can contribute significantly to local emissions.

Existing measures on large and small industrial processes should reduce VOC emissions by about 40 per cent and a Solvents Directive should reduce emissions from certain industries by about 57 per cent between 1990 and 2007. Reductions will come mainly from the coating of textiles, pharmaceuticals, surface cleaning and vehicle finishing sectors. The Auto-Oil Directives will cut vehicle emissions of VOCs and nitrogen oxides by about 70 per cent.

Data source: NETCEN **Update period:** Annual **Data notes:** Dataset excludes methane.										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S4.7 Aerial emissions of sulphur dioxide (SO_2) in the UK by sector



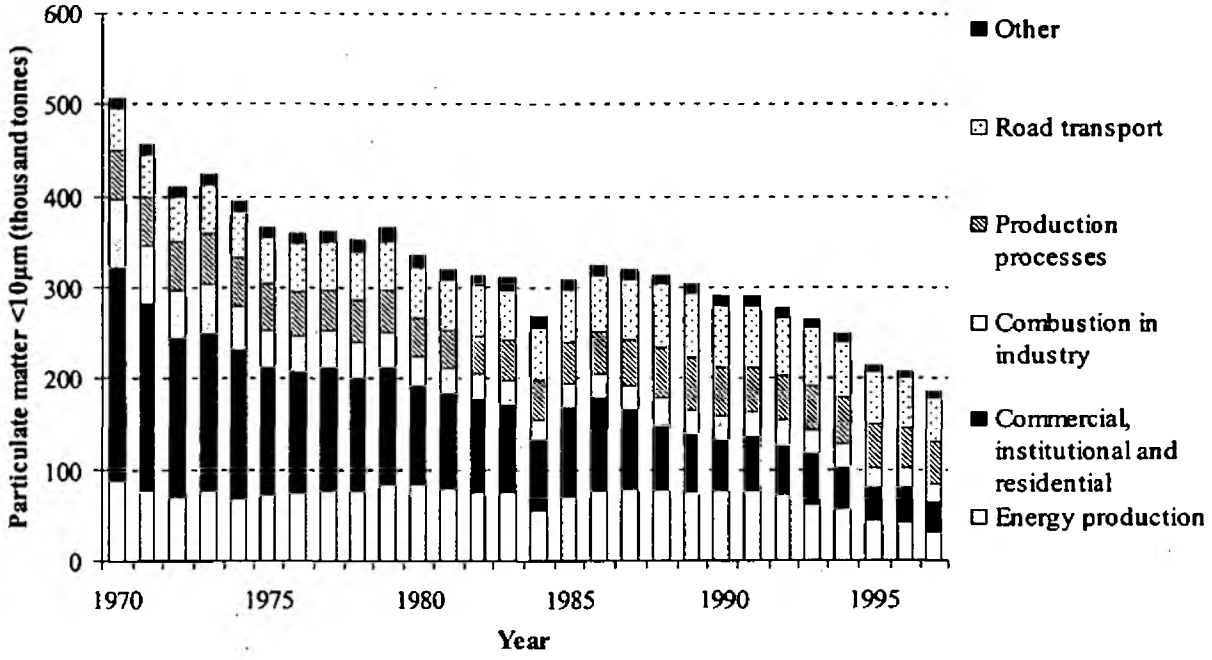
Sulphur dioxide can cause breathing difficulties, is toxic to vegetation and is a precursor of acid rain causing acidification of natural ecosystems (**V4.1**) and damage to buildings. Until the 1950s, urban pollution was dominated by sulphur dioxide from domestic and industrial coal burning. Cleaner fuels and the movement of power generation away from cities to larger stations in rural areas reduced this problem. National emissions, however, continued to increase until 1970. UK coal consumption fell by two-thirds from 1960 to 1998. In 1997 sulphur dioxide emissions of 1,700kt came mainly from power stations with smaller contributions from other industries and oil refineries.

Some 350kt per year of sulphur, an average of 13kg per ha per year, were deposited in the UK in 1992-1994. Over half of this came from the UK's emissions though nearly 90 per cent of these are exported. International sources of sulphur make an important contribution to acidification in neighbouring countries. Within western Europe, the UK is one of the highest producers of sulphur dioxide, with per capita emissions in 1996 of 34kg per year, compared with only 18kg per year from France which has a large nuclear energy sector.

The UNECE Second Sulphur Protocol required the UK to reduce its emissions by 80 per cent between 1980 and 2010 and the acidification, eutrophication and ground-level ozone protocol has increased this to 87 per cent. Most of the cuts will be achieved by the electricity generators who are projected to reduce their emissions from 1,500kt to 365kt between 1998 and 2005.

Data source: NETCEN **Update period:** Annual **Data notes:** 1 Kilotonne (kt) = 1000 tonnes.										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S4.8 Aerial emissions of PM_{10} in the UK by sector



Over the past 40 years particles, largely arising from coal burning, have been measured as 'black smoke'. Attention turned in the 1990s to the specific particle sizes that can be inhaled in significant amounts into human lungs, those with diameters less than 10µm. PM_{10} is the fraction now usually measured though finer particles are also being studied in relation to health effects.

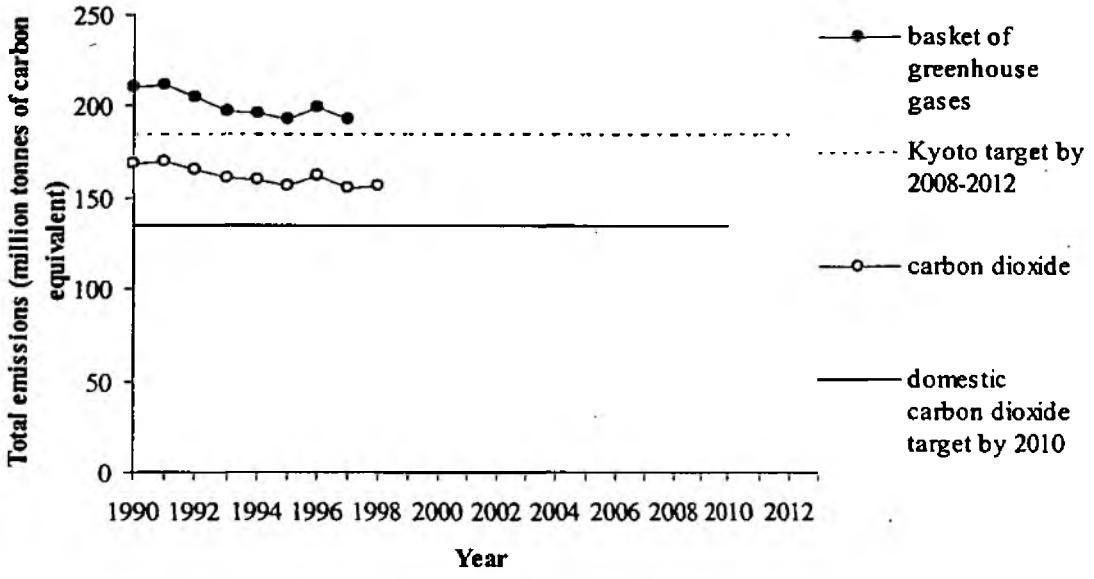
PM_{10} emissions arise mainly from diesel vehicles, power generation, and industrial combustion and processes. In urban areas road transport emissions predominate though the relative contributions of road transport and industry vary widely between different urban areas. In London, vehicles produce over three-quarters of PM_{10} emissions whereas in other industrial areas power generation can account for a high proportion of the particle emissions. The reduced use of coal-fired stations largely accounts for the overall decline in primary PM_{10} emissions since 1970. Road traffic accounts for 25 per cent of PM_{10} but 61 per cent of $PM_{0.1}$ (particles less than 0.1µm diameter). Whilst PM_{10} emissions fell by 60 per cent between 1970 and 1996, the decline was only 32 per cent for $PM_{0.1}$. Diesel vehicle exhaust limits have already cut particle emissions per kilometre by over 80 per cent between 1993 and 2000.

The Auto-Oil Directives will cut particle emissions from diesel cars by 50 per cent, and from heavy-duty vehicles by 80 per cent from 2006. By 2010 road transport emissions of PM_{10} are expected to fall by two-thirds of those in 1995. Reductions in industrial sulphur and nitrogen emissions over the next decade should also significantly reduce the formation of secondary particles.

Data source: NETCEN
Update period: Annual
Data notes: 1 Kilotonne (kt) = 1000 tonnes.

Scales of possible use	UK	•	E&W		Agency Region		Local Govt.		Other	

S4.9 Emissions of greenhouse gases in the UK



Climate change is recognised as one of the greatest environmental threats facing the world today. All countries party to the Climate Change Convention have acknowledged the need to reduce greenhouse gases, which are causing global warming. Developed countries have agreed legally binding targets to reduce their emissions. Carbon dioxide emissions are mainly caused by energy consumption. Transport has been the fastest growing source in the UK as a result of the sharp increase in road traffic, particularly in the 1980s.

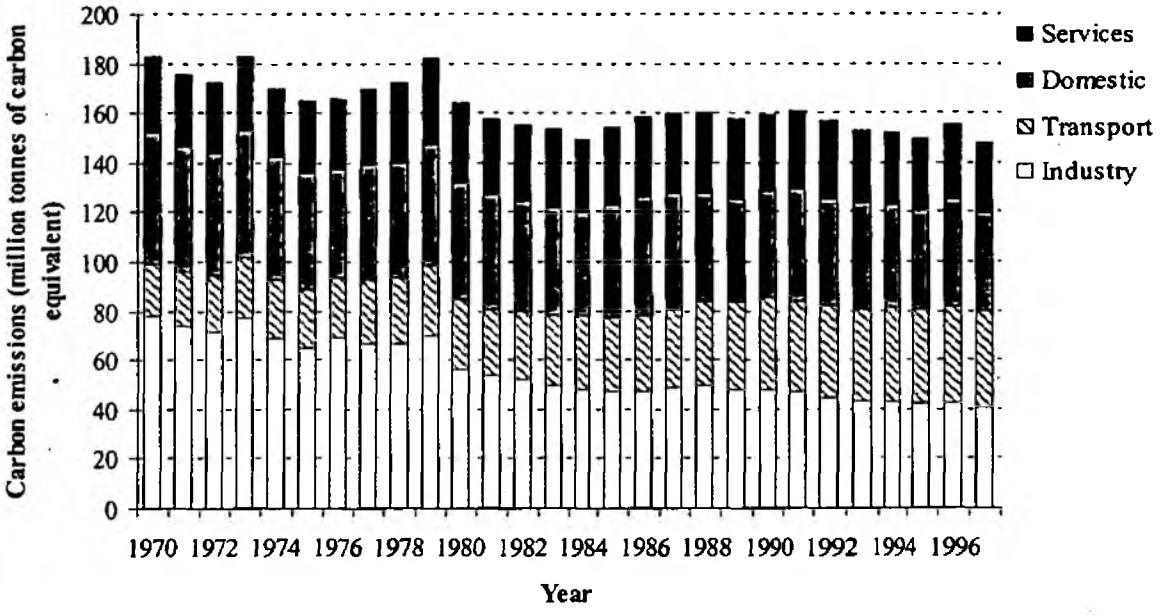
Under the Kyoto Protocol, the UK has a legally binding target to reduce emissions of the basket of six greenhouse gases by 12.5 per cent relative to the 1990 level over the period 2008-2012. It also has a domestic goal to cut CO_2 emissions by 20 per cent below 1990 levels by 2010.

UK emissions of the 'basket' of six greenhouse gases, weighted by global warming potential, fell by nine per cent between 1990 and 1997. Emissions of carbon dioxide, the main greenhouse gas, fell by seven per cent between 1990 and 1998. Carbon dioxide emissions fell in the first half of the 1990s mainly because of a switch from coal to gas and nuclear power for electricity generation. They are, however, expected to start increasing again after 2005.

This indicator is taken from DETR (H9).

Data source: NETCEN **Update period:** Annual **Data notes:**										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S4.10 Carbon dioxide emissions by end user in the UK



Carbon dioxide is the most important greenhouse gas and indicators of trends by end users are required to target policy measures and monitor their effect. Between 1970 and 1997, carbon dioxide emissions from transport rose by 87 per cent, and the proportion of total emissions coming from road transport more than doubled to 26 per cent.

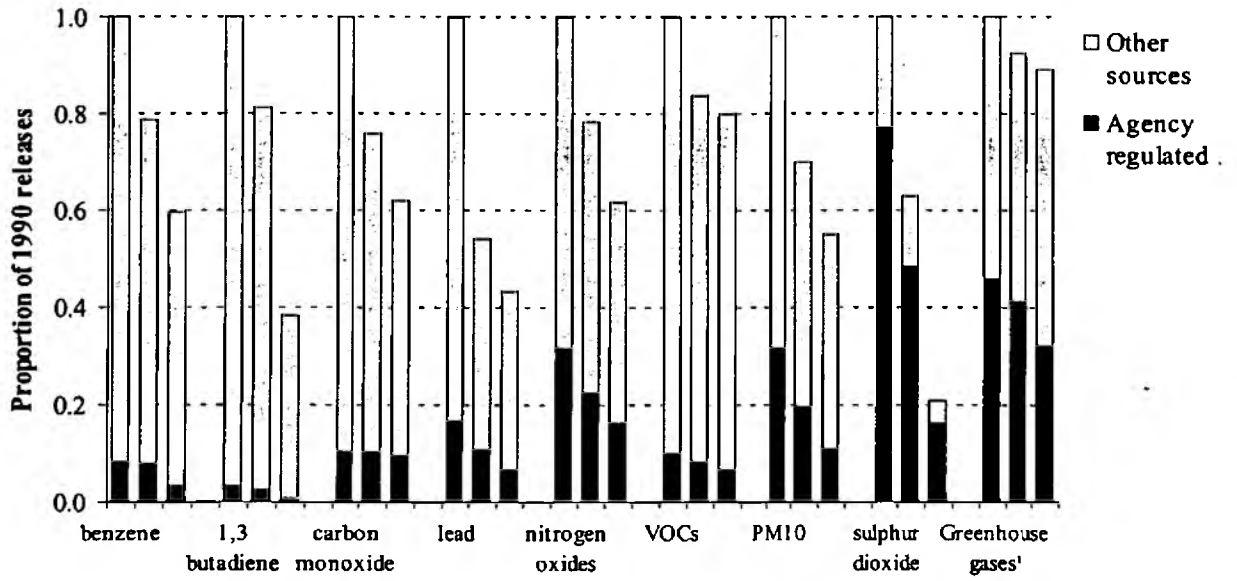
Under the Kyoto Protocol, the UK has a legally binding target to reduce emissions of the basket of six greenhouse gases by 12.5 per cent relative to the 1990 level over the period 2008-2012. It also has a domestic goal to cut CO_2 emissions by 20 per cent below 1990 levels by 2010.

The general decline in carbon dioxide emissions reflects increased efficiency in energy use, a switch in power stations from coal to natural gas and nuclear, and the decline in heavy industry. The increase in transport emissions reflects the increase in road traffic, which has outweighed improvements in energy efficiency of vehicles.

This indicator is taken from DETR (N3). We hope to develop this indicator to show regional splits.

Data source: NETCEN **Update period:** Annual **Data notes:**										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S4.11 Emissions to air from Agency-regulated industrial processes



Bars are in 1990-1995-1998[2] order

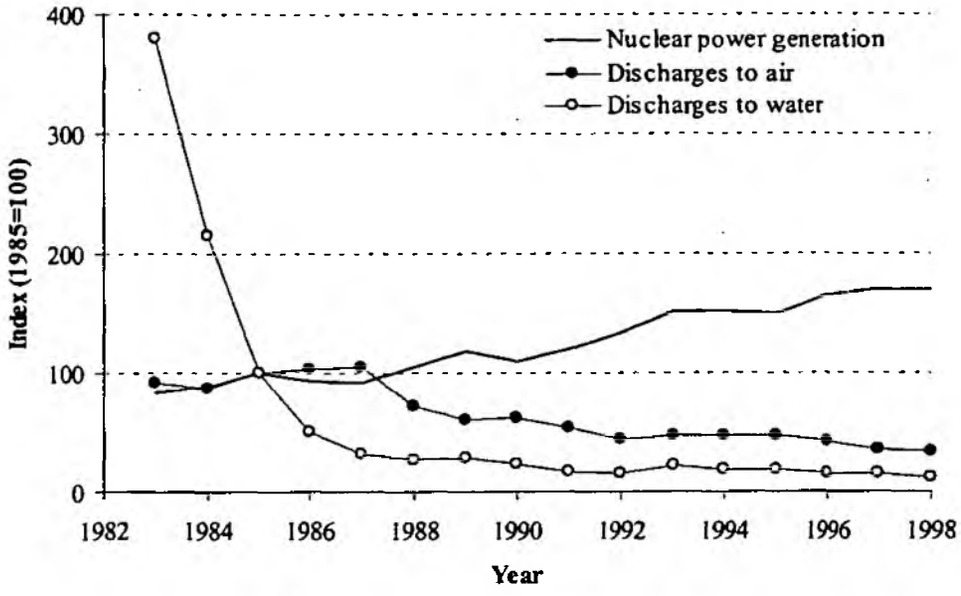
The Agency regulates more than 2,000 of the most potentially polluting industrial processes ('Part A' processes) under the 1990 Environmental Protection Act. These processes include large combustion plants, metals, minerals, chemicals and incineration processes. The legislation takes a holistic approach known as 'Integrated Pollution Control' or IPC. Processes must adopt the 'Best Practicable Environmental Option' to minimise impacts on the environment. The IPC legislation is being superseded by the EC Directive on Integrated Pollution Prevention and Control (IPPC). This directive covers a wider range of activities and industrial processes. Costs and benefits must be balanced by the application of 'Best Available Techniques' (BAT).

Agency-regulated processes contribute a significant proportion to UK aerial emissions of greenhouse gases, acidifying gases and fine particles, though each of these has been reduced substantially in the past decade (**S4.5, S4.6, S4.7, S4.8, S4.9, S4.10**). In 1998 IPC processes accounted for about 40 per cent of carbon dioxide emissions, 88 per cent of sulphur dioxide, 26 per cent of nitrogen oxides and 20 per cent of PM_{10}. The main contributing sectors include fuel and power for sulphur dioxide, nitrogen oxides and particles, chemicals for VOCs, and metals for carbon monoxide and lead. The reductions in releases achieved by IPC processes between 1990 and 1998 were carbon dioxide 30 per cent, sulphur dioxide 57 per cent, nitrogen oxides 48 per cent and PM_{10} 66 per cent. Other toxic pollutants have also been reduced over the same period, for example, lead by 59 per cent, benzene by 61 per cent and dioxins by 92 per cent.

Data source: NETCEN and Environment Agency
Update period: Annual
Data notes: Agency-regulated sources are in England and Wales. Other sources include those in Scotland and Northern Ireland. [1]Greenhouse gases are expressed as carbon equivalents. [2]The non-Agency-regulated ('other') sources for 1998 are provisional estimates.

Scales of possible use	UK		E&W	*	Agency Region		Local Govt.		Other	

S4.12 Discharges from the nuclear industry in the UK



The generation of electricity from nuclear fuel produces only small emissions of CO_2 (the largest contributor of greenhouse gases to global warming) and no discharges of other air pollutants such as SO_2 and NOx. Radioactive substances are also used in medicine (radiotherapy, for example) and in the scientific industries. The radioactive discharges are the less toxic waste products from electricity generation and the medical and scientific industries that are emitted under Agency authorisation to air and water.

Around 28 per cent of the electricity generated in the UK came from nuclear sources in 1997 boosted by support under the Non-Fossil Fuel Obligation (NFFO) in the 1990s. As existing capacity is retired and not replaced, nuclear power's contribution to electricity generation will be reduced in the early decades of the 21st century.

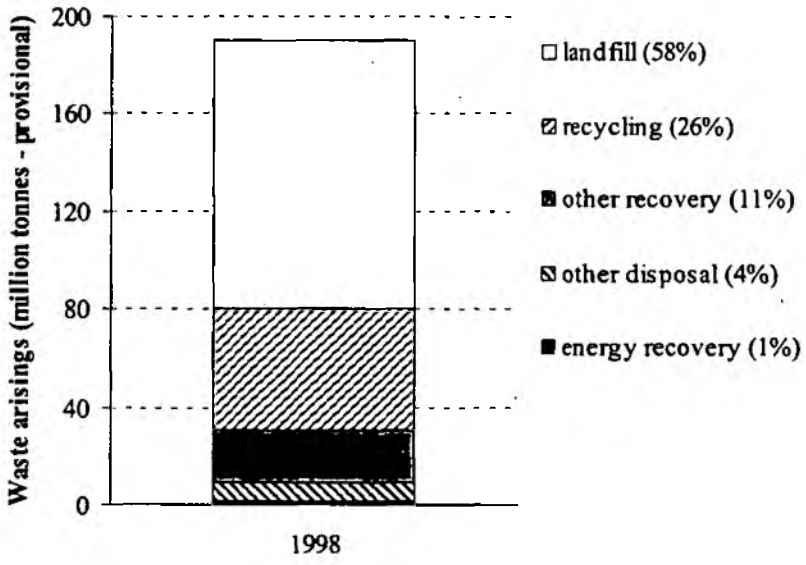
UK aerial radioactive emissions fell by 63 per cent between 1983 and 1998. Emissions to water fell by 97 per cent in the same period. Electricity production from nuclear sources has doubled at the same time.

The UK has signed up to the Oslo and Paris Conventions (OSPAR) Strategy with regard to radioactive substances, agreed in July 1998. Parties will, by the year 2000, work towards achieving further substantial reductions or elimination of discharges, emissions and losses of radioactive substances to certain marine environments. By the year 2020, parties will ensure that discharges, emissions and losses of radioactive substances are reduced to levels where the additional concentrations in the marine environment above historic levels are close to zero. Aerial discharges are to be maintained as low as reasonably practicable.

This indicator is taken from DETR (M4).

Data source: DTI, MOD,SEPA, BNFL, UKAEA, British Energy Generation Ltd, British Energy Generation (UK) Ltd, Nycomed Amersham **Update period:** Annual **Data notes:**										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S5.1 Waste arisings and management in the UK



The Government is committed to achieving targets derived from European legislation, such as the Landfill Directive and the Packaging Directive. The Landfill Directive, which requires substantial amounts of waste to be diverted from landfill, will require a step change in the management of municipal waste in the UK.

The types of waste we produce, all forms of waste management, and the transport of waste, have impacts on the environment. Waste is a potential resource and increased levels of reuse, recycling and energy recovery will contribute to sustainable development.

It is estimated that between 170 and 210 million tonnes of waste are produced each year in the UK by households, commerce and industry, including construction and demolition. Nearly 60 per cent of this is disposed of in landfill sites.

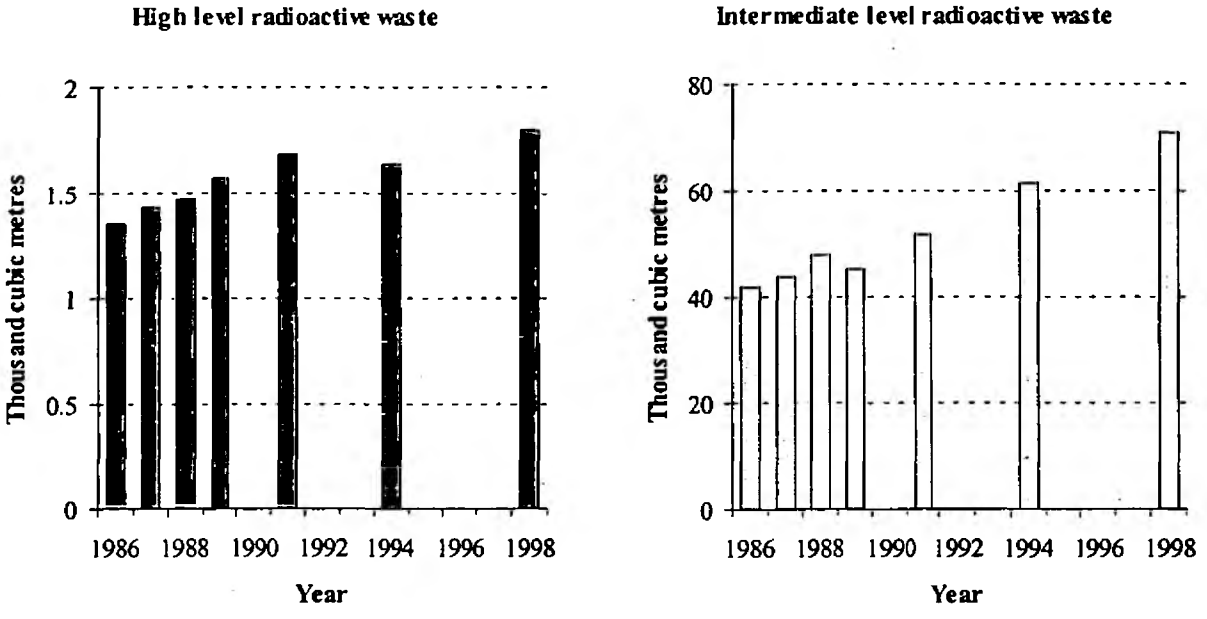
The 1998 estimate is provisional, and will be revised when final information from current surveys is available. For most sectors there are no comparable data for earlier years.

This indicator is taken from the DETR (H15).

Data source: DETR and others
Update period: Unknown
Data notes: Data are provisional and will be presented as a time series for England and Wales in the future. The indicator uses an estimate of 190 million tonnes of waste produced.

Scales of possible use	UK	*	E&W	*	Agency Region		Local Govt.		Other	

S5.2 Radioactive waste stocks in the UK



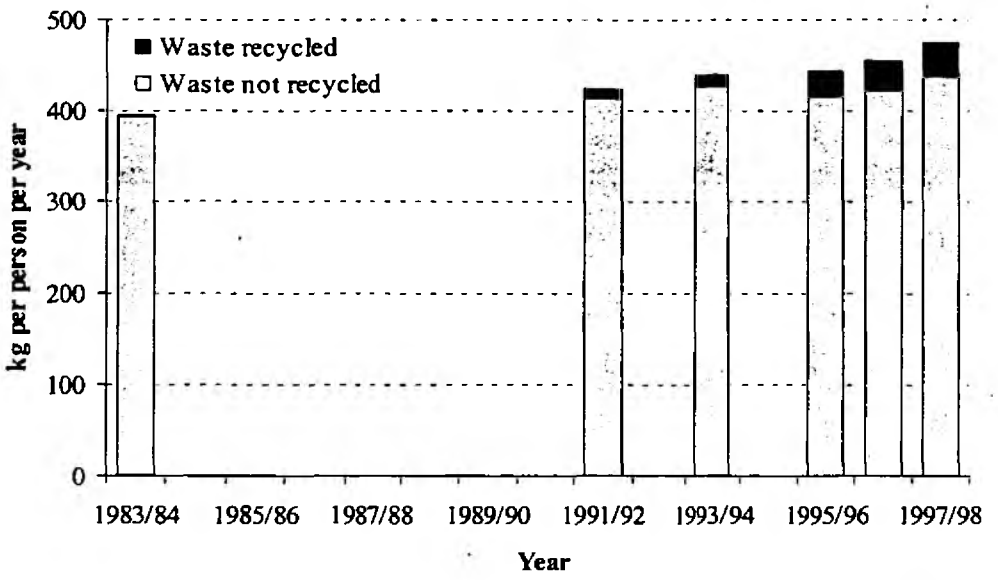
High and intermediate radioactive waste stocks are the waste products from electricity generation, defence activities and the medical and scientific industries, which cannot be discharged safely, to air or water. Approximately 95 per cent of the UK's radioactive waste comes from the nuclear power industry. High level (HLW) and intermediate level radioactive wastes (ILW) will remain radioactive for many years and need careful management and storage to prevent danger or damage to humans and the environment.

There is presently no disposal route for these wastes so they have to be stored. Storage is limited to a small number of sites. Low level wastes (LLW) such as nuclear workers' clothing are less toxic and can be disposed of in specially built shallow disposal facilities. UK stocks of HLW increased by 34 per cent between 1986 and 1998. Stocks of ILW increased by 69 per cent in the same period. The keeping and use of radioactive materials and, in particular, on the accumulation and disposal of radioactive wastes is covered by the Radioactive Substances Act 1993. The Environment Agency is responsible for the enforcement of the Act in England and Wales.

This indicator is taken from DETR (M3).

Data source: Electrowatt Ekono UK Ltd **Update period:** Unknown **Data notes:** Data from UK Radioactive Waste Inventory									
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S5.3 Household waste and recycling



Household waste includes household bin waste and also waste from civic amenity sites, other household collections, recycling sites, litter collections and street sweeping. Household waste represents about 90 per cent of municipal waste, which is collected and managed by local authorities. Most recycling of household waste comes from "bring" sites such as bottle and paper banks, and increasingly from kerbside collections.

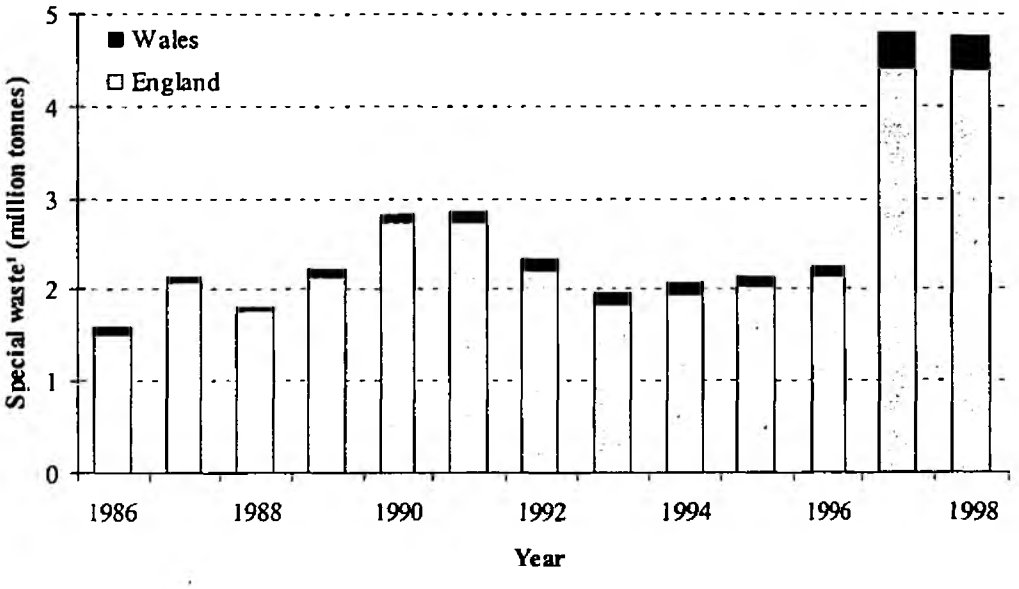
In England and Wales, amounts of household waste generated have increased steadily to nearly 500kg per person per year in 1997/98; a 20 per cent increase since 1983/84. It is difficult to compare long-term changes because of differences in data sources and definitions. The increase in levels of household waste is likely to be linked to a number of factors, including the increase in number of households and changes in the pattern of consumer spending. There may also be an increase in the amount of commercial waste mixed in with household waste. Improved recycling rates reflect improved provision of recycling facilities.

Household waste reduction and increased recycling would lead to a reduction in the environmental impact of waste disposal. The Waste Strategy 2000 for England and Wales sets goals of 25 per cent recycling or composting by 2015, 30 per cent by 2010 and 33 per cent by 2015. Local authorities are required to set targets to reduce household waste.

This indicator is also used by DETR (A5).

Data source: DETR and the Chartered Institute of Public Finance and Accountancy **Update period:** **Data notes:**										
Scales of possible use	UK	*	E&W	*	Agency Region		Local Govt.		Other	

S5.4 Special waste arisings



Managing and disposing of hazardous waste has a particularly high impact on the environment. Before 1996, Special Waste was defined by the Control of Pollution (Special Waste) Regulations 1980. The Special Waste Regulations 1996 defined a wider range of hazardous wastes as special. Following the introduction of these regulations, all movements of special waste are tracked until they reach a waste management facility.

Amounts fluctuate from year to year, partly due to variations in amounts of contaminated soil removed for remediation purposes. There is no clear trend.

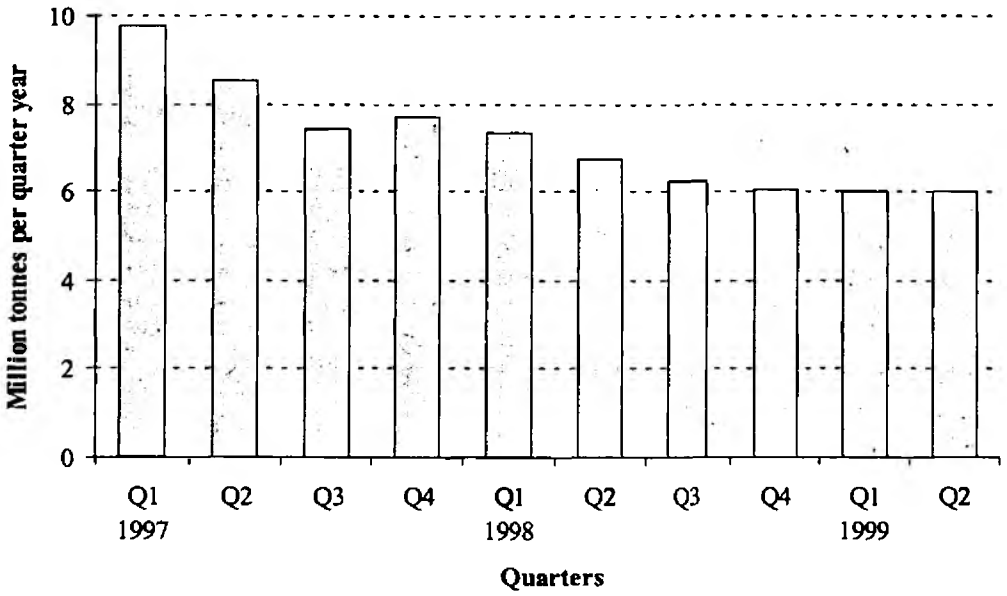
It is anticipated that further changes will be made to the list of special wastes over the next few years. These additions may substantially increase the tonnage of wastes defined as special, regardless of trends in the overall volume of waste generated. The amount of special waste produced will also be affected by any new measures taken to remove hazardous chemicals from the utility chain. Further work will be needed to develop this indicator so that it reflects trends in the amount of hazardous waste generated, independent of the definition of special waste. It is possible that this indicator could be further developed to include the type of treatment of the waste and other such details.

This indicator is also used by DETR (A7).

Data source: Environment Agency
Update period: Annual
Data notes: [1]The criteria defining special waste were changed in September 1996. Data for the periods before and after this date are not directly comparable. The years shown refer to financial years (e.g. 1998 = 1998/99 financial year).

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

S5.5 Construction and demolition waste going to landfill in the UK



Efficient use of construction material resources at all stages in the construction process reduces the amount of waste generated and maximises the opportunities for greater reuse and recycling. This greater resource efficiency helps to minimise the environmental impacts of construction including through lower demand for virgin material and reduced burden on landfill sites.

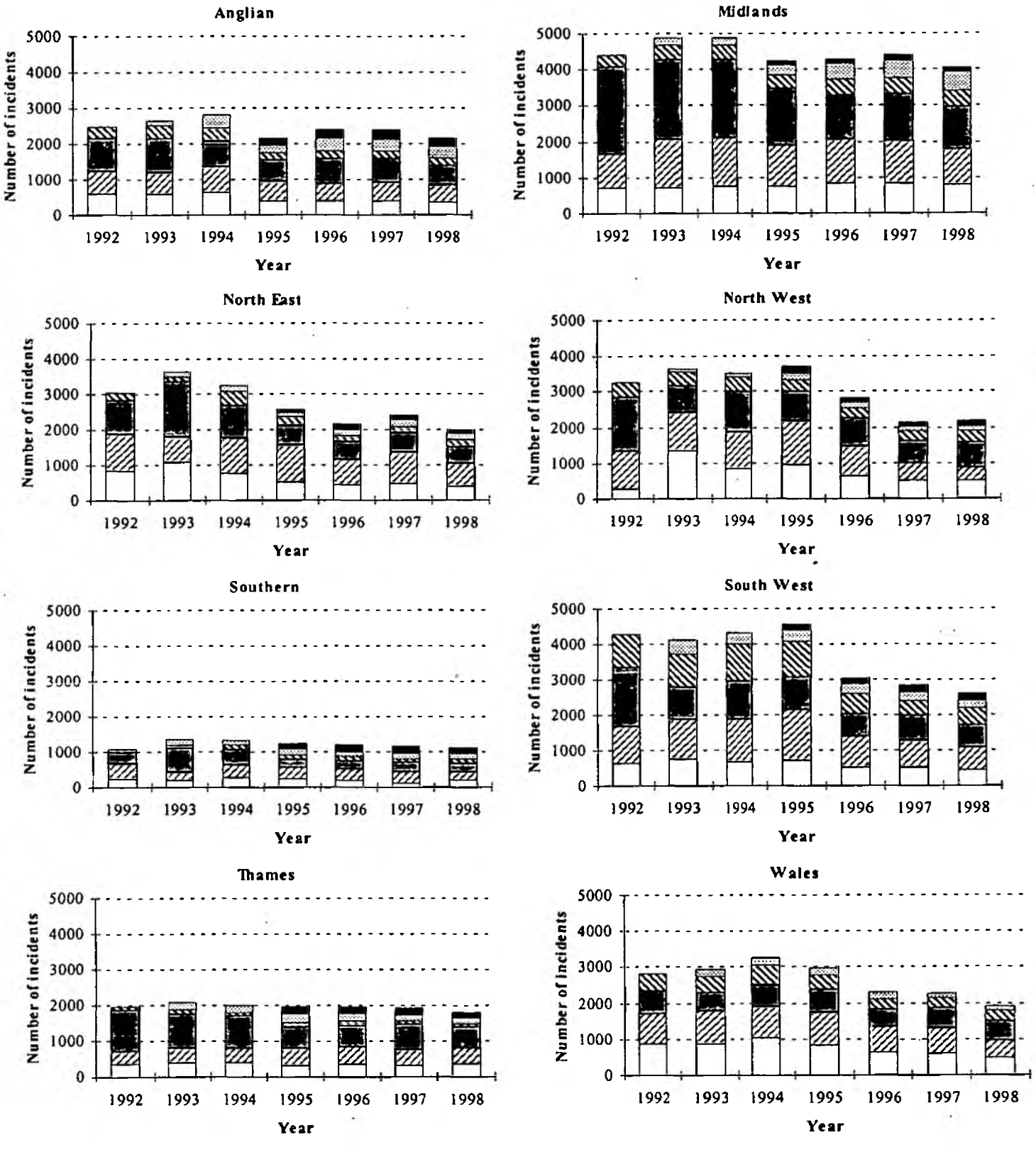
A decline in the amounts of construction waste going to landfill can reflect either a reduction in the amount of construction waste generated, an increase in the percentage of waste re-used or recycled, or an increase in unauthorised landfilling or flytipping (possible development indicator, see Appendix I). The landfill tax of £2 per tonne for inactive waste has encouraged producers to look for alternative uses for construction waste. Changes to the landfill tax in October 1999 will have implications for future trends. In 1998, around 20-25 million tonnes of construction and demolition waste a year went to landfill. This represents around 30-40 per cent of total construction and demolition waste. The amounts landfilled have reduced substantially since the introduction of the landfill tax in October 1996.

Information on long-term trends is not available, but there has been a clear downward trend throughout 1997 and 1998. Most of the construction and demolition waste going to landfill is used for engineering or restoration work at sites.

This indicator is taken from DETR (D10).

Data source: HM Customs and Excise **Update period:** Quarterly **Data notes:** The reported figures may include some unidentified inactive industrial waste. Contaminated land, which is exempt from landfill tax, is not included.										
Scales of possible use	UK	*	E&W		Agency Region		Local Govt.		Other	

S6.1 Water pollution incidents



This indicator represents substantiated water pollution incidents reported to the Environment Agency. Substantiated incidents are categorised into three classes depending on the severity of the damage to the environment and all of these classes are included in the indicator data.

The number of incidents recorded depends largely on reports from the general public and, increasingly, the emergency services. As a result, the predominant types of pollution incident reported are those with greatest visual impact such as oil and dyes or where fish appear to be distressed. Incidents involving very toxic chemicals may not be reported as they are not visible, and they often have greatest impact on invertebrate fauna, which is not immediately apparent. Recorded data are therefore likely to be an underestimate of the more substantive stresses that the aquatic environment is under.

Over the last decade, the overall number of recorded and substantiated water pollution incidents has decreased. A more useful indication of what has happened is given by an evaluation of the changes seen in the most serious water pollution incidents over time and the reasons for these. For example the total number of these Category one incidents decreased from 388 in 1992 to 128 in 1998. More specifically, the farm-derived incidents decreased from 64 to 22 over the same period. This is linked to tighter regulation, increased investment and pollution prevention campaigns. The recently enacted Groundwater Regulations may reduce incidents in the future.

Care must be taken in interpreting trends in these data, which should be considered not in isolation but within the broader context of the changing regulatory, legislative, social and economic environment.

Data source: Environment Agency
Update period: Annual
Data notes: Data are substantiated incidents. Data for domestic and residential sources were not collected separately prior to 1995. Environment Agency Wales records domestic and residential in other category. 1992 other category includes transport incidents.

Scales of possible use	UK		E&W	*	Agency Region	*	Local Govt.		Other	

Appendix I: Indicators proposed for future development

No. Issue for indicator development

1. **Bioaccumulation of chemicals**
   Data on the bioaccumulation of chemicals in the marine environment are being collected under the National Marine Monitoring Programme (NMP). In England and Wales, bioaccumulation monitoring has been conducted at 38 sites (in 1999) representing all of the major estuaries. A range of contaminants was recorded including metals and organics from a variety of matrices, specifically; fish muscle, fish liver, shellfish tissue and fucus (seaweed). These data may be suitable for the development of an indicator.

2. **Endocrine disruption**
   The Agency is considering development of indicators of endocrine disruption in a range of fish and invertebrate species. The indicators will need to identify both an organism's exposure to endocrine-disrupting substances and any population-relevant effects that arise, for example, effects on growth, reproduction and mortality. Ideally, the indicators should discriminate between different types of disruption of endocrine systems.

3. **a) Waste and hazardous emissions by sector**
   b) Industrial and commercial waste arisings by sector
   The Agency has carried out a national survey of industrial and commercial waste and data from this is currently being analysed. *The Waste Strategy 2000 for England and Wales*[5], proposes a target of reducing industrial and commercial waste to landfill to 85 per cent of 1998 levels by 2005. Indicators in the area of waste are in development by DETR and will be included in the Agency's set if suitable.

4. **Ecotoxicological effects**
   Direct Toxicity Assessment (DTA) or ecotoxicological assessment may be used as an indicator of environmental quality, and is already used in some national programmes (for example in the NMP). The Agency is undertaking research to develop appropriate ecotoxicological indicators for assessing the status of the environment. These may include specific indicators such as those showing reproductive toxicity (see no. 2 – endocrine disruption), and general indicators such as those showing acute and chronic mortality.

5. **Flooding**
   The current indicator for the issue of flooding (**S1.3** Major flooding incidents) is limited and there needs to be further development in this area. Data on flood warnings is collected but this is a response indicator and as such, would be excluded from the set. Flooding is such a major issue that it is very important to include a sensitive indicator of change in flooding events or risk and this needs to be progressed by our Flood Defence function.

6. **Reduction of orthophosphate in Sensitive Areas (eutrophic)**

[5] DETR, 1999. Waste Strategy 2000 for England and Wales: Part 1 (Cm4693-1) - ISBN 0 10 146932 2 and Waste Strategy 2000 for England and Wales: Part 2 (Cm4693-2) - ISBN 0 10 146933 0.

No.	Issue for indicator development
	The current indicator(s) for nutrients in rivers (**V4.2**) may not actually reflect changes of eutrophication status in particular vulnerable waters. The arrangements for measuring eutrophication are being reviewed with a view to deciding if a robust indicator for this issue is possible and if so, what it should be.
7.	**Reduction of nitrate in Nitrate Vulnerable Zones (NVZs)** Measures of reduction of nitrate in NVZs are currently being developed by DETR and the Agency. These are likely to be based on measurements of nitrate in groundwater, surface water or soil water in nitrate restricted areas. Relevant measures will be included in our indicator set when they become available from this joint exercise.
8.	**Sustainable tourism** Indicators representing the sustainability of tourism in the UK are under development by the Department for Culture, Media and Sport (DCMS) (DETR (D16)). These will include some environmental aspects of tourism such as relevant CO_2 emissions or energy use and possibly others. A baseline assessment of these indicators will be published by DCMS and a relevant indicator from this work may be adopted by the Agency.
9.	**Sites affected by abstraction** Over one fifth (800) of SSSIs in England are dependent on the proper functioning of wetland ecosystems. Wetlands are one of the country's most endangered wildlife habitats. Many SSSIs have been drained for agriculture, damaged by pollution or alien species or have been used for development. Many wetland plants and animals have specific requirements in terms of water quantity and maintaining this is essential if these sites are to be protected. A joint review by the Agency and English Nature has identified sites affected by water abstraction. The Government has asked the Agency to review all licensed abstractions affecting SSSIs and to use its powers to revoke or amend those found to be having a significant adverse affect. The Agency is developing an indicator, which will draw upon a register of all known sites degraded by abstraction. The indicator is currently in development for DETR (Q6).
10.	**Countryside quality** Indicators for countryside quality are being developed by the Countryside Agency for DETR (S7). There are a number of possibilities being proposed for the forthcoming Rural White Paper. These may include changes in enclosure patterns (hedges etc.) or deterioration in countryside features and their functional condition. These indicators will be reviewed when available and relevant ones added to our set.
11.	**Fly tipping** Fly tipping of waste is seen as a significant problem by many organisations including the Agency and Local Authorities. Most fly-tipped waste is found in response to a complaint. Data could be collected nationally and an indicator developed from the number of incidents or the source and amount of waste fly-tipped.
12.	**Aesthetic quality of rivers** The Aesthetic quality of rivers was measured as a trial in the 1995 General Quality Assessment Survey (GQA). Parameters such as the presence of oil, foam, sewage evidence and litter were included in the monitoring. The scheme is being repeated at

No.	Issue for indicator development

50 sites across England and Wales in 2000. The aesthetic quality of rivers would be an important addition to other water quality indicators, which do not take account the perception of rivers as an environmental resource. Regular routine monitoring would need to be carried out in order to provide data for a good indicator. Further monitoring of rivers for aesthetic parameters will be subject to funding being available.

13. **Saltmarshes threatened by sea level change**

Saltmarshes form a natural defence against the sea as well as providing a natural habitat for many species. Rising sea levels may be causing accelerated erosion of some saltmarshes, especially those trapped between the sea and hard sea defences. An indicator to reflect the changing extent of saltmarshes would help to monitor the impact of these factors. Suitable monitoring sites and methods need to be established. English Nature has the responsibility to monitor the marine Special Areas of Conservation (SACs) designated under the Habitats Directive. Sixteen of the sites in England have been designated for saltmarsh features. English Nature aim to monitor these sites at least once every six years with the possibility of more frequent monitoring at sites that are experiencing 'coastal squeeze'. The actual methods for monitoring have not been agreed yet, but are likely to be mainly aerial photography and remote sensing. Monitoring is starting in the 2000/01 financial year.

14. **Environmental change network (ECN)**

The ECN programme operates a network of 12 terrestrial and 42 freshwater sites in the UK. The programme is co-ordinated by NERC and has a wide range of additional sponsoring organisations, including the Agency. A range of parameters are measured at the sites including; meteorology, atmospheric and precipitation chemistry, soil water and surface water chemistry, soil properties, vegetation cover and the types of vertebrate, invertebrates and macrophytes present. The ECN may prove a rich data source for indicators of climate change and freshwater quality in the future.

15. **State of key species**

The Government published its Biodiversity Action Plan (BAP) in January 1994 in response to the United Nations Convention on Biological Diversity agreed at Rio in 1992. The UK's Biodiversity Action Plan sets out the broad strategy for conserving and enhancing biodiversity in the period up to 2015. The priority species include skylark, red squirrel, a number of fish, flowering plants, mosses, lichens and invertebrates. These plans contain targets for the conservation and enhancement of the priority species and habitats. There are also over 120 local BAPs, which enable communities to identify wildlife that matters to them, and to contribute to national biodiversity targets.

There are about 430 species and 40 habitats identified in the UK BAP which are rare, threatened or vulnerable. These species have been selected because they are the most threatened or are rapidly declining in numbers and extent. Action plans are being developed for each species and habitat, designed to maintain and improve their status. The Agency is the 'contact point' for enquiries and information on some of these, and the 'lead partner' responsible for managing the action plan on some. This indicator will be developed into one tracking the achievements of all these plans. This indicator would be an overall assessment of change in the most threatened species. An

No.	Issue for indicator development
	indicator for the development of the BAPs is used by DETR (S4).
16.	**Soil and land indicators** There is currently a lack of good quality information to propose indicators in the areas of soil quality and quantity. In particular, indicators for the issues of contaminated land and soil erosion need to be developed. Soil erosion is seen as an important issue locally, where the consequences of severe soil erosion on land degradation, water quality and fisheries can be a problem. Quantification of soil erosion nationally is still needed, and how it is changing through time. An R&D project has been proposed to identify and develop a set of national indicators for soil quantity and quality. The aim of this project would be to recommend a set of indicators of physical, chemical and biological quality and soil quantity that allow for the heterogeneity of soil types and land use. The current indicators for soil issues presented in this report will be revised if the project goes ahead and has a successful outcome.

Appendix II: Some relevant indicators or ideas not included in the set

For some of these indicators data exists but were not considered relevant or robust enough; for others, better data sets are needed. These may be looked at through our R&D process eventually.

No.	Indicator and reason(s) for non-inclusion
1.	**Number of blue flag beaches** 'Compliance with the Bathing Waters Directive' (**V3.4**) and 'Beach litter in the UK' (**V6.2**) cover this topic.
2.	**Human health indicator** It is difficult to identify a causal link between the environment and health issues because of confounding factors such as socio-economic conditions.
3.	**Noise complaints** Complaints received by Local Authorities are not necessarily a good indicator of the problem of noise pollution. The Agency is concerned about noise pollution and has a responsibility to regulate noise from some large industries. A good indicator of the problem was not identified.
4.	**Extent of invasive weeds** Invasive weeds can be a pressure on other species. One-off distribution maps of invasive weeds are available but there are no plans to repeat the surveys so an indicator could not be proposed.
5.	**Extent of non-native species** Non-native species, for example, some fish and signal crayfish can cause pressure on native species. An indicator of this pressure was investigated but there were doubts expressed about what actually it did indicate. It is possible that marine non-natives may be useful for indicating changes in water temperature or currents due to climate change but data are sparse.
6.	**Incidence of blue-green algae** Monitoring for nuisance algae is variable between Agency regions and usually reactive. The data available do not currently lend themselves to use as an indicator.
7.	**Status of lichens** Lichens are possibly a good indicator of air quality. There is a lack of suitable data to propose an indicator.
8.	**Effects of air pollution on biodiversity and eutrophication** It was hoped that more emphasis could be given to the effects of air pollution rather than the levels of emissions or exceedance of standards. Unfortunately, suitable data were not available. There are also other more significant factors affecting these topics than air pollution and indicators are included to cover these. This issue is a possible area for development under the R&D process but has been excluded for the moment.

No.	Indicator and reason(s) for non-inclusion
9.	**Progress with schemes to alleviate low river flows** This indicator was seen as a response, rather than directly related to the state of the environment or pressures on it. The decision was made to exclude response indicators from the set.
10.	**Lengths of river undergoing habitat restoration** Response indicator (refer to number 9).
11.	**Implementation of water level management plans** Response indicator (refer to number 9).
12.	**Compliance with authorisations and licences** Compliance with authorisations and licences was proposed as an indicator of various issues, especially water quality. These are more of an Operational Performance Measure (OPM) than an environmental indicator and as such, were excluded from the set. Water quality issues were thought to have sufficient coverage through other indicators.
13.	**Number of successful prosecutions for environmental damage** Response indicator (refer to number 9).
14.	**Planning applications with likely environmental impact** Planning applications likely to have a significant environmental impact are referred to the Agency. This is seen as a response indicator and has been excluded for the reasons given in number 9.
15.	**Number of enforcement and prohibition notices served** Response indicator (refer to number 9).
16.	**Environmental accreditation schemes** Response indicator (refer to number 9).
17.	**Company turnover spent on environmental improvements** Response indicator (refer to number 9).
18.	**Packaging waste regulations** Response indicator (refer to number 9).
19.	**Trans-frontier shipment of waste** Data are available for the amounts of trans-frontier shipment of wastes. This issue has an importance politically but there is no clear significance for the state of the environment.
20.	**Indicator of arable farming intensification** Correlation of crop yields with input use is made difficult by the influences of improvements in farming technology. This topic is also covered by other indicators, such as 'Agricultural land use' (**V1.2**) and 'Consumption of inorganic fertilisers' (**S4.1**) and 'Usage of pesticides in agriculture and horticulture' (**S4.2**).

No.	Indicator and reason(s) for non-inclusion

21. **Number of sites used for landfilling waste**
The number of sites used for landfilling waste is not a good indicator as many small sites are giving way to the use of a few larger sites. Other indicators cover this topic such as 'Household waste and recycling' (**S5.3**) or 'Industrial and commercial waste arisings (in development)'.

22. **Sewage sludge used on farmland**
Data are available for the amounts of sewage sludge used on farmland. It is largely unclear if this can be correlated with any environmental impact and in general, will provide a benefit to the environment. Heavy metal contamination of soils is covered by 'Heavy metals in agricultural topsoils' (**V4.4**).

23. **Exceedance of critical loads of acidity to soils**
Data are available for this issue but they are presented as maps rather than time series data. The topic is covered by indicators of emissions of acidifying gases and by 'Acidification in the UK' (**V4.1**). It should be possible to turn this into an indicator in the short-term.

24. **Trace organics in water**
The data for Agency monitoring of trace organics (for example, solvents) is not readily available in a nationally interpreted form. Indicators in the area of chemicals and their effects are proposed in Appendix I and these are likely to include trace organics.

25. **Stocking density**
Stocking density is likely to be significant for issues such as soil erosion. Soil erosion is included as an area of possible indicator development (Appendix I). Data for stocking densities per se is not available but a surrogate could be calculated. 'Livestock on agricultural holdings' (**S2.9**) was chosen as a background indicator of the pressures of animals on the environment. These pressures include waste disposal and air pollution issues in addition to soil erosion.

26. **Area of land at risk from flooding**
The area of land at risk from flooding could change with climate change. This is, however, not surveyed frequently and an indicator would be unlikely to show any change even over long periods of time.

27. **Number of flood warnings issued**
Response indicator (refer to number 9).

28. **Use of irrigation water by agriculture**
Agricultural spray irrigation is a consumptive use of water and the data are available. The amount of water abstracted for this purpose is very small in comparison with other uses ('Abstraction from non-tidal surface and groundwater' **S3.1**). Other indicators cover the area of water availability, use and efficiency.

Appendix III: Indicators for our Environmental Vision[1]

Quality of life	
V3.4	Compliance with the Bathing Waters Directive
V6.3	Quality of surroundings in England and Wales
V6.2	Beach litter in the UK
S2.11	Leisure day visits in the UK
S2.10	Craft on inland navigable waterways
Enhancing wildlife	
V2.2	Populations of wild birds in the UK
V1.6	River habitats classification
V2.3	Coarse fish catches
V2.4	Salmon catches
'Greening' the business world	
S4.12	Discharges from the nuclear industry in the UK
S4.11	Emissions to air from Agency-regulated industrial processes
S4.3	Pollutants from sewage treatment works
Using natural resources wisely	
S5.1	Waste arisings and management in the UK
S5.4	Special waste arisings
S3.3	Household water use
S2.4	Water demand and availability
S3.1	Abstraction from fresh water
Ensuring the air is clean	
V3.1	Days when air pollution is moderate or higher in the UK
S4.5	Aerial emissions of nitrogen oxides (NOx) in the UK by sector
S4.7	Aerial emissions of sulphur dioxide (SO_2) in the UK by sector
Improving and protecting inland and coastal waters	
V3.3	Rivers of good or fair quality
V3.5	Dangerous substances in water
V3.6	Estuary water quality
V4.2	Nutrients in rivers
S4.4	Loads of major contaminants to coastal waters
S6.1	Water pollution incidents
Protecting and restoring the land	
V1.4	Area of derelict land in England
V4.5	Organic matter in agricultural topsoils
V6.1	Landscape features
S2.8	Net loss of soils to development in England
Reducing flood risk	
V5.3	Sea level change
V5.4	Thames Barrier closures against tidal surges
S1.3	Major flooding incidents (in development)
Limiting and adapting to climate change	
V1.5	Electricity from renewable sources in the UK
S1.1	Annual average surface temperature in central England
S1.2	Summer and winter rainfall
S4.9	Emissions of greenhouse gases in the UK

[1]Some indicators may be relevant to more than one theme. More details of cross-referencing are given in Table 2.

Glossary of abbreviations and acronyms

AMP	Asset Management Plan
ANC	Acid neutralising capacity
BAP	Biodiversity Action Plan
BNFL	British Nuclear Fuels Limited
BTO	British Trust for Ornithology
CCW	Countryside Council for Wales
CFC	Chlorofluorocarbon
DCMS	Department for Culture, Media and Sport
DDT	Dichlorodiphenyltrichloroethane
DETR	Department of the Environment, Transport and the Regions
DoE	Department of the Environment
DTA	Direct toxicity assessment
DTI	Department of Trade and Industry
EC	European Commission
ECN	Environmental Change Network
EQS	Environmental Quality Standard
GQA	General Quality Assessment
HCFC	Hydrochlorofluorocarbon
HLW	High Level Waste (radioactive waste)
HMSO	Her Majesty's Stationery Office
ILW	Intermediate Level Waste (radioactive waste)
ITE	Institute of Terrestrial Ecology
LEAP	Local Environment Agency Plan
LLW	Low Level Waste (radioactive waste)
LOD	Limit of determination
MAFF	Ministry of Agriculture, Fisheries and Food
MoD	Ministry of Defence
MRV	Minimum reporting value
NERC	National Environmental Research Council
NETCEN	National Environmental Technology Centre
NFFO	Non-Fossil Fuel Obligation
NMP	National Marine Monitoring Programme
NVZ	Nitrate vulnerable zone
OPM	Operational Performance Measure
OSPAR	Oslo and Paris Conventions
PARCOM	Paris Commission
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SEPA	Scottish Environment Protection Agency
SSSI	Site of Special Scientific Interest
UKAEA	United Kingdom Atomic Energy Association
UNECE	United Nations Economic Committee for Europe
VOC	Volatile organic compound
WHO	World Health Organisation

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