A FRAMEWORK FOR CHANGE

Restored, protected land with healthier soils

JULY 2001

ENVIRONMENT AGENCY

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"A nation's capital is the health and proper use of its land"

LORD LYTTLETON IN HIS ADDRESS TO THE WORCESTERSHIRE AGRICULTURAL SOCIETY, 1872

1. Why a Framework for Change?

The Environment Agency's vision

In June 2000 the Agency consulted widely on its long-term objectives and goals. After taking into account the responses that we received, in January 2001 we published *An Environmental Vision: The Environment Agency's Contribution to Sustainable Development* (the *Vision*)[1]. This sets out our long term, aspirational objectives for the environment, grouped under nine environmental themes. In preparing it, we were very conscious that it would be the process by which those objectives are met - the route by which the Agency plans, in partnership with others, to make progress towards the long term destination – that would be of particular interest. This was reinforced by the comments we received during the consultation on the Vision.

Frameworks for Change

To show the route we propose to take, we have prepared a series of *Frameworks for Change*, one for each of the *Vision*'s nine environmental themes. This document is one of these thematic *Frameworks* which are intended mainly for internal planning purposes though they are publicly available. They set out our proposals for the medium term to make progress towards the long-term objectives described in the *Vision*. These *Frameworks* – and the associated dialogue and business development that will flow from them – are not only intended to make progress towards the environmental outcomes in the *Vision*, but also to improve the Agency's service delivery to Government[2], industry, and the public. They are also intended to improve our own internal efficiency and effectiveness. Overall, we regard them as being beneficial to both our stakeholders, and society in general. They are frameworks with a menu of possible actions, rather than final plans, because we still have to agree the final proposals. We have to balance the competing priorities within them, take into account their specific implications for others, and match them to the resources we have available. This balancing and prioritisation has to be agreed with Government, and will be done through our corporate planning process, with our firmed-up work programmes appearing in our formal Corporate Plans. The Government's current revision of its statutory guidance in respect of our sustainable development remit will also help us clarify the routes and options available to us.

[1] The Environmental Vision, and Frameworks for Change is available on the Agency's website http://www.environment-agency.gov.uk

[2] References to Government include the UK Government and, where appropriate, the National Assembly for Wales.

We will be discussing these proposals with our stakeholders. The main vehicle for this external dialogue and discussion will be a separate series of sector based *Frameworks* starting late in 2001. These will draw from the nine themes the issues and outcomes relevant to the sector concerned.

Working with partners

We recognise that we cannot on our own deliver the outcomes and goals we have set out. We already work in close partnership with a wide range of organisations and groups, and we are keen to explore how we can strengthen existing partnerships and develop new ones. This does not just involve seeking partners for Agency led projects, but also supporting the work of others. We will need to work with a wide range of bodies with an interest in land issues, including those we regulate. Below we list areas where we will want to work in partnership with others, but have not sought fully to specify who these others might be.

2. Restored, protected land with healthier soils

The environmental importance of land tends to be poorly appreciated by society. Land is a finite resource and care is required to ensure that its potential is conserved and where possible enhanced. Society needs to appreciate better the environmental importance of appropriate land management for protection of soils and to avoid harm to water and air.

Land management

There are many aspects of land management that potentially can have a major impact on the environment – including land use planning, agriculture, land contamination, the spreading of wastes and sewage sludge, mineral extraction and the deposition of air pollution. Inappropriate land use or management can be detrimental to the health of soils, through, for example, a reduction in organic matter, reduced biological activity; and, through erosion, loss of the soil itself. Land use also impacts on water resources, through urbanisation, land drainage and afforestation, and soil management can affect the retention and infiltration of water. At the same time, a great number of different factors can impact on land and its management – ranging from its historical usage, through national and international legislative requirements to current Government policy.

Most land in the UK is privately owned and this has a significant bearing on the way it is managed. We need to ensure, therefore, that private land managers understand fully the impact of their actions and accept their responsibility to put right any damage they may cause.

The Common Agricultural Policy (CAP) has a major influence on land use in rural areas. The European Union is shifting the emphasis away from CAP payments linked to production towards measures aimed at helping the environment. Agricultural land use should be sustainable and should not cause permanent deterioration to soils or the landscape. There are many different types of soils in England and Wales but little is known about how their quality is changing, although a continued decline is indicated. A Code of Good Agricultural Practice (COGAP) for soil management has been published, but it has no statutory status and evidence shows it is not very widely adopted. Meanwhile, Government has prepared a draft soil strategy for England, following a recommendation by the Royal Commission on Environmental Pollution.

The health of soil can be considered to be its ability, based on its physical, chemical and biological status to perform the functions that it is required to perform to support current and likely future uses. Application of suitable organic wastes to land can help maintain and improve soil health, and avoid problems caused by their disposal by other means, for example incineration. However, applying contaminated or inappropriate wastes, or using inappropriate cultivation techniques, can have negative impacts.

On certain soils, the risk of soil erosion, surface water runoff and local flooding can be increased by inappropriate cultivation methods that damage soil structure. The risks are higher on sandy and chalk soils that are naturally free draining, so problems can be overcome by adoption of good agricultural practices.

Contaminated land

Current estimates put the number of contaminated land sites in England and Wales at somewhere between 5,000 and 20,000. Even at the lower end of this estimate, contaminated land would still cover an area greater than Manchester. Such sites can present unacceptable risks to human health, to surface and groundwater, ecosystems, buildings, crops and animals.

Most remediation of contaminated land currently occurs through development under planning regulations. However a new contaminated land regime (for dealing with contaminated land not being developed) was introduced in England in April 2000, under which remediation requirements are based on a "suitable for use" approach. Where possible, those responsible for contaminating land are also held responsible for funding the necessary clean-up. Arrangements for dealing with 'orphan' sites – where there is no responsible party is unclear – are also provided. The Pollution Prevention and Control Regulations, introduced in August 2000, oblige operators of permitted processes to take steps to prevent current land contamination and, where it does occur, to carry out remediation.

Urban land use

In its 1999 Report, the Urban Task Force advocated a design-led approach to urban regeneration. It highlighted the expanding 'footprint' of urban development and emphasised the need to avoid developments on 'greenfield' sites through the use, where possible, of derelict land and the cleaning up of existing contamination. Unfortunately, there is for the moment a geographic mismatch between the supply and the demand for 'brownfield' sites. Generally, environmental pressures on land vary from region to region as shown in table 1 (page 15).

3. The Environment Agency's role

The Environment Agency has a limited range of powers relating directly to land and soil protection. It has some powers relating to the spreading of industrial wastes and sewage sludge. Under the Pollution Prevention and Control Regulations, it will also have powers to prevent direct pollution of land by industrial activities, while greater influence over land management may be delivered by more focus on regional and national planning issues.

The Agency, together with local authorities, also has a key role in operating the Part IIA Contaminated Land Regime. It will prepare progress reports on implementation of the new regime and on the remediation and management of contaminated land. The Agency has an important out-reach role in dealing with contaminated land and encouraging best practice.

The Agency's role in flood defence requires it to understand the causes of flooding and to advise on appropriate risk management measures. Within this role, the Agency has to advise on the flood risk impact of both urban development and agricultural practices.

The Agency uses its technical understanding of soil and land issues to influence national environmental policy. We maintain a national leadership on the technical aspects of contaminated land management and have an increasing role as a source of soil expertise.

The State of the Land

The Agency has recently published a State of the Land report[3]. Generally, there is a lack of sufficient information on the state of the land environment to support national and regional policy decisions. Some information is collected but its scope is limited. Table 2 (page 16) provides a summary of the information available at present.

Policy drivers

Among the key national and international drivers that will influence our actions over the period of this *Framework* are:

- **European drivers:** The Common Agriculture Policy and Directives on: Integrated Pollution Prevention & Control (IPPC); Water Framework; Strategic Environmental Assessment; Environmental Impact Assessment; Landfill; Sewage Sludge; Nitrates; Habitats; and Birds. The Environmental Liability White Paper.

- **National and regional drivers:** England Soil Strategy, Wales Soil Strategy, Waste Strategy for England and Wales; Urban White Paper; Rural White Paper; and revised Planning Guidance.

4. Working in partnership

Wherever possible, the Agency will identify partners with common interests, with whom it can collaborate to maximise overall impact. We routinely work very closely with, and provide technical support to, the Department for Environment, Food & Rural Affairs (DEFRA) and to the National Assembly for Wales (NAW). We also maintain links with the Department of Transport, Local Government and the Regions (DTLR) on planning issues. Our activities are framed by, and help to implement a range of Government policies and commitments, including its Sustainable Development Strategy (and the supporting strategies and schemes of the Department of Trade and Industry and NAW), its Urban and Rural White papers and Modernising Government and Better Regulation policies.

We have agreed a Memorandum of Understanding with the Local Government Association for work related to the contaminated land regime. Through our R&D programme, we are collaborating with the Soil Survey and Land Research Centre and the Centre for Ecology and Hydrology on soil quality monitoring. We have also joined the Land Use Policy Group – a collaborative forum of regulatory agencies concerned with the rural environment (including English Nature and the Countryside Council for Wales).

[3] Environment Agency (2000) *State of the environment of England and Wales: the band*

We have strong relationships with the key stakeholders of both urban and rural land, including other regulators, industry representatives, researchers, consultants, technology providers and owners of land.

Effective dialogue has been established with the agricultural and forestry sector over a number of years at regional level, while liaison and partnerships with a range of key organisations – such as the National Farmers Union and Farmers Union of Wales – are being strengthened at a national level.

We also work with others to develop new and better technical methods for the assessment and treatment of land contamination, including the Soil and Groundwater Technology Association (SAGTA), Contaminated Land: Applications In the Real Environment (CLAIRE) and European initiatives.

In the longer term, we will further strengthen our partnerships with key players in the agricultural sector, and will continue to work closely with local government and key stakeholders on contaminated land issues.

5. The Environment Agency's objectives

In *An Environmental Vision*, our overall long-term objective with respect to land is that:

> *Our land and soils in countryside and towns will be exposed far less to pollutants. They will support a wide range of uses, including production of healthy, nutritious food and other crops, without damaging wildlife or human health. Contaminated and damaged land will be restored and protected.*

Many of the mechanisms by which land will be improved are addressed through the *Frameworks* covering A *"greener" business world and Wiser, sustainable use of natural resources*. Air pollution can impact on land, and land use can affect water quality and the rate at which water reaches ground and surface waters. An improved state of the land will in turn help deliver our aspirations to improve the quality of life and enhance the environment for wildlife.

The *Vision* and long-term objectives will help achieve these outcomes:

- Society will value land and soil quality as much as it values the quality of air and water.
- Major contaminated land problems will have been identified, and the land cleaned up and restored so that it is fit for specific uses, and the landscape enhanced.
- The creation of new problems by the inappropriate use and development of land, by direct and indirect additions to the soil, and by accelerated soil erosion, will have been prevented.
- More land will have been brought into sustainable use through more effective clean-up methods and clearer planning targets.
- Land use will match its capability, and land users will pre-guarantee appropriate restoration and long term management as required.

We will seek to achieve these goals in the most efficient and effective manner, taking into account the costs and benefits of the options available to do so.

6. Goals and actions

For each outcome we have identified below a number of goals we intend to achieve in the short to medium term in order to move towards the *Vision* for the environment. We have also outlined the activities that will help achieve these goals, together with the tests to assess progress in their delivery. In practice, activities may contribute to the achievement of more than one goal and outcome.

Tests for progress

The Government's set of sustainable development indicators[4] help show, at a high level, whether we are on a sustainable track. The Agency has also developed its own set of environmental indicators[5] that will be used to show progress towards the *Vision*. In addition to these, we have included some key tests for progress for each outcome.

Role of the Environment Agency

To clarify the role of the Agency in achieving each of these goals, we have allocated the activities to one of three categories:

Environment Agency's role is central

Environment Agency as a substantial partner

Environment Agency's involvement to build understanding

[4] DETR (1999) *Quality of life counts. Indicators for a strategy for sustainable development for the UK: a baseline assessment.*

[5] Environment Agency (July 2000) *Environmental Indicators.* A set of Environmental Indicators for Agency use (also available on the Agency's website http://www.environment-agency.gov.uk)

Land and soil quality

Outcome 1 – Society will value land and soil quality as much as it they values the quality of the air and water.

Tests for progress:

- Opinion surveys to determine the value the public, industry, farmers and Agency staff place on land and soil.
- Actual land use practices will have changed positively.
- Area of Agency-owned contaminated land will reduce.

GOAL	ACTIVITY
Goal 1.1 Increased awareness of the importance of land and soil quality.	**Short to medium term:** • **Provide annual summary reports on the state of land indicating trends in main indicators.** • **Agree, publish and then implement an Agency soil protection strategy.** • Complete a baseline survey of public attitudes to land and undertake subsequent surveys. • Agree and implement a national framework for monitoring of soil and land. **Medium term:** • **Agree and implement a national plan for developing the Agency's technical skills and expertise in the environmental management of land.** • Working with Government, review existing environmental indicators for soil and land and develop further indicators as required.
Goal 1.2 Best practice in dealing with Agency land holdings developed and recognised as a benchmark for others.	**Short to medium term:** • **Publish an Agency land management strategy and include a progress report on contaminated land management in annual reports.** **Medium term:** • **Survey Agency owned contaminated land and complete necessary remediation.**

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Contaminated land

Outcome 2 – Major historic contaminated land problems will have been identified, and the land cleaned up and restored so that it is fit for specific uses, and the landscape enhanced.

Tests for progress:

- Area of contaminated land.
- Area of derelict land.
- Previously developed land available for use.
- Land gained through remediation.
- Number of sites still awaiting remediation.
- Numbers of major orphan sites in England and Wales.
- Number of contaminated sites remediated through planning.
- Number of voluntary site agreements relative to the number of remediation notices.

GOAL	ACTIVITY
Goal 2.1 Comprehensive guidance on the assessment of risks from contaminated land available.	**Short to medium term:** • **Establish within the Agency a centre of expertise in risks to human health from contaminated land.** • Continue the production and revision of guideline values for the assessment of risks to humans from contaminants in land. • Complete the development of models for assessing risk to ecosystems and others receptors from contaminants in land. • **Promote best practice in contamainated land management.**
Goal 2.2 Comprehensive guidance on the management of risks from contaminated land available	**Short to medium term:** • Publish further guidance on the choice and application of remediational technologies. **Medium term:** • **Produce annual reports on remediation practice, including price comparisons.** • Publish guidance on sustainable land treatment options.
Goal 2.3 A simplified remediation licensing regime will be in place.	**Short to medium term:** • **Make recommendations for a dedicated remediation licensing regime.** • Implement remediation licensing regime (timing dependent on Government introducing regulations).
Goal 2.4 The number of historic contaminated land sites for which we have specific responsibility will be reduced by remediation action.	**Short to medium term:** • **Develop a regime for radioactively contaminated land, based on the main Part IIA Contaminated Land Regime.** • **Agree a plan for the management of "orphan" sites.** • **Progress work on Special Sites.** **Medium Term:** • **Reduce the numbers of remediation notices issued, as voluntary action increases.** • Agree policy for the Agency's input to the management of contaminated land within the planning regime.

Contaminated land *continued*

Goal 2.5 The geographical extent of contaminated land will be known.	**Short to medium term:** • Agree standard formats with local authorities for information for the state of contaminated land report. • **Publish first report on the state of contaminated land.** • **Publish information on the state of radioactively contaminated land.**

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Avoiding misuse of land and soil

Outcome 3 – The creation of new problems by the inappropriate use and development of land, by direct and indirect additions to the soil, and by accelerated erosion, will have been prevented.

(See also *Framework* document *A "greener" business world* and *Improved and protected inland and coastal waters*)

Tests for progress:

- Number of newly (not historic) contaminated sites being identified.
- Trends in concentrations of toxic substances in soils.
- Organic matter in top soils.
- Area of land where critical loads are exceeded by aerial deposition.
- Number of farms with a nutrient management plan.
- Number of farmers who use the Code of Good Agricultural Practice (soil) and other relevant guidance.
- Area of land at medium to high risk of soil erosion.
- Reduction in major soil erosion incidents.

GOAL	ACTIVITY
Goal 3.1 Activities on IPPC sites will not cause new land contamination.	**Short to medium term:** • **Publish guidance on site reports for IPPC sites.** • **Assess and report on the impact of aerial deposition on land and soil quality.** **Medium term:** • **Ensure all IPPC sites have produced and acted on site reports.** • **Require all IPPC authorisations take proper account of the potential of the process to cause deterioration of land quality, both on-site and away from the site.**
Goal 3.2 Soil erosion and degradation will be reduced.	**Short to medium term:** • Develop and agree criteria for producing maps of existing and potential soil erosion and degradation. **Medium term:** • **Produce maps for all of England and Wales and include them in local environment action plans.** • **Identify vulnerable catchments and prioritise soil management actions, including changes to agricultural activities.**
Goal 3.3 Flood risk from inappropriate soil cultivation will be reduced.	**Short to medium term:** • Encourage the uptake of good cultivation practices for the protection of soil by working in partnership with farmers and farming organisations in high risk areas. • **Develop catchment models to identify flood risk due to soil degradation and land use practices.** • Carry-out further research on how to reduce surface water run-off through good soil husbandry methods.

Environment Agency's role is central

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Environment Agency's involvement to build understanding

Avoiding misuse of land and soil *continued*

Goal 3.4 Waste will only be spread on land where it confers a benefit and does not have negative impacts on human health or the environment.	**Short to medium term:** • Publish guidance on how to assess the benefit and potential impacts of spreading activity. • Encourage the use of farm waste management plans and nutrient management planning. **Medium term:** • Establish the capacity of different soil types to accept wastes without impairment of soil function.

Environment Agency's role is central
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Environment Agency's involvement to build understanding

Bringing land into sustainable use

Outcome 4 – More land will have been brought into sustainable use through more effective clean-up methods and clearer planning targets.

Tests for progress:
- Proportion of contaminated sites remediated using sustainable techniques.
- Number of major soil erosion incidents; sedimentation / siltation incidents.
- Off-site sediment flow.

GOAL	ACTIVITY
Goal 4.1 Soil quality will be maintained and improved.	**Short to medium term:** • **Integrate soil and land protection into all current Agency regulatory policy including consideration of "heritage soils".** • **Identify the number of sediment related pollution incidents and achieve a reduction in numbers.** • Support the development by Government of new regulations for the spreading of waste and other materials on land available. **Medium term:** • Evaluate the scope for further protection of soil and land through regulation. • **Repeat survey of sustainable remediation techniques.**
Goal 4.2 Agricultural soil will be protected.	**Short to medium term:** • Make recommendations for measures (both advisory and regulatory) to improve and protect agricultural soils, and produce advisory documents.

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Land use and capability

Outcome 5 – Land use will match its capability and land users will pre-guarantee appropriate restoration and long term management as required.
(see also *Framework* document *An enhanced environment for wildlife*)

Tests for progress:
- Amount of new development approved in inappropriate environmental locations.

GOAL	ACTIVITY
Goal 5.1 Land use will be optimised.	**Short to medium term:** • Work with DEFRA and NAW to identify and promote agri-environment schemes which enhance land quality. • Increase the Agency's role and influence in further CAP reform and identify "best options" that support land management. • Work with DEFRA and NAW to introduce strategic environmental assessment of new policies that may result in significant changes in agricultural and forestry cropping patterns and techniques. **Medium term:** • Secure national agreements for an enhanced role of the Agency in planning. • **Investigate and publish impacts of land use decisions on the environment.** • **Include land use capability in all local environment action plans.**

Environment Agency's role is central
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7. Research and development

New R&D is needed by ourselves and others to support delivery of this *Framework*.
This will need to:

- develop better indicators of soil quality, including those to assess the environmental impact of agriculture.
- support collection, collation and assessment of soil information for national and regional planning.
- further develop and review the Contaminated Land Exposure Assessment (CLEA) model and guideline values.
- identify and quantify those activities, including spreading of wastes, that most impact on soil quality.
- determine criteria to evaluate the economic costs of soil deterioration and erosion.
- support and evaluate innovative remedial technologies.
- identify soil husbandry methods that reduce surface water run-off.
- describe criteria to evaluate the sustainability of different land use options.
- provide guidance for determining land capability and matching it to land use.

To deliver this R&D, we will aim to influence and collaborate with other key stakeholders, in particular working through existing national and international networks.

8. Implications for the Environment Agency

The Environment Agency's ability to deliver these goals varies. Some aspects are entirely within our power (for example, developing our expertise). Others depend on persuading the Government to introduce legislative changes (for example, developing new and revised regulations), or working with or influencing others (such as through education) or a mixture of these (as in the case of the Planning System). Successful delivery will require:

Expertise and awareness

- Increased awareness in the Agency of the need to value soil and land.
- Increased technical understanding of soil systems and their functions, including the retention and infiltration of water.
- Enhancement of existing technical excellence in contaminated land and its remediation.
- Increased expertise and knowledge of land and agricultural economics.
- Better developed skills in the communication of land-based issues to the community.
- Better developed technical skills in land management.
- Integration of land and soil protection within all Agency activities.

Policies and strategies

- Development and implementation of an Agency soil strategy.
- Development of a public communication programme on land issues.

Monitoring and reporting

- Coordinated programme for monitoring land and soil, in partnership with others.
- Better indicators of land and soil quality.
- Reporting on the environmental impact of agriculture.
- Reporting on the environmental impact of urban development and minerals extraction.

Knowledge

- Better understanding of health issues relating to land contamination.
- Better understanding of the links between soil contaminants and risks to wildlife and other environmental media.
- Better understanding of soil systems and their functions, including the retention and infiltration of water.
- Better understanding of sustainable land use and which land uses are sustainable in what circumstances.

Influencing and education

- Influence economic decisions relating to both urban and rural land, including regional plans and the future reform of agriculture.
- Provide clear leadership on the impacts of agriculture on the environment and their control.
- Influence the reform of the Common Agricultural Policy and its application in England and Wales.
- Raising public awareness of land quality issues.

New and revised regulations

- Work with Government to develop new regulations relating to the remediation of contaminated land.
- Work with Government to develop new regulations relating to land spreading.
- Work with Government to develop measures to support soil protection in agriculture.

The planning system

- Develop and implement land use and development control policies.
- Work with planning authorities on the implementation of sustainable land use plans.

TABLE 1: Regional variation in environmental pressures on the land

Environmental quality measure	Anglian East	Midland West	North	North West	Southern	South	Thames	Wales
Nitrogen deposition (critical load exceedance for natural vegetation)	M	L	M	M	M	H	L	H
Soils (exceedance of acidity critical loads)	M	L	M	H	L	M	L	H
Stock of vacant and derelict land	L	M	H	H	M	M	M	M
Demand for land for housing	L	M	M	M	H	L	H	L

KEY

This has been based on selecting the two Regions with the greatest breaches of standards, poorest quality or highest loadings and ranking these as H - highly impacted; the two Regions with the best quality or lowest loadings are ranked as L - least impacted. The other Regions are ranked M - moderate (where the impacts are about equal, more than two Regions may be designated H or L).

Source: Environment Agency (2000) *Environment 2000 and Beyond.*

TABLE 2: Key environmental trends

Viewpoint	State and trends
Land use and resources	**Total stock:** 150,360km2 (15 million ha). **Land use:** A total of 74% agriculture, 8.5% woodland 10% urban and 7.5% other uses in 1996. Small but steady increase in woodland and urban areas and slight decline in crop areas linked to set-aside. **Land cover:** In 1990, 66% arable and improved grassland; 13% semi-natural and heath/moorland; 9% woodland; 10% urbanised. Reduction of arable, grass and semi-natural cover since 1984 due to increased urbanisation and afforestation. Over 4% increase in amount of urban use since 1945, rate of 0.8% per decade. **Housing development:** Numbers of households increasing: 3.8 million new homes needed in England between 1996 and 2021; 0.2 million in Wales. **Farming:** Increased productivity, increased mechanisation, intensification of livestock grazing, land drainage Changed nature of landscape in arable areas – larger fields, fewer hedges. Decline in horticulture. **Industry:** Decline in industrial land use generation of derelict land in 1970s and 1980s, legacy of contaminated land. **Commerce:** Between 1986 and 1990, the amount of out-of-town retail floorspace almost tripled, but growth has since reduced. Affects land use, dependence on cars. **Previously developed land:** 33,000ha in England in 1998 (0.3% of land); 5,700ha in Wales in 1993 (0.3%). Reclamation now outpaces new dereliction in England (8.5% less derelict land in 1993 than in 1974 in England). **Contaminated land:** Estimates vary between 50,000 and 200,000ha in England and 4,000ha in Wales (1.6% total land area) but better information needed. **Land classifications:** About one-third of agricultural land is classified as grade 1, 2 and 3a (best and most versatile) in England. Only 20% grade 1, 2 and 3 in Wales. Some 159 Countryside Character Areas in England. **Erosion:** Nearly half the arable land in England and Wales is likely to be vulnerable to soil erosion. Livestock, vehicles and people are causing accelerated peat loss in the hills. **Soil condition:** Water-holding capacity, soil structure and resistance to erosion are being affected adversely by reductions in soil organic matter levels. **Habitats:** Diversity reflects changes over centuries from "original" state. Recent declines in amount of heathland and unimproved grassland; increases in woodland and improved grassland. **Mineral extraction:** Some 50,000ha of land was being mined in 1994, mainly for aggregates, for which demand is projected to increase by 25 to 40% by 2011.
Key biological populations	**Soil biodiversity:** No information on trends. Non-native flatworm affecting earthworms in some areas. Falling levels of soil organic matter indicate reducing soil biomass.
Compliance with standards and targets	**Soil acidity:** Under arable crops, acid soils have decreased from 10% to 4% since 1970s. Under grass, acid soils have increased from 39% to 55%. **Nutrients:** Soils with low phosphorus or potassium levels have fallen over the past 20 years. A total of 22% of soils now have high phosphorus levels.

TABLE 2: Key environmental trends *continued*

	Organic matter: Between about 1980 and 1995 arable soils with less than 4% organic carbon increased from 78% to 88%; similarly, grassland soils increased from 44% to 60%. Lower levels of organic matter provide smaller reservoirs of nitrogen and other nutrients that suppor the long-term fertility of soils. **Hazardous substances:** Very small changes in soil metal concentrations between 1980 and 1995. Urban soils tend to have higher concentrations than agricultural soils. Organic contaminants (such as dioxins, PCBs) at low concentrations. **Radioactive pollution:** There is no specific information on the state of radioactively contaminated land in England and Wales.
Health of the environment	**Acidification:** Sulphur and nitrogen deposition exceeds critical loads of acidity over a significant area of the UK. International agreements are likely to lead to significant reductions in emissions of sulphur and nitrogen by 2010, however, critical loads in parts of Wales, Cumbria and the Pennines will still be exceeded.
Long-term reference sites	**Environmental Change Network:** Insufficient number of years to show trends yet. Soils at sites at Rothamsted reflect trends in atmospheric pollution and inputs (fertilisers, management). There is increasing acidity in some grassland soils, decreasing levels of organic matter in arable soils.
Aesthetic quality	**Landscape:** Over 23% of the countryside in England and Wales is protected as a National Park or an Area of Outstanding Natural Beauty. Quality and local character of lowland landscapes declined between 1972 and 1994, although the rate of landscape change was greatest from 1945 to 1972. Declining features include hedges, trees and unimproved land. **Buildings and other developments:** Only 56% of England is classed as tranquil. Since the 1960s England has lost 21% of its tranquil areas (19,000km^2). There is potential pressure from wind farms and inappropriate development. **Litter:** Detracts from aesthetic appeal. High standards in National Parks, but 15% of city and town centres had unsatisfactory levels of cleanliness. Some 30% of people "very worried" by litter in 1996/97.

Source: Environment Agency (2000) *The state of the environment of England and Wales: the land.*

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