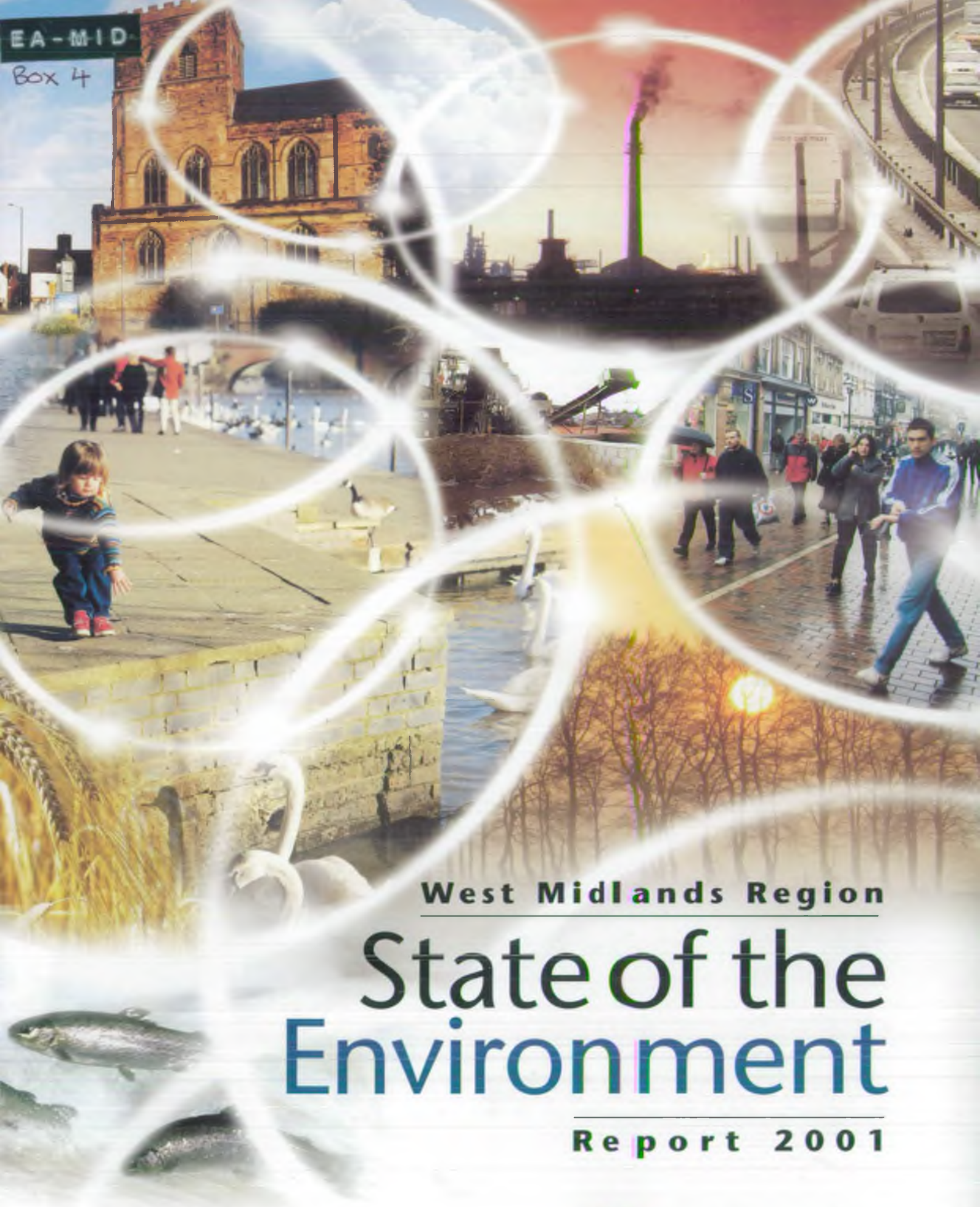

West Midlands Region

State of the Environment

Report 2001

Environment Agency

nvironment Agency's
a better environment
in the West Midlands

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ENVIRONMENT AGENCY

Contents

Foreword

The environment of the West Midlands is one of its most valuable, but not necessarily valued, assets. The region can claim a rich diversity of urban and rural landscape and culture. From the recent examples of urban renaissance in the heart of Birmingham, to the wild uplands of the Shropshire and Staffordshire Hills, we can enjoy some of the finest townscape and countryside that England has to offer.

Our region's environment is under threat. It experiences pressure from development as the demand for new homes and places to work increases; pressure from pollution as more cars take to the roads; pressure from a changing climate caused by global warming; and pressure on our essential water resources caused by ever-increasing demands.

Left unchecked, these pressures will almost certainly result in lasting damage and permanent change to our environment.

Change is an essential component of modern day living, reflecting social and economic demands. Indeed, the concept of sustainable development, which lies at the very heart of the Environment Agency's work in the West Midlands, itself embraces change as a necessary part of our lives.

The aim, therefore, is not to stop development, but to ensure that it proceeds in the right places and, essentially, with the right safeguards and benefits to mitigate and compensate for environmental losses. In this way, new development ought to be seen as contributing to environmental quality rather than eroding it.

This report sets out in a structured and comprehensive form, the State of the Environment of the West Midlands - a snapshot of our region's environment. It provides a baseline against which we will be able to gauge the effects of our joint actions over the coming years, whilst also highlighting a number of the more pressing environmental issues that are facing our region.

I hope you find its contents both informative and thought provoking and that you will join the effort to protect and improve the environment of the West Midlands for future generations.

Councillor Colin Beardwood

Environment Agency Board Member

Chair of the West Midlands Regional Chamber

March 2001

Chapter One

A better environment for the West Midlands

A vision for the environment

The Environment Agency's objective is to help achieve a healthy, rich and diverse environment in England and Wales, for present and future generations. By doing so we will contribute to the national aim of achieving sustainable development.

In this report we review the current state of the environment in the West Midlands, which is home to some 5.3 million people. We identify the challenges to be overcome to address not only our historic environmental problems, but to ensure that future development sustains and enhances the natural resources of the region.

The Environment Agency aims, through use of its statutory duties and powers and through the way it works with and influences others, to ensure that all new development in the West Midlands is sustainable in the widest sense of the word.

Quality of life is not just about increased economic prosperity. It is also about how economic growth, a more inclusive society and the state of the environment improves the well being of all those living in the West Midlands.

State of the environment in the West Midlands

The West Midlands is subject to greater pressures on its environment than almost any other English region. These pressures come from flooding, demand for scarce water resources, land contamination, volumes of waste and emissions to atmosphere. Despite its rich and varied natural resources, these pressures, a product of high population density, traffic volume and a long industrial tradition, characterise the region. Nevertheless, we have an opportunity to improve and enhance through development.

With the right policies and careful planning these issues can be resolved. This is most dramatically demonstrated by improvements achieved in the water quality of the region in the past thirty years, such that many of our urban rivers and canals that were once a national disgrace, are now an increasing environmental asset. For instance, major quality improvements in the River Tame have been instrumental in the utilisation of the River Trent as a major drinking water source.

This report, in a series of topic chapters, summarises the current state of various aspects of the West Midlands environment, and identifies what needs to be done and the measures by which we shall judge success. We summarise the key, cross cutting issues which emerge and which, in the view of the Environment Agency, should help shape the regional debate on future environmental policy within the West Midlands.

Below
Worcestershire

We recognise that we cannot achieve a better environment for the region through our own efforts alone. Decision-making at a local and community level will always be important, but increasingly regional decisions are likely to affect the environment. The Government Office for the West Midlands, Advantage West Midlands (the regional development agency), the West Midlands Round Table for Sustainable Development and the West Midlands Local Government Association, all have a significant role to play in bringing about sustainable development. Many other established organisations such as English Nature, the Ministry for Agriculture Fisheries and Food (MAFF) and the Countryside Agency are increasingly working regionally to bring about these objectives. We have already developed strong relationships with these bodies but fully realise that in future our partnerships will need to be strengthened further if the environment of the West Midlands is to be protected and enhanced.

Map 1 West Midlands Region

Priority issues for the West Midlands region

Water, water everywhere

Water has indeed been everywhere at certain periods in recent years. Unprecedented flooding events have occurred across the region, causing distress and misery for thousands of people, together with significant economic upheaval. Climate change is becoming an increasing reality and although the scale of the issue is still not fully understood, it is clear that we can expect a wider extreme of weather conditions, leading to more frequent and sometimes more severe floods. Conversely a combination of higher temperatures and extended periods of low rainfall will mean that droughts of the severity experienced in 1975-6 and 1995-6 will become more common.

In the West Midlands:

- *There are 62,000 properties at risk of flooding in an extreme event*
- *Groundwater is being pumped in parts of the region in excess of its sustainable yield*
- *Annual average temperature has increased by 0.6˚C in the last century*
- *Rainfall extremes are predicted to become worse with about 30% increase in winter and a similar decrease in summer*
- *There has been a drastic decline in certain aquatic species such as water vole and white-clawed crayfish.*

Outcomes needed are:

- *A presumption against development in flood plains*
- *Over abstracted aquifers being brought into sustainable management*
- *Commitment across the region to reducing greenhouse gas emissions*
- *Water conservation measures being adopted by business and householders*
- *Increasing the proportion of electricity generated from renewable sources to 10% by 2010*
- *Improvements made to river and wetland habitats through collaborative projects.*

The air we breathe

Emissions from power stations and other industrial processes and vehicles emissions have their environmental impact, locally, regionally and globally. Better energy efficiency and improved emission standards in industry can be a win-win for the environment and the economy, but the region will only fully meet the long-term air quality targets if it tackles vehicle emissions. The level of car ownership is high and commuting is common in all areas. Innovative abatement technology is part of the answer, but the management of urban hot spots depends on changing patterns of private vehicle usage.

In the West Midlands:

- *72% of households have access to at least one vehicle*
- *Air quality standards are regularly breached around the motorway network, but industrial sources of pollution are in decline*
- *Ozone levels exceed standards in rural areas*
- *Highest levels of nitrogen oxide are associated with motorway corridors to the north of Birmingham.*

Outcomes needed are:

- *Continuing to reduce and minimise pollutants from industry*
- *Working in partnership to achieve higher standards of air quality, particularly for nitrogen oxides, sulphur dioxide, particles and ozone*
- *Locating industrial and commercial developments sensitively, aiming to reduce vehicle movements, introduce innovative technology and improve air quality*
- *Improving the public transport infrastructure.*

A throw away society

Using less water and minimising and reusing household and industrial waste helps reduce the impact of human activity on the environment. Some industrial sectors have led the way in optimising the use of natural resources and minimising waste. But the waste we generate from our homes is increasing alarmingly and there is a mismatch between the volume of waste being produced and our ability to manage it in a way which is acceptable in terms of the environment and public health. Transport of waste is again an issue with much of the waste created within the Birmingham conurbation currently being taken to sites within the surrounding shire areas.

In the West Midlands:

- *16 Million tonnes of waste is generated in the region each year*
- *2.5 million tonnes of household waste was produced in the region in 1995. This could increase to 5.3 million tonnes by 2020*
- *In 2020 less than 1 million tonnes of household waste will be able to go to landfill disposal, with 4.3 million tonnes diverted to other forms of treatment*
- *Unless growth in waste is stemmed, additional recycling and composting plants will be necessary*
- *Domestic water consumption is increasing by 1.5% per year.*

Outcomes needed are:

- *Initiatives from local to regional level, involving producers and consumers, to contain and reduce the amount of waste produced*
- *A region-wide informed debate about the choices and implications for new waste treatment plants if growth in waste continues*
- *Improving the monitoring of waste to ensure that we can all plan effectively for future needs*
- *Emphasising the need to reduce our use of water and introduce innovative ways to minimise consumption.*

Top
Ludlow

Middle
M6 Birmingham

Rebuilding for the future

The poor quality of some of our land, soil and groundwater is one of the undesirable impacts of our long industrial heritage. As a region we have been in the forefront of beneficial redevelopment, but as we solve the more urgent problems we begin to learn of the insidious nature of historic contamination. Improvements in urban water quality, surveys of historic contamination and innovative remediation technologies open the way for regeneration projects that will bring sustainable environmental and aesthetic improvements. A major challenge relates to the need to regenerate areas of past dereliction.

Top
Brindley Place, Birmingham

Right
Birmingham

In the West Midlands:

- *30% of reported pollution incidents are caused by oil and fuel spillage*
- *The construction industry is the most frequently identified source of reported industrial pollution incidents*
- *Significant areas of land in the metropolitan area are affected by previous industrial use*
- *Water quality is improving with the percentage of the best quality rivers more than doubling since 1990 and the percentage of the poorest rivers almost halving*
- *There are sixteen candidate Special Areas of Conservation (SACs) and one Special Protection Area (SPA) in the West Midlands*
- *There may be a lack of suitable land to meet development targets in the urban areas.*

Outcomes needed are:

- *Considering risks to groundwater in development*
- *Continuing the successful programme of water quality improvements by tackling, through partnerships, the continuing problems of diffuse pollution in urban areas*
- *Local authorities to work with the Agency and others to identify at the earliest possible time, the extent and nature of contaminated land within the region*
- *Cleaning and redeveloping brownfield sites in preference to greenfield sites*
- *Remediating land to meet targets for new housing in the region*
- *Taking action to mitigate detrimental impacts on SACs and SPAs.*

Five and a half million lifestyles

An improved environment is an issue for everyone in the region, because it is only with lifestyles geared to improving the environment that lasting improvements will be made. The challenge is to provide the framework, in terms of planning and development policies, provision of public services and regulatory controls, which will provide incentives to everyone to help deliver the outcomes. As part of this, the public need to have the opportunity for informed choice about options for the environment, particularly in situations where there is uncertainty of outcome.

In the West Midlands:

- *Current levels of household waste recycling in the region are around 5 to 10%*
- *Each person travels around 6300 miles per year. Of that 5500 miles are travelled by car and 678 miles by public transport*
- *Each person takes around 1000 journeys per year. Of those, 50% are for personal and leisure, with the remainder for work, shopping and education*
- *The region has healthy fish stocks in many rivers attracting commerce and tourism and recreational opportunities.*

Outcomes needed are:

- *Stabilising growth in waste and recycling 33% of household waste*
- *Improving the public transport infrastructure to reduce dependence on car use*
- *Reducing levels of journeys by car*
- *Increasing availability of locations for fishing and other leisure and recreation opportunities*
- *Restoring poor quality urban still waters*
- *Adopting the principles outlined in the Agency's Environmental Vision.*

Sustainable development isn't just about the work of regional organisations; it's about the consequences of the decisions and actions of every person and business in the West Midlands. This report highlights some challenges that can only be achieved through significant changes in the way we all live our lives and conduct our business.
We know that we need to work with other organisations and individuals at both regional and more local levels to better communicate these important messages. We need to continually challenge behaviours and expectations in relation to the West Midlands environment.

The future of our region depends on all of us.

Right
'Reducing levels of journeys by car'

Chapter Two

Climate change

Background

Much of our current concern for the environment stems from an acknowledgement that climate - both global and local - is changing. The extent to which such change is due to the actions of man alone is, however, still not universally accepted. Looking back over several millennia the range has been between ice ages and subtropical conditions, so there is nothing new in the fact that climate is changing or that such large changes have had massive implications for the flora and fauna.

Whilst such changes may seem academic, it is important to consider that the average temperature now is only about 5° Celsius above the average during the last ice age. A change of a few degrees can have a profound effect and annual mean temperatures over Central England have risen by some 0.6°C since 1901 (figure 1).

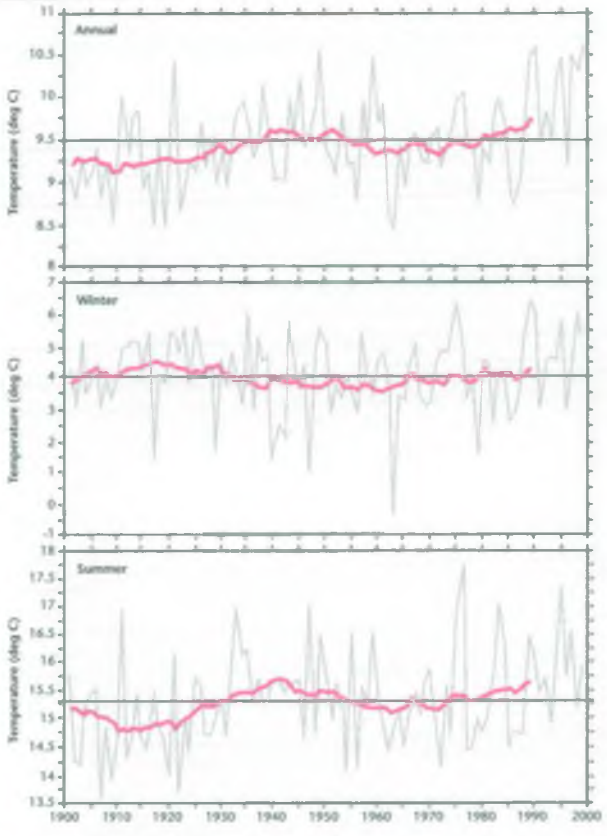
Interest in climate change in the West Midlands and its potential implications has been heightened by findings of a study conducted by Dr Rob Wilby of the University of Derby. This revealed that five of the ten warmest years of the twentieth century occurred in the 1990s - (1990, 1995, and 1997-1999).

The same study revealed that there has been a significant rise in the frequency of 'hot' days since 1901, concentrated in the recent part of the century. The duration of the frost-free period in Central England has increased by about 20 days per year since 1801.

Annual precipitation totals across the region have increased by some 3-4% since the 1930's, with the winters becoming wetter and the summers drier. Although there has been no noticeable change in the frequency of rainfall events, their intensity has tended to increase, especially in the winter months.

Figure 1

Annual, Winter and Summer Mean Temperatures (°C) for the Central England Temperature Record 1901-1999.



Smooth curves show 20-year moving averages and horizontal lines show the 1961-1990 average.

Most experts attribute climate changes to a build up of 'greenhouse' gases in the atmosphere. These are so called because they trap heat within the atmosphere rather than it radiating out into space. There are several greenhouse gases, some of which result from industrial activity, but the most potent in terms of its effect is carbon dioxide resulting from the combustion of fossil fuels. Depending on their rate of increase, it is thought that greenhouse gases are likely to have a significant effect on future climate conditions, and the United Kingdom Climate Impacts Programme (UKCIP) has produced in 1998 four alternative long term scenarios as a means of projecting and anticipating future climatic conditions - (low, medium-low, medium-high and high).

Three outcomes are common to all four scenarios: all predict increases in average temperatures, increases in winter precipitation and decreases in summer precipitation. The climate warming ranges from +1.1°C for the low scenario to +3.2°C for the high scenario by the 2080s. This compares with +0.6°C for Central England during the period 1901 to 1999.

The year-to-year variability in seasonal temperatures also changes in the future. Winter variability decreases, indicating that very cold winters become rarer. This trend is more pronounced in the west than in the east of the region. Conversely, summer variability increases, indicating that very hot summers occur more frequently.

We are used to a marked year on year variability in rainfall patterns and this can be expected to continue. Annual average precipitation increases in all four UKCIP 1998 scenarios, by between 1-5% by the 2050s. This change hides possible increases in the winter precipitation of 11-13%, and reductions of summer precipitation by 13-16% across the larger area modelled under the medium-high scenario. Future changes in the frequency of severe summer and winter gales are not considered significant.

The low resolution of the UKCIP 1998 scenarios limits the scope for detailed climate impact assessment at sub-regional scales. However, using an established forecasting technique known as the Regional Climate Model (RCM), an annual average temperature change of +3.0°C by 2080-2100 might be expected in the West Midlands under the medium-high scenario with greater spatial (geographic) variations in summer than in winter.

The RCM also predicts a change in annual precipitation of +7% in the West Midlands by 2100, with local variations ranging from +4% in west Shropshire to +12% in west Hereford and Worcestershire. Seasonal changes are more marked with average precipitation changes of +30% in winter and -28% in summer, relative to the period 1961-1990.

The scale and range of these modelled projections are shown on the accompanying maps (figures 2a and 2b overleaf).

If action is not taken, we can expect existing climatic trends to continue unabated. More rain and a greater intensity of winter rainfall events will lead to more flooding; higher temperatures and lower rainfall in summer months could give rise to greater demand for water and shortages in some areas. Rising temperatures and changed rainfall patterns will also have an effect on the natural environment with changes to habitats and species distribution. It could also have significant implications for agriculture and landscape.

High river levels in Ludlow

Roles and responsibilities

The Environment Agency has no direct remit to monitor and regulate in most aspects of the issues surrounding climate change. It does, however, have a close interest in the impacts of climate change.

Below
Stafford

The Agency regulates companies that produce and use greenhouse gases under the Integrated Pollution Control (IPC) and the new Integrated Pollution Prevention and Control (IPPC) regimes. These enable the Agency to set targets for reducing emissions of these gases. Under IPPC we are also able to set targets to improve energy efficiency, leading to reduced emissions of carbon dioxide. The other major users of fossil fuels (e.g. transport and domestic energy) are largely unregulated and in such cases we will have to rely on our influencing and partnership roles to develop and promote policies aimed at reducing emissions of greenhouse gases.

Issues and challenges

The potential impacts of climate change could affect much of the natural environment and society. Some impacts could be beneficial, although attention tends to focus on those that are damaging.
As far as the Agency's direct interests are concerned, the increased risk of flooding and the consequences for water resources are already being factored into planning. The impact on fisheries and other wildlife needs to be better understood, as there is the prospect of trying to sustain biodiversity in circumstances where it is unlikely to succeed.
Specific changes will occur, including the potential appearance of new pests and diseases.
Changing climate could also have other health effects due to heat stress and air quality.

Figure 2A

Change in Mean Surface Air Temperatures (°C) over the West Midlands by 2080-2100

Figure 2B

Change in Precipitation (%) over the West Midlands by 2080-2100

Environment Agency responses and targets

The Agency has commissioned work to understand the changing climate and how it impacts on our own activities.

This work will continue, and

- *Regulatory processes will be used to help deliver the Government's targets for reductions in greenhouse gas emissions*
- *The Agency will apply best practice in our own operations to reduce our own contribution to climate change*
- *The impact of climate change will be considered in reviewing the level of protection afforded by flood defences and the information applied in the strategic studies that get underway in the period 2001/2003*
- *The impact on water demand and resources will be kept under review*
- *The Agency's actions in Biodiversity Action Plans (BAPs) and conservation and fisheries activities will be kept under review as the potential impacts of climate change become better understood*
- *The Agency will support broader studies in partnership with other interested parties to understand the impact of climate change and how the local community can best adapt and take advantage of the situation.*

Right
View from Worcestershire Cricket Ground under flood

How others can contribute

All of society has a role to play in mitigating and adapting to climate change. Some of these are applicable generally; others could be specific to the West Midlands.

Examples of universal actions are:

- *Householders and businesses need to reduce energy consumption by utilising more efficient heating and lighting technology*
- *We can all also reduce our contribution as individuals from transport by changing our travelling habits, choice of vehicle and efficient use of delivery vehicles*
- *Planning authorities and developers need to take account of changing flood risk and the impact on water demand and resources. They can help reduce emissions of carbon dioxide by specifying and building energy efficient properties and locating developments close to public transport links*
- *Farmers and gardeners need to take account of changing temperature and rainfall patterns in making choices about crops and irrigation.*

At the local level, the Environment Agency will support work by the Midlands Environment Business Club and Severn Trent Water Ltd to develop a study on the potential impact of climate change in the West Midlands.

At Government level, the draft UK (Climate Change) Programme includes a target to increase the proportion of electricity generated from renewable sources to 10% by 2010. In addition, the Kyoto agreement committed Government to a 12.5% cut in greenhouse gases from the 1990 levels by 2008/12. The Government has proposed a step further by adopting a target to reduce carbon dioxide emissions by 20% by 2010.

Conclusions

Despite the limited detailed historical data on the climate, there is good evidence to suggest that the West Midlands climate has changed in the last hundred years. It has become warmer and there is more rainfall in winter and less in summer than a century ago. Projecting the information forward is subject to large uncertainties and the final outcome is dependent on assumptions that go into the climate models. However, most experts agree that the future scenarios suggested by climate models give a consistent message of 'more of the same'; that is, warmer temperatures with wetter winters and drier summers. This will have consequences for all businesses and human activity that is affected by these variables, as well as for wildlife.

Chapter Three

Water quality

Background

Rivers and estuaries are an important part of the region's environment. They support amphibians, fish and many plant species as well as a variety of invertebrates, which are fundamental in food chains. Large numbers of bird species and rare mammals, such as water voles and otters, are reliant upon these habitats. Rivers can also form important links between otherwise fragmented habitats acting as wildlife corridors.

In addition to environmental benefits, rivers are a source of water for drinking, domestic, agricultural and industrial use. Both rivers and estuaries are also a valuable recreational resource.

Groundwater is also important both as a source of water supply and to sustain rivers and wetlands during dry seasons. Its quality needs to be protected for both these reasons.

Our rivers are subject to numerous stresses, which include pollution, habitat degradation, low flows (caused by drought, abstraction and climate change) and recreational activities. It is important that we are aware of the pressures on them and that we have a reliable picture of their overall 'health' to effectively manage water quality. We assess the quality of the water by reference to its biology and chemistry.

Right
Poor quality urban river

Roles and responsibilities

The Environment Agency is responsible for controlling discharges to the water environment under several regulatory systems. Discharges, including those from sewage treatment works for example, require a consent, which sets conditions for effluent quality. In addition to this regulatory work and more general pollution control activities, the Agency carries out extensive monitoring to ensure that water quality is maintained or improved.

The management of water quality is also affected by other River Quality Objectives (RQOs) arising from the Directives issued by the European Union that impose requirements to monitor, report compliance and pursue improvements.

Some Directives have been in force for many years, the most important being:

- *Control of Dangerous Substances in Surface Waters*
- *Surface Water Abstracted for Drinking Water*
- *Freshwater Fisheries*
- *Urban Waste Water Treatment*
- *Pollution of waters by Nitrates from Agriculture*
- *Groundwater*

The Agency's other roles relevant to water quality and its management include liaison with:

- *Water companies responsible for the sewerage network and treatment works*
- *Other private and industrial discharges*
- *The Office of Water Services (OFWAT) which along with the Agency advises the Secretary of State on the water and sewerage companies investment programmes*
- *Local authority environmental health departments who are responsible for public health including private water supplies*

Issues and challenges

River water quality

The Environment Agency has a national method for classifying the water quality of rivers and canals known as the General Quality Assessment scheme (GQA). This provides a measure of the state of water quality and is designed to show trends and enable comparisons to be made between different time periods and locations. The chemical assessment is based on three years' results, stored on the public register and uses standard published methods of calculation. No subjective judgements are involved.

Water quality is assigned one of six grades (A to F). The grade for a particular stretch is determined exclusively by three chemical measurements (ammonia, dissolved oxygen and biochemical oxygen demand) which reflect the most common types of pollution including discharges of treated waste from sewage treatment works, agriculture and industry. Figure 3 shows how river water quality, classified according to the GQA, has improved from 1990 to 1998.

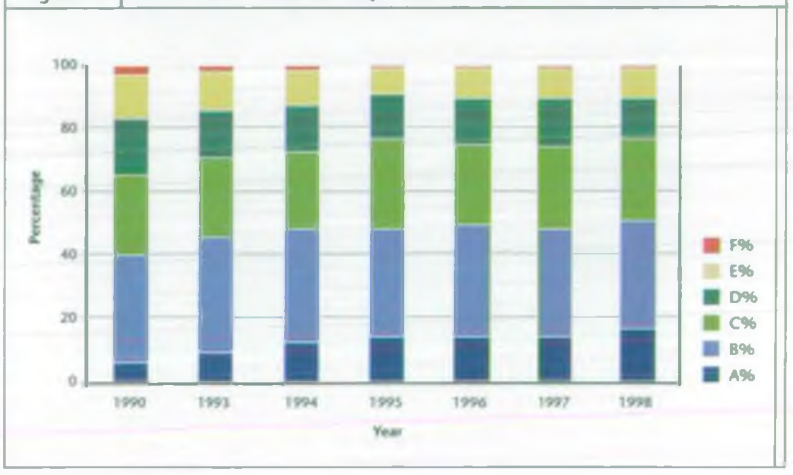
Water quality in the West Midlands is generally good or fair (89% in Grade A-D) except in the industrial heartlands where the impacts of historic pollution are still in evidence.

There has been an underlying trend of improvement in water quality. Since 1990, for example, the percentage of the best quality (Grade A) rivers has more than doubled (from 6% to 16%) and the percentage of the poorest (Grade E & F) quality rivers and canals has almost halved (from 18% to 10%). This improvement is due to significant improvements in the quality of discharges to rivers in the region, to tighter regulation and to better enforcement and pollution prevention by the Agency.

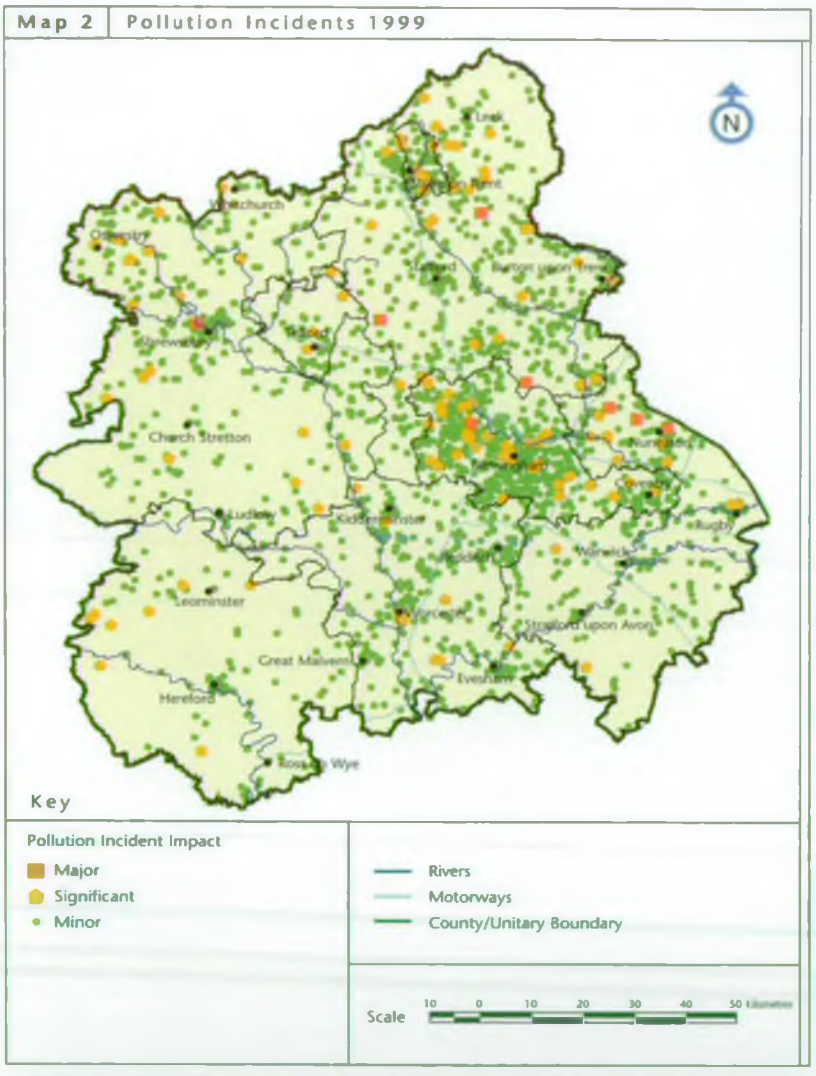
Top
River Tame below the raised section of the M6 motorway

Bottom
Pollution from sewer overflow, Stoke on Trent

Figure 3 Historical Trend of GQA classes from 1990 Onwards



Map 2 | Pollution Incidents 1999



Above
Pollution from contaminated land, Bentley Mill Lane, Walsall

ENVIRONMENT AGENCY
EMERGENCY HOTLINE
0800 80 70 60

Pollution incidents

The Agency is responsible for responding to reports of pollution incidents from the public and industry. The Agency has set a standard pollution incident classification and can report the incidents by the types and sources of pollution. Although there is a falling trend in the number of substantiated incidents in the West Midlands, a number of factors may have influenced the figures. For example, heavy and prolonged rainfall may result in fewer incidents being reported. Map 2 shows the pollution incidents that occurred in the West Midlands in 1999.

In the West Midlands, oils and fuels are the most significant types of pollution accounting for 30% of reported incidents. The construction industry is the most frequently identified source of industrial pollution, although agricultural activities, in particular dairy farming, account for 20% of reported incidents.

The Agency will address these priority areas by tighter regulation, enforcement and pollution prevention and by continuing partnership work with the construction and petroleum industries.

Groundwater quality issues generally arise as a result of bad management practices in industry and agriculture, either as a result of large single spillages soaking into the ground or from a slow build up of pollution through prolonged leakage or land disposal of chemicals.

An example of pollution across the industrial West Midlands is the use of industrial solvents as cleaning agents. Historically, the custom and practice for disposal of used solvent simply involved pouring onto the ground. This, together with many spills and accidents, as well as leaking storage tanks and other similar incidents, has led to widespread solvent pollution of the groundwater.

Research at Birmingham University has found solvents present in over 75% of the groundwater abstractions in Birmingham and Coventry. Although these concentrations were not all above the limits for drinking water, the presence of such chemicals can limit the use of the groundwater. Recent legislation has enabled the Agency to serve notices to require the storage and use of such chemicals to be carried out in such a way as to protect groundwater. Bunded storage areas, sealed drains and other precautions can be required to prevent leakage into the ground. Pollution incidents can be reported to the Agency by phoning our emergency hotline on 0800 80 70 60.

Sewage treatment and sewerage infrastructure

Every 5 years the Director General of Water Services (OFWAT) reviews the prices to be charged by water companies, which takes into account the plans by the companies to invest in improved facilities including those required to meet environmental standards. These plans are known as Asset Management Plans (AMP). The most recent review related to the period between 2000 and 2005. In drawing up the programme, the Director General is required to take into account guidance issued by the Secretary of State. This guidance was informed by extensive public consultation involving the Agency, local authorities and the public. The Government has agreed the environmental requirements to be met by the water companies up to 2005.

The programme is known as the National Environment Programme and will achieve the nation's river water quality objectives in nearly all cases, where the water companies cause existing failures. The programme includes improvements to sewage treatment works effluent quality and reduces the numbers of spills of diluted sewage in periods of rain. With the improved treatment of sewage, additional sludge is produced. The most sustainable route for recycling the sludge is onto agricultural land.

Sheep dip

Sheep dip disposal to land now requires control by the Agency. There are several hundred authorised sites for such disposal across the region. The disposal of sheep dip chemicals has led to pollution of some rivers and groundwaters, but monitoring has so far been limited, so the extent of the problem is not fully known. The Agency is undertaking a programme to locate unauthorised disposals of such chemicals to ensure the environment is protected in the future.

The synthetic pyrethroid sheep dips now in use are extremely toxic to the invertebrates in rivers that fish feed on, and even small discharges can have a devastating impact.

Reported incidents in the West Midlands show that this issue arises most frequently in the western parts of the region where sheep farming is a more common activity.

Urban run-off

All built up areas need to be drained to remove surface water. Traditionally this has been done using underground pipe systems to prevent local flooding by conveying the water away as quickly as possible. This provides an easy route for pollutants from urban areas to be washed into rivers and ground waters and water quality failures and pollution incidents are becoming more evident.

Conventional drainage systems cannot easily control poor run-off quality and thereby contribute to the problem. In addition, conventional drainage systems largely ignore amenity aspects such as water resources, community facilities, landscaping potential and provision of varied wildlife habitats.

Sustainable Drainage Systems (SuDS) are a response to this problem and can be designed to fit in most urban settings with a variety of design options available. SuDS balance these different issues and are more sustainable because they:

- *Manage run-off flow rates, so reducing flooding*
- *Protect or enhance water quality*
- *Are sympathetic to the environmental setting and the needs of the local community*
- *Provide a habitat for wildlife*
- *Encourage natural groundwater recharge.*

Groundwater quality

There are groundwater resources found across the region with numerous pressures in terms of quality and quantity. The main aquifer of strategic importance to the West Midlands, and where the water is present in sufficient volume to abstract for use, is the Triassic Sherwood Sandstones.

Other aquifers of more local importance include the Devonian and Silurian Sandstones and Limestones of Worcestershire, Herefordshire and southern Shropshire, and the Carboniferous Sandstones, Shales, and Mudstones of Coventry, the Black Country and eastern Shropshire. Abstracted groundwater is used for public supply as well as for a range of industrial, agricultural and private uses throughout the region.

Below
Walsall Canal

Nitrates

Nitrate concentrations in groundwater are particularly high in areas of arable farming. This is principally as a result of over application of nitrate rich fertilisers over many years, but also to the changes in agricultural practices such as ploughing of grassland.

Another source of nitrates is the deposition of airborne oxides of nitrogen emitted from high temperature sources, principally from vehicles and industrial processes.

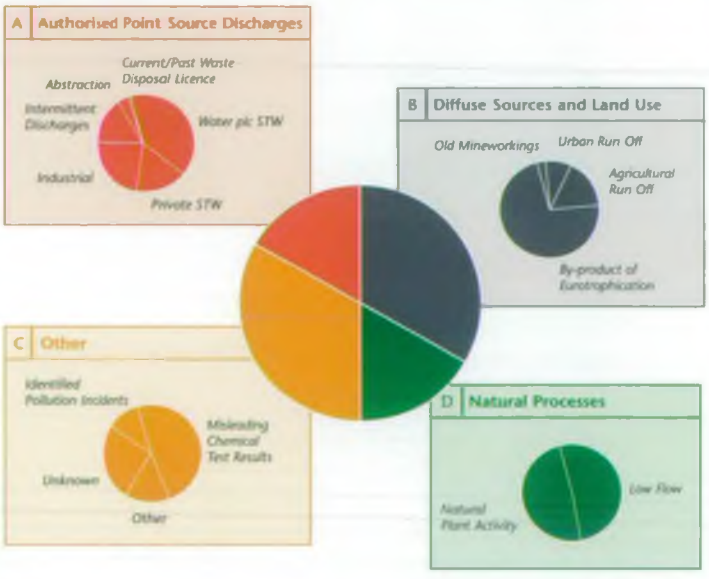
There are a number of designated Nitrate Vulnerable Zones (NVZs) across the region. These areas are defined using the catchment areas of surface and groundwater abstractions, which can stretch some kilometres from the borehole location. Within the NVZs, use of agricultural nitrate from artificial fertilisers and farm derived manure and sludges are restricted to within defined application rates to minimise nitrate pollution to groundwater. In areas where substantial concentrations of emitting sources are predominantly directly up-wind of an NVZ, atmospheric nitrogen input may contribute a substantial proportion of the nitrate pollution.

Minewater rebound

There are few deep coalmines or active metal mines left in the UK. However, once abandoned, such mines will often fill with groundwater and there will often be surface discharges of mine waters which are stained with metals such as iron. These can appear in areas where previously none has occurred. Such discharges can be found in Stoke, the Black Country and Telford associated with former coalmines and across Shropshire from former metal mines. The majority of former mines in this region have water levels that have fully recovered to their final level, but within the Warwickshire, South Staffordshire and Stoke areas water level rebound/recovery is still happening. Controlling the excess water can cause problems for redevelopment as well as dealing with the associated contamination.

Map 3 River Quality Objectives 1999

Figure 4 1999 Reasons for Failure of River Ecosystem Targets



Environment Agency responses and targets

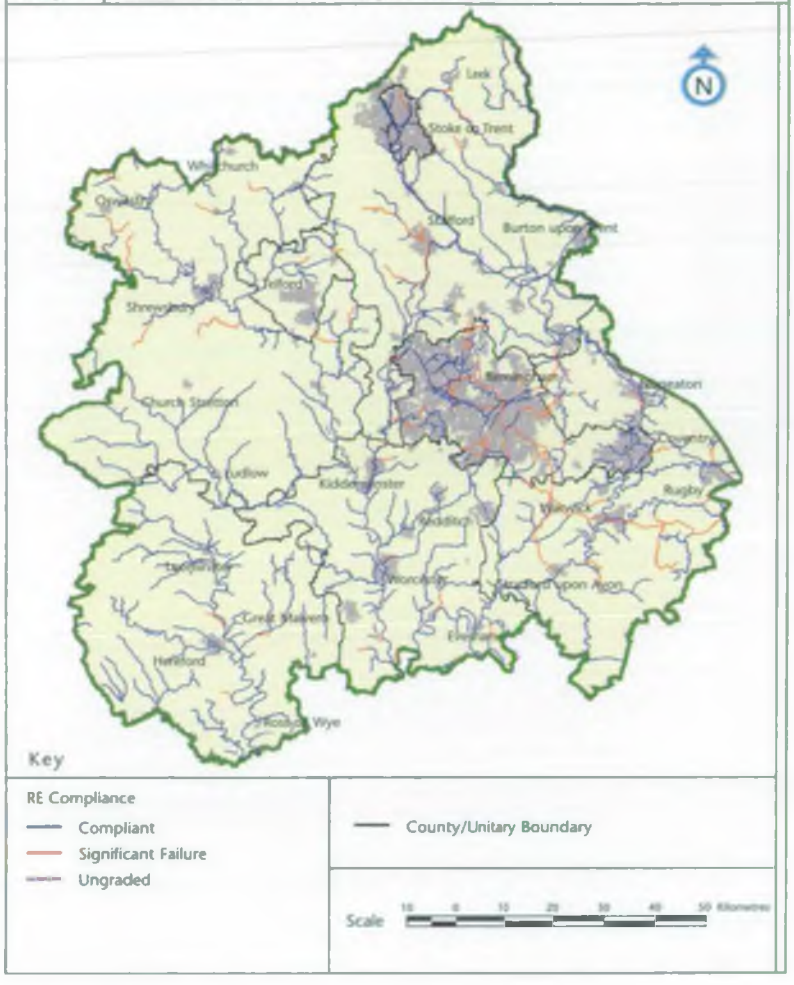
Water quality targets

The Environment Agency has set water quality targets for all rivers, known as River Quality Objectives (RQOs). These are used to plan maintenance and improvement of water quality. These objectives are based on the uses made of rivers. They have been in use nationally since the 1970's, but were formally set and agreed by the Government for all rivers in 1989 and include objectives relating to the delivery of European Directives. RQOs specify the water quality needed in rivers if we are to rely on them for water supplies, recreation and conservation. RQOs reflect the present and future needs of the nation and, through consultation, the wishes of local communities.
In September 1998, the government set out specific targets to be met by 2005, in terms of maintaining and improving the achievement of RQOs.
Achieving them will help to sustain the use of rivers for recreation, fisheries and wildlife and protect the interests of abstractors.

The RQO in current use is known as the River Ecosystem Classification (REC). The scheme comprises 5 target classes, which reflect the water quality requirements of communities of plants and animals living in our rivers. Compliance is reported annually. Where river quality does not meet the objective set, the reason for failures must be investigated and identified and a clear improvement plan established. The Environment Agency has set a national categorisation of reasons for failure. The aim is for rivers to achieve their objective in time-scales dependant upon the scale of improvements.

Left
River-bank pollution

Map 4 River Ecosystems Compliance 1999



Map 3 shows RQOs for the rivers in the West Midlands Region. Compliance with these objectives is shown in map 4.

In the West Midlands, compliance with the River Ecosystem targets has improved with 75% of lengths (2994km of 4010km) achieving their target in 1999. The reasons for the failures in the remaining 25% (1016km) are shown in figure 4 and relate to discharges, diffuse run-off and nutrient enrichment. The failures will need to be addressed by further improvements in the quality of discharges to rivers in the region, tighter regulation, enforcement and pollution prevention by the Agency and also partnerships, particularly with local authorities and the water companies.

A Case Study

Shifnal

Shifnal in Shropshire is a small but growing market town, with predominately housing to the north, south and west sides of the town, and a small industrial zone to the east. Shifnal forms a dormitory area to both Telford and Wolverhampton and has good transport links.

The town lies within the catchment of a tributary of the River Worfe. It also lies on the important Triassic Sherwood Sandstone aquifer and within the catchment of a public water supply, which contributes to the drinking water supply of the town. Treated sewage effluent is discharged to the watercourse downstream of the town.

The abstraction of groundwater for public water supply to the town is one cause of a reduction in the base flow to the river system. This reduction in stream flow causes pressure on the stream's aquatic life and limits the potential dilution for any discharges into the stream, including sewage effluent.

Any significant development in Shifnal will create additional demands for water supply and sewage disposal. Increased water supply from abstraction would reduce further the base flow to the watercourse and affect other water supported ecological features. Any future reduction in flows in the stream would result in effluent discharges having a greater impact on the chemical and biological quality of the watercourse. It would also constrain further effluent discharges from increased development.

This case study illustrates the complex environmental interactions which need to be considered when planning new developments.

Top
Norton Green

Land use and water quality

The vulnerability of groundwater resources is variable and is related to land use, soil type, geology (superficial deposits and solid geology) and the depth to water table. A site with thin sandy soil overlying sandstone with a water table close to the surface will be far more vulnerable than one on clay with thick soil cover and a water table deep underground. As man's activities have an effect on groundwater quality, it is essential that the most risky activities are located in the least vulnerable areas for groundwater. The Agency has published a series of groundwater vulnerability maps for the region on a 1:100,000 scale. These indicate the relative vulnerability across the region.

The following major subdivisions are included along with more details on soil classification:

- ***Major Aquifer*** *- these are the most vulnerable aquifers due to their high permeability and are often fractured. They are also the most exploited for water abstraction*
- ***Minor Aquifers*** *- these seldom produce large quantities of water for abstractions but are important for local supplies and supporting river flows. They are often of variable permeability with layers of water bearing rock in between clays or shales, which contain less water*
- ***Non- Aquifers*** *- these are likely to contain relatively small volumes of water of local importance only. These areas are the least vulnerable to pollution from surface activities.*

There is a significant proportion of the region underlain by major aquifers, which are the most vulnerable to pollution arising from man's activities at the surface.

In addition to this, Source Protection Zones (SPZs) are defined around major abstractions due to the increased vulnerability of groundwater in such locations. The extent of these areas is defined by calculating and mapping the catchment area of the borehole.

How others can contribute

In the West Midlands, the National Environment programme will improve some river stretches and check the risk of future deterioration of many stretches. In addition, 40 schemes relating to the protection of important wildlife habitat sites from the effects of discharges have been identified

Land use planning

In many areas the risk of groundwater contamination is a material planning consideration, which should be taken into account in land-use planning decisions. If groundwater is to be given adequate protection by the planning system, appropriate policies need to be included within development plans and Regional Planning Guidance. The Environment Agency will encourage local planning authorities, and others where appropriate, to include groundwater protection policies in land-use planning documents and to apply those policies in future decisions.

Design, construction, maintenance and management

A significant proportion of pollution incidents could be prevented if existing site practices were to be reviewed and best practice in design, construction, maintenance and management applied to existing and new installations. The Environment Agency will encourage the operators of all potentially polluting sites to carry out regular reviews of their activities with pollution prevention in mind. This will be achieved through the production and dissemination of guidance from the Agency and other associations regarding the design, construction, maintenance and management of domestic, agricultural and industrial sites to minimise their potential impact on the environment.

Householders

Householders need to be made aware of the potential for serious environmental damage that can arise from commonly accepted activities which, if multiplied many thousands of times, could cause lasting harm to the environment. The disposal of used engine oil and cooking oil to domestic sewers are commonly occurring examples.

Conclusions

- *Water Quality is improving with the percentage of the best quality rivers more than doubling (6% to 16%) since 1990 and the percentage of poorest rivers almost halved (18% to 10%)*
- *Water pollution from permitted point source discharges is less significant now with the focus moving to pollution from diffuse sources and land use*
- *A significant proportion of pollution incidents would be prevented if existing practices were reviewed and appropriate best practices were applied*
- *Improving water quality in the region, particularly in the urban areas, provides an opportunity for urban regeneration*
- *Protection of groundwater quality is a high priority; it is a vital resource for the region and once polluted often cannot be remediated at reasonable cost and is thus an environmental asset lost forever.*

Chapter Four

Water resources

Background

Water reserves held in our rivers, wetlands and aquifers are replenished by rain and snow but, although water is a renewable resource, it is not an infinite resource. The amount available for abstraction depends on the quantity that falls, the amount lost back to the atmosphere, and the amount needed by the water dependant ecology.

The average rainfall over the West Midlands is 719 mm per year (1961 to 1990 average), well below the England and Wales average of 901mm. There are significant variations across the region as shown in map 5. Annual average rainfall ranges from over 1200mm towards the west of the region to under 600mm in the Avon catchment. Much of the falling precipitation is lost to evaporation and transpiration by vegetation, especially in the hotter summer season, so, on average, under 30% of the total rainfall remains as 'effective' (i.e. available for some sort of beneficial use).

As well as meeting abstraction needs, effective rainfall must also provide the water required to:

- *Maintain river flows at levels acceptable for conservation, recreation and fisheries*
- *Maintain wetland levels sufficient for the ecology*
- *Ensure groundwater levels are sufficient to provide base flow support to river flows in dry weather.*

Although we are perceived as a wet country, we also have a high population density, so for each person there is relatively little water. In the West Midlands the annual effective rainfall equates to around 2000 litres per person per day - comparable with Zimbabwe and lower than Ethiopia.

Roles and responsibilities

There are many demands on our limited water resources. Water companies must maintain an adequate, clean, public water supply, fundamental to public health. Water also plays an essential role in many industrial processes, including food production, power generation and chemical manufacture. It is also vital for irrigating crops in dry weather. We also use water for navigation and recreation, and it is essential to our water-dependent ecology.

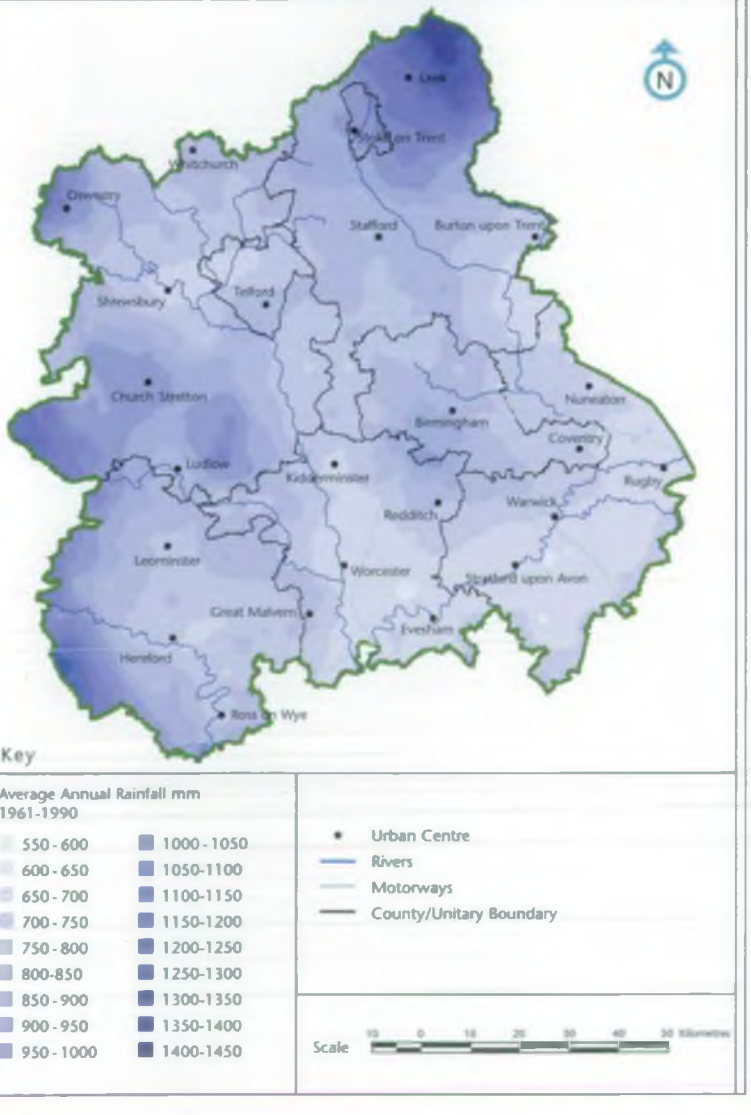
Abstracting more water than is available from natural replenishment, whether from surface water or groundwater, may cause environmental damage or reduce the amount of water available for abstraction by other water users, unless the water abstracted is used, treated and returned upstream of the original point of abstraction. The Environment Agency is responsible for achieving the sustainable management of water resources, and balancing the needs of the environment and abstractors. We issue licences to abstractors, and routinely monitor compliance with licence conditions. New abstraction licences are granted on a precautionary basis, to ensure sustainability principles are not compromised.

Bottom
Burton upon Trent - Brewing has been a traditional user of groundwater

In March 1999, the Government published 'Taking Water Responsibly' which set out its decisions, following consultation, for changes to the abstraction licensing system in England and Wales. Foremost among these decisions is the proposal for the development at a local level of Catchment Abstraction Management Strategies (CAMS) by the Agency. Our vision for these is 'a shared strategy for the sustainable management of water resources within a catchment'. CAMS will be produced from 2001 and will set out relevant local water resources abstraction policies, abstraction licence changes, background information and issues in each catchment. They will include local maps of water resource availability. Local consultation will be an important element in the production of CAMS, and each document will then be renewed on a 6 year rolling basis.

The regional Water Resources Strategy (March 2001) looks 25 years ahead and will provide a framework for CAMS and deal with issues that cross catchment boundaries. As CAMS are produced, these will, in turn, provide a more detailed basis for information on local water resources status, issues and actions to feed back into future reviews of regional water resources strategies.

Map 5 | Annual Average Rainfall mm 1961 to 1990



Issues and challenges

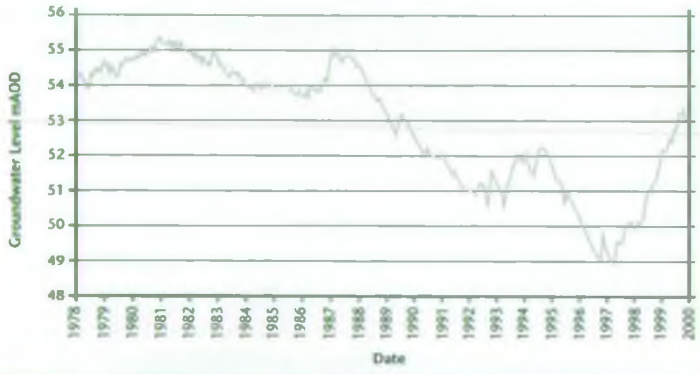
Over-abstracted rivers and groundwater

There are clearly limits to the amount of water available for use. Many river catchments and groundwater units within the West Midlands are approaching the limit of sustainable abstraction, where any further resource exploitation would lead to general environmental degradation. Indeed, some have already exceeded this limit. Consequently, large areas are deemed closed to further abstractions, severely limiting the availability of new water resources.

Even though fresh waters have long been used for human activities, abstractions have only been regulated and licensed since the implementation of the Water Resources Act, 1963. As our understanding of the water environment has improved, we have recognised that some historically authorised abstractions within the West Midlands are causing environmental problems. This may be because the volume of water legally abstracted (i.e. within the terms of the licence) exceeds the total available for sustainable abstraction. This results in low river flows, drier wetlands and a degraded environment. Alternatively, abstractions may be located near to a site that is especially vulnerable.

Bottom
Warwickshire

Figure 5 Groundwater Hydrograph : Check Hill, Kingswinford



A Case Study

Check Hill Borehole

The hydrograph taken from the Check Hill borehole (Fig.5) shows that the water level in the Wombourne (Sherwood Sandstone) groundwater unit fell to an all time low in 1997. Historically this unit has supported a high rate of public water abstraction, which has led to a depletion of stream baseflows with resultant environmental problems. This groundwater unit is considered to have an unacceptable abstraction regime.

Public water supply

The demand put on water supply has increased over the last century due to population growth, reducing household size and increases in the uses of water. It is essential that a sustainable, secure, high quality and affordable water supply is achieved in the future, without detriment to the environment.

Water companies have a major impact on the water cycle, due to the large volumes of water that they take from rivers and aquifers and the water returned after treatment through the sewage works. Some uses of water, such as public water supply and some industrial uses are consumptive, that is, they have a net effect of removing water from the environment. These abstractions can cause environmental stress and low flows in some rivers. Public water supply accounts for over 80% of total consumptive water abstraction. The majority of the remainder is for industry.

Future pressures on water supply could include increasing demand and changes in water resource availability due to global warming. Demand could also increase due to:

- *Increasing numbers of households*
- *Growing demands for non-essential uses of water such as power showers and private swimming pools*
- *Increased garden watering*
- *New industrial and commercial ventures.*

River Severn regulation

The River Severn has been developed as a 'regulated' river since the construction of Llyn Clywedog reservoir in the mid 1960's. This means that the natural river flows are artificially enhanced by releasing stored water to meet the needs of the ecology, recreation and navigation, and the abstractors. Both Llyn Clywedog and Lake Vymwy reservoirs support the river flows in dry weather, along with a series of groundwater boreholes in Shropshire. Without this support there would be increased constraints on abstractors during low flow periods or a greater risk of environmental damage.

The control point for management of the system is at Bewdley, half way down the River Severn, where a 5-day average flow of 850 million litres per day is maintained. Figure 6 shows the mean daily flow hydrograph for a wet year (1998) and dry year (1995) on the River Severn at Bewdley.

Transfer of water using canals

British Waterways and others have proposed the use of the canal network to transfer water from areas of comparative surplus to those struggling to meet demand. As the general flow of any such transfers across the country will be from the north and west to the south and east, there would be increased flows through the Midlands. Canal transfers are limited by the amount of water that can be moved without disturbing canal traffic and habitats as well as the cost of pumping water against the canal gradient.

Rising groundwater in Birmingham

Groundwater levels are rising in the Birmingham conurbation due mainly to reduced abstraction for industrial processes. This is causing flooding in basements. The rising water can also move into areas of contaminated ground causing it to become polluted.

Figure 6 Mean Daily Flow for the River Severn at Bewdley

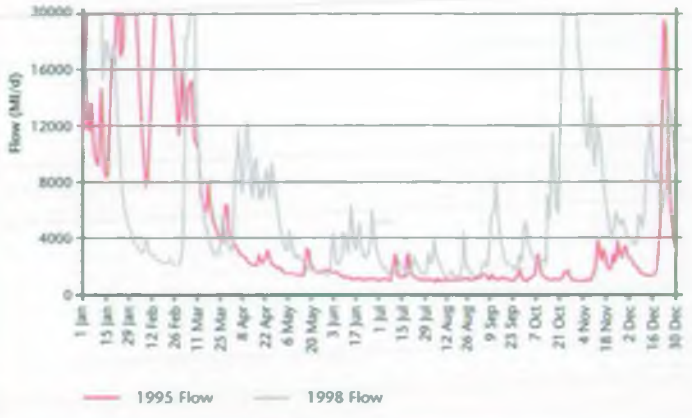
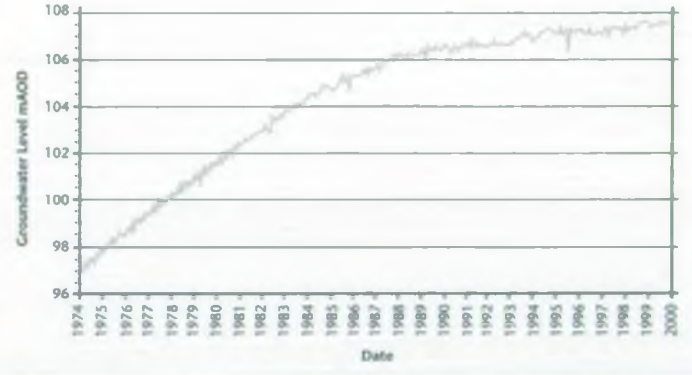


Figure 7 Groundwater Hydrograph : Constitution Hill, Birmingham



A Case Study

Constitution Hill Borehole

Figure 7 shows the hydrograph taken from the Constitution Hill borehole. This clearly indicates a steadily rising groundwater level in the Birmingham (Sherwood Sandstone) groundwater unit.

Right
River Avon, Evesham

Environment Agency responses and targets

Over-abstracted rivers and groundwater

The Agency is seeking to restore sustainable levels of abstraction throughout the West Midlands, in conjunction with water companies and other abstractors. This involves reducing licensed volumes, altering licence conditions, or relocating abstraction points. Sites and abstraction licences to be reviewed have been identified in our Restoring Sustainable Abstractions Programme (RSAP). RSAP includes the key water company over-abstracted sites comprising the National Environment Programme, as well as reviews of the ecological sites of European importance designated under the Habitats Directive. Water companies have sufficient flexibility to make significant changes without threatening the viability of their business, and are willing in principle, to reduce the identified abstractions to sustainable levels and substitute alternative sources where necessary. However, financial constraints and increasing demands due to new developments may hinder this process.

Under the forthcoming Catchment Abstraction Management Strategy (CAMS) process, resource assessments will be undertaken for each water resource management unit. This will include surface water sub-catchments, for winter and summer periods, and each significant groundwater aquifer unit. Once this is completed the Agency will be able to refine the local abstraction licensing policy to reflect any local problems and issues, and alter existing abstraction licences over time to balance the needs of the abstractor with those of the environment dependent on water resources.

Right
'Climate change could impact on the demand and supply of water'

Left
'Non-essential uses of water such as private swimming pools increasingly put extra pressure on demand'

Public water supply

The Agency recognises the importance of maintaining safe and adequate water supplies. In meeting growing demands it will ensure that leakage levels are maintained at an economical level and that best use is made of metering and other demand management tools.

River Severn regulation

Following commission in 2001, two further phases of the Shropshire Groundwater Scheme will contribute an extra 65 million litres per day regulation support to the River Severn. We believe that this will improve protection of the river and estuary environment and will give greater certainty of resource availability.

An important area of work will be to revise the procedures and contingency measures for management of River Severn regulation and abstractions in drought periods, so that timely action can be taken to reduce the potential for environmental damage or water supply difficulties caused by low flows.

Rising groundwater in Birmingham

The Environment Agency advocates the development of the Birmingham groundwater scheme to support downstream abstractions on the River Trent in dry weather. This scheme would help to alleviate the problem of the rising groundwater affecting basements in some parts of Birmingham. Reducing leakage from mains and sewers will also have a limited effect.

Transfer of water using canals

Despite the concerns about the impact, the use of canals to transfer water could play an important part in future water resource development, particularly for moving water outside the West Midlands. The Agency would be involved in licensing any abstractions associated with transfers and would require supporting environmental assessments.

How others can contribute

Water companies

Water is lost from the supply network through leakage. Leakage has been reduced substantially over the last few years, although the Agency believes that further progress on leakage control is technically achievable and economically viable. We advocate a 'twin track' approach to balancing supply and demand across the West Midlands. This entails sensible management of existing and future water demands and, where appropriate, developing further water resource supply schemes.

Local authorities

Planning authorities need to take water resources constraints into account when issuing planning permissions or drawing up local plans and planning guidance.

It is vital that the timing and location of new developments is synchronised with the development of sustainable water supply systems and infrastructure. Water companies have a duty to supply new developments with mains water, which may increase pressure on the existing supply infrastructure and reduce the level of service to existing customers. Since many locations in the West Midlands are closed to further abstraction on sustainability grounds, supplies to support new developments may need pumping from distant abstraction points and connecting with supply and disposal infrastructure links. These transfers have their own sustainability implications.

Throughout much of the region the water abstraction sustainability limit is perceived as having been reached or surpassed, i.e. surface water and groundwater in aquifers is closed to further abstraction. This could be a practical constraint on the location of developments requiring large volumes of cheap, reliable raw water (industrial, agriculture etc).

Conclusions

- *There is no overall shortage of water in the West Midlands at present, but the availability of new supplies is limited and should not be taken for granted. Planning authorities need to take water resources constraints into account*
- *Long term demand for water may rise and the Environment Agency will be seeking a 'twin track' approach to meeting future demands, i.e. managing demands and developing new or enhanced water supply schemes*
- *There are presently some local environmental problems due to over-abstraction. We are working with water companies and other abstractors to restore the environment*
- *Over the next few years, the Catchment Abstraction Management Strategy (CAMS) process will be used to develop local plans to bring water resources into a sustainable management regime and ensure it is maintained in the future*
- *Rising groundwater in Birmingham is causing flooding of basements but water supply developments offer scope for tackling the problem*
- *Climate change could impact on the demand and supply of water.*

Chapter Five

Flooding

Background

Flooding of land adjacent to rivers and the coast is a natural process and, in the right place, a desirable process. It can however have far reaching effects on people and property and there are considerable costs associated with the damage it causes. These costs are not only financial and economic, such as damage to property and flood defences and disruption to commerce, but can also cause distress, injury and loss of life. Flooding events can make extreme demands on the emergency services and create loss of public confidence in the planning process. However, flooding can also have many benefits to the environment, the essential maintenance of certain important wildlife habitats for example.

The principal cause of river flooding is excessive rainfall or snow melt within a limited period, which overwhelms the drainage capacity of land, particularly when the ground is already saturated or when channels become blocked. Changing climate is predicted to cause increases in sea levels and increased intensity and duration of rainfall in the winter. The latter could increase the frequency of flooding in the West Midlands.

Map 6 | Areas Prone to Flooding

The impact of flooding can be aggravated by:

- *The growth of built development in catchments and other changes in land use which increase the rate and volume of run-off, such as deforestation and some farming practices*
- *Sediment movement that has changed river cross-sections and affected flood levels*
- *Inadequate maintenance of flood defence systems, watercourses, culverts and road gullies, particularly where this leads to channel blockage*
- *Canalisation, modification and diversion of rivers and watercourses, which increase the rate of flow and decrease the time taken for water to travel within a catchment*
- *Building of structures (e.g. embankments) which reduce storage and restrict flows over historical floodplains and thereby create additional flood risks both upstream and downstream.*

Flooding is, therefore, the result of a combination of natural physical conditions, including the potential effects of Climate Change and human activity.

Approximately 62,000 properties have been identified in the West Midlands as being at risk from flooding in an extreme event. The Environment Agency has produced indicative floodplain maps to indicate areas at risk from flooding.

In the West Midlands, flooding is most frequently experienced from the River Severn and smaller upland tributaries of the River Trent. However, in Easter 1998, the River Avon catchment, particularly at Leamington Spa, Warwick and Stratford-on-Avon, suffered its worst flooding for over 100 years, causing damage to 1000 properties and 1,400 caravans. In October of the same year, severe flooding on the River Severn affected Shrewsbury, Bewdley and other communities on the river. On the River Wye, there was flooding at Hereford and Ross-on-Wye. In November and December 2000, the same areas were again seriously affected with the worst flooding since the 1940s, together with parts of Staffordshire in the Trent catchment. Regrettably, these flood events have led to loss of life, as well as great economic damage and personal hardship.

Top left
Bewdley in November 2000

Bottom
Shrewsbury in November 2000

Opposite Page
Uckinghall in December 2000 - Many smaller villages are also badly effected at times of flood

Roles and responsibilities

There is no statutory duty on central or local government to protect land or property against flooding. However, operating authorities, namely the Environment Agency and local authorities, have permissive powers to carry out flood defence works in the public interest. Individual property owners are also responsible for managing the drainage of their land in such a way as to prevent impacts on neighbouring land. The primary responsibility for safeguarding their own land and other property from flooding remains with the owner, as outlined in the Agency's publication 'Living on the Edge'.

In addition to property owners, the Ministry for Agriculture, Fisheries and Food (MAFF), the Environment Agency and local authorities all have significant roles in managing flood risk.

Government guidance on flood and coastal defence is set by MAFF, who also contribute to the funding of defence measures. The Environment Agency has a statutory supervisory duty for all matters relating to flood defence and is the principal operating authority for main rivers and sea defence. The Agency also has the lead role for the dissemination of flood warnings. Local authorities are the operating authority for ordinary watercourses. Local planning authorities are responsible for the control of development which might be directly affected by flooding or affect flooding elsewhere.

Issues and challenges

Development control

The Agency is dependent on planning authorities to ensure the protection of the environment and to prevent future problems arising as a result of development in areas at risk of flooding.
There is considerable development pressure in the West Midlands for new housing, on both greenfield and brownfield sites, many of which are located in floodplains.

The Environment Agency and its local authority partners will need to consider developing a range of suitable policies, dealing with such issues as:

- *Guiding inappropriate development away from the flood plain*
- *Developing Sustainable Urban Drainage Systems (SuDS)*
- *Creating and enhancing environmental corridors.*

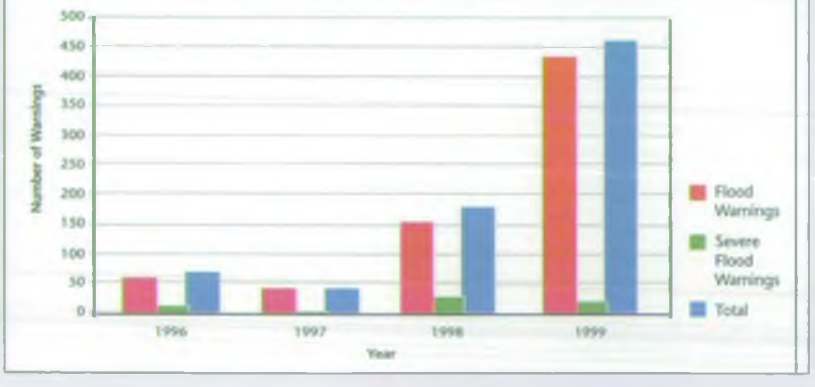
Flood defence investment

a) Capital works

In June 2000, MAFF published a research project, 'National Appraisal of Assets at risk from Flooding & Coastal Erosion'. One of its conclusions was that capital works and maintenance investment needed nationally in order to continue to provide and maintain present defence standards is in excess of £0.3 billion/year. For the West Midlands, this would work out as an increase of nearly 75% on existing levels of capital investment, highlighting the need to re-appraise spending on flood defence.

In certain situations, it may not be economically or environmentally appropriate to undertake traditional capital works to reduce flood risk and other options may need to be considered.

Figure 8 Number of Flood Warnings Issued in the West Midlands from 1996 to 1999



Capital Expenditure on Flood Defence in the West Midlands (1993/4 to 1999/00)

Year	Expenditure
1993/4	£2,050,000
1994/5	£3,129,000
1995/6	£2,711,000
1996/7	£1,503,000
1997/8	£1,104,000
1998/9	£1,984,000
1999/00	£2,817,000

b) Maintenance works

Approximately £3.6M per year is spent carrying out maintenance work to riverbanks and flood defences, along 2,200 kilometres of main river. The works are necessary in order to maintain the design capacity of assets and watercourses, to ensure that flood flows are safely contained. Around 100 skilled Agency staff carry out this routine work in an environmentally sensitive way to complement and enhance existing habitats.

Flood warning

The Agency conducts detailed flood forecasting and makes the decision whether or not to issue a flood warning. A new simplified system of flood warnings was introduced in September 2000:

The Agency uses the number and type of flood warnings issued as an indicator to monitor flood risks in any given area.

Significant investments are being made to improve our ability to forecast and warn of imminent flooding. Future developments will enable more rigorous assessment of performance as our knowledge of flood warning risk areas and properties at risk improves. A study is being carried out to ascertain the feasibility of issuing warnings to people in areas where a flood warning service has not previously been provided.

Environment Agency responses and targets

The Agency seeks to reduce the risk from flooding in order to safeguard lives, sustain economic activity and to protect and enhance the environment.

In November 1999 MAFF issued a set of 'High Level Targets' for flood and coastal defence operating authorities. This is a comprehensive set of fourteen targets, which provides the framework by which performance will be measured and monitored. Published alongside these targets is the 'Elaboration of the Environment Agency's Flood Defence Supervisory Duty' which addresses issues that are complementary to the high level targets.

The key objectives to achieve MAFF's policy aims for flood and coastal defence are to:

- *Encourage the provision of adequate and cost effective flood warning systems*
- *Encourage the provision of technically, environmentally and economically sound and sustainable flood and coastal defence measures*
- *Discourage inappropriate development in areas at risk from flooding and coastal erosion.*

The relevant targets covered are:

- *Policy statements*
- *Provision of flood warnings*
- *Emergency exercises and emergency plans*
- *National Flood and Coastal Defence database*
- *Flood defence inspections and assessment of flood risk*
- *Expenditure programmes*
- *Biodiversity*
- *Water Level Management Plans*
- *Development in areas at risk of flooding.*

Right
Testing new demountable defences already used in Europe

The Environment Agency is required to report to MAFF and the Department of the Environment, Transport and the Regions (DETR) on those local authority development plans upon which the Agency has commented, identifying plans which do, and do not, have flood risk statements or policies. The Agency will also report where final decisions on planning applications were in line with, or contrary to, Agency advice on proposed development in areas at risk from flooding. MAFF and DETR are monitoring the extent to which planning authorities are heeding flood risk advice.

To achieve MAFF's High Level Targets will involve actions from the Agency, as well as others. The Draft Regional Planning Guidance Review for the West Midlands provides a framework for the policies and guidance that local authorities should include in development plans relating to flooding.

A Case Study

Diglis Avenue, Worcester

In collaboration with residents at Diglis Avenue in Worcester, floor levels of some Severnside properties have been raised to offer a 20-year standard of protection. This will not guard against major floods such as those experienced in November/December 2000 but will offer defence in less serious events.

The Agency has assessed flood risk for areas within the indicative floodplain to determine the appropriate requirements for direct warnings and major Flood Incident Plans. It is also conducting public awareness campaigns to alert people to the risk of flooding, telling them where to obtain flooding information and explaining what to do in the event of a flood.

The Indicative Floodplain maps issued by the Agency to all planning authorities in 1999 to assist their decision making, will be updated annually. Indicative Floodplain maps will form the basis for the planning process at development plan and individual application stages. These maps were published on the Internet in December 2000 and are now available to a wider audience. Further information about flood risk and the actions that individuals should take are in Environment Agency publications and from our Floodline freephone on 0845 988 1188.

Watercourses should be retained in open corridors. This will protect access for future maintenance and provide expansion areas for flood flows and storage. Consideration should be given to returning culverted watercourses to open channels.

The Agency's response to recent flooding events includes a strategic study of the River Severn to identify what is achievable and justifiable in order to provide protection from flooding for the communities along the main channel of the river. This will result in proposals for works to be undertaken spread over several years. In parts of the West Midlands, alternative 'demountable' methods of defence are being investigated which could be more environmentally acceptable than the more traditional banks and walls.

Site investigations are currently being carried out at Bewdley and Shrewsbury to explore the possibility of providing removable flood defence barriers along part of the riverfront where traditional defences would be environmentally unacceptable.

ENVIRONMENT AGENCY
FLOODLINE
0845 988 1188

How others can contribute

Flooding is a problem which affects the whole community and is likely to intensify as climate change and development in floodplains take effect. Increasingly, interested parties are working together to provide solutions. The development of river catchment strategy plans will assist in assessing the correct levels of investment in flood defence activities.

An example of this approach is the multi-organisation bid which the Agency is involved in for European Community LIFE-Environment funds, to part finance a project on Sustainable Management of Urban Rivers and Floodplains using the River Tame and its upper tributaries.

The Agency looks to local authorities to give appropriate weight to flood risk information in preparing development plans and considering individual proposals for development. The Agency will comment on development plans and respond to planning applications, opposing inappropriate development on flood risk grounds. We welcome preliminary discussions with developers to identify the potential problems and solutions early on in the process as this can save much time and money on abortive effort.

It is vital that potential increases in surface water runoff from all developments is considered. As greenfield sites are developed, flow rates can be increased, heightening the risk of flooding downstream. The Agency and our local authority partners need to develop policies to encourage sustainable drainage systems which control water as near its source as possible. Developers need to understand the reasons for this approach and take account of it in their plans and designs. In order to reduce the risk from run off, the Agency advocates Sustainable Drainage Systems (SuDS), referred to in the water quality chapter.

In addition to statutory obligations, when carrying out flood and coastal defence works, operating authorities should aim to avoid damage to environmental interests, to ensure no net loss to habitats covered by Biodiversity Action Plans and seek opportunities for environmental enhancement. This is relevant to local authorities, riparian owners and Internal Drainage Boards.

Finally, householders and companies in flood risk areas need to understand the risk to themselves and their property, be aware of the Agency's warnings and have plans to respond when they receive them.

The slogan used in the recent flood awareness campaign provides an apt summary:
Flooding. You Can't prevent it. You can prepare for it.

Conclusions

- *Flood risks will continue to be present in many riverside locations for the foreseeable future*
- *The Agency will work with local communities to build defences where these are affordable, justified and environmentally acceptable*
- *In the meantime, the Agency will continue to develop its indicative flood plain maps and flood warning systems to help others identify the areas at risk and protect themselves*
- *The Agency will work with others to avoid new problems occurring by ensuring that development does not take place in flood risk areas and that drainage is managed in an appropriate way*
- *Climate change implications need to be factored in to future planning and developments.*

Flooding.
You can't prevent it.
You can prepare for it.

Chapter Six

Maintaining and enhancing biodiversity

Background

Biodiversity is concerned with the variety of living organisms, including within and between species, and the different habitats and ecosystems. The Convention on Biodiversity was signed by more than 150 heads of Government at the Earth Summit in June 1992. The UK published four strategies in response to the Earth Summit, including a Biodiversity Action Plan (BAP) in 1994. The UK Steering Group Report of 1995 identified 1,250 species considered to be threatened. From these 'Species of Concern', some 400 priority species and 40 key habitats have been identified which have targeted actions. Maintaining the balance of our environment in the West Midlands is essential to protect one of the region's key assets.

Roles and responsibilities

The Environment Agency is the national contact point for leading work to protect 39 Priority Species and five habitats, all of which rely on water in some way. The West Midlands has nine of these Priority Species and three of these habitats.

This report focuses on just four species as indicators:

- *Otter*
- *Water Vole*
- *White-clawed Crayfish*
- *Atlantic Salmon.*

In this work the Agency works closely with others with similar responsibilities such as English Nature, local authorities and Wildlife Trusts, both close to and away from the water environment. We also closely monitor the work of our own departments such as Flood Defence and Water Resources to ensure that any construction or maintenance work does not cause damage to these species and habitats. Wherever possible, opportunities are taken to provide enhancements.

Otter

Issues and challenges

Otters are generally uncommon in the region. A top aquatic predator, they are excellent indicators of good bankside habitat and river quality. Otters need good fish stocks, numerous resting sites, and undisturbed sites for breeding. Otters have a high public profile, are listed both on the Biodiversity Action Plan (BAP) and in the Habitats Directive, and are fully protected under the Wildlife and Countryside Act.

Otters suffered a population collapse in the 1960's following the introduction of persistent pesticides, although they were already declining through habitat loss, surviving in low numbers only in the Welsh Borders where high quality habitat remained. The persistent chemicals involved are now banned from use and most have subsequently reduced in the environment. Consequently, otters are now recolonising from their strongholds in Wales, assisted by significant conservation action.

Otters have large ranges and travel several kilometres. Road and rail crossings where bridges and culverts do not allow safe passage are hazardous and several otters have been reported killed in the region in recent years. Such losses may be critical in limiting the expansion of the otter population.

Loss of riparian habitat through inappropriate land drainage, intensive agriculture, fragmentation of the river corridor habitat by development and disturbance due to increased access to riversides all have a detrimental effect on otters. Fish traps, particularly eel fyke nets, can be a drowning hazard to otters if a guard is not fitted. There are potential problems at fish farms as otter predation is possible. Otters suffer disturbance caused by hunting mink with dogs.

Environment Agency responses and targets

The Environment Agency has supported two collaborative projects, the 'Otters and Rivers Projects' with the Wildlife Trusts in the Severn and Trent catchments, since 1991. These projects have attempted to raise awareness of the otter's needs, undertaking wide ranging habitat improvements, survey, monitoring and road crossing mitigation work across the region to provide suitable conditions for otter colonisation.

Future actions will focus on the need to:

- *Continue to support the otters and Rivers Projects*
- *Protect headwater streams as effective corridors between catchments*
- *Influence future development proposals to include habitat provision and mitigate against the adverse impacts and threats posed to otters by, for example roads*
- *Ensure the use of otter guards on eel fyke nets and mink traps and provide mitigation assistance to fish farms.*

The national otter survey is to be repeated during 2000/01. Regional monitoring is ongoing as part of the Otters and Rivers Projects. The aim is to meet the BAP target of restoring otters to all catchments where they have been recorded since 1960, by 2010.

Right
Otter

Water Vole

Issues and challenges

Water voles have a high public profile; they are listed on the Biodiversity Action Plan (BAP) and their habitat is fully protected under the Wildlife and Countryside Act. Water voles are much rarer in the region than they were ten years ago and, if the current rate of decline continues, they may become extinct over much of their former range within the next ten years. Strongholds are noted on some rivers in urban areas. Water voles need good riparian habitat and established soft banks to burrow in. Luxuriant fringing vegetation also provides food and cover in which to avoid predators. As water vole populations become more fragmented and isolated from one another, the rate of decline is likely to accelerate. The best populations survive where there are clusters of colonies and where mink are either controlled or absent.

Water voles are Britain's fastest declining mammal. Two national surveys carried out by the Vincent Wildlife Trust in 1989-90 and 1996-98 show that the population has declined by 88% in only seven years. In the Severn, Wye and Trent catchments, occupancy of surveyed sites fell drastically.

Natural recovery is likely to be slow, as the species is poor at dispersing long distances. The general fragmentation of suitable riparian habitat has been identified as a key limiting factor and the widespread presence of mink will continue to exacerbate the situation. Pressure on the riparian environment from the high population density, development and increasing recreational impacts will limit increases in the water vole population, and may accelerate decline unless mitigation measures are implemented.

Left
Water vole

Environment Agency responses and targets

Future action will focus on the need to:

- *Continue to support collaborative projects, such as with the Wildlife Trusts, to raise awareness of the water vole's needs, undertake wide ranging habitat improvements and other work across the region to provide suitable conditions for the species*
- *Protect headwater streams, ditches and ponds supporting water vole populations*
- *Identify areas suitable for colonisation where the species is still present and mitigate where loss has occurred. Locally important 'key sites' should be identified for water voles and included in local planning policy*
- *Introduce carefully targeted mink control as a conservation tool to maintain important water vole populations and to enable their expansion.*

The Vincent Wildlife Trust through a sampling survey intended to show trends in populations (2970 sites across England, Scotland and Wales) has carried out national monitoring of water vole. The baseline survey was established in 1989-90, repeated 1996-98 and the next survey is due in 2005.

At the local and regional level, more detailed surveys have been carried out by the Wildlife Trusts in order to identify key populations of water voles. These populations should be surveyed annually/biannually to monitor their survival. Local habitat enhancement and water vole mitigation work should be reviewed by post project appraisal, to assess successes and failures and better inform future action.

The aim is to meet the UK Government's BAP target of maintaining and restoring water vole populations to all catchments where they have been recorded in the 1970s, by 2010.

White-clawed Crayfish

Issues and challenges

The white-clawed crayfish is the only native crayfish species in the UK. Formerly widespread in clean, hard water areas, its distribution has been reduced by historic pollution and more recently by disease and competition from introduced species, particularly the American signal crayfish. Crayfish are now restricted to only certain reaches of a few rivers and some lakes within the region, notably the Wye and Teme catchments and the upper reaches of the Trent. In some of these locations signal crayfish are present in other parts of the catchment, and would put white-clawed populations at risk either through plague or displacement if they spread.

White-clawed crayfish populations are also at risk from the spores of the plague fungus being transferred from infected waters by a number of potential routes including fish transfers or wet fishing and trapping equipment. Several crayfish plague outbreaks have been confirmed across the region.

Whilst the introduction of alien species is the major threat, losses can also arise through inappropriate river dredging, hard engineering, pollution incidents - particularly from the newly introduced synthetic pyrethroid sheep dip, drought and over abstraction.

Environment Agency responses and targets

The Environment Agency has published recognition leaflets and has undertaken a number of habitat enhancements and protection projects to increase limited populations. We have established research projects to better understand crayfish biology and investigate techniques for eradicating the alien species. Increasingly, native crayfish conservation is being taken into account when determining fish transfer consents.

Above
Ross on Wye

The Agency leads the Biodiversity Action Plan (BAP) for the native crayfish and seeks in our planning responses and consenting activities to meet the BAP target by protecting their limited locations from development and pollution, while seeking enhancements wherever possible. The Agency is also involved with certain projects around the region to control alien crayfish.

Crayfish surveys have been carried out on a number of catchments and locations across the region in recent years to establish distribution and population status of both native and alien crayfish. Monitoring of known crayfish populations and surveys to locate new colonies will be undertaken as resources permit, as will monitoring the spread of alien species towards vulnerable native populations. Live crayfish sightings or mortality reports from the public will be followed up.

The BAP seeks to maintain the current distribution and increase individual colony size and if possible to increase and sustain the range of indigenous crayfish.

Atlantic Salmon

Issues and challenges

The Atlantic salmon (salmo salar) is widely recognised as an excellent indicator of environmental quality, reflecting both water quantity and quality and the physical condition of rivers within the region.

Salmon spawn in the headwaters of rivers and streams and spend two years in the upper reaches before going to sea for one winter and then returning to the streams in which they were born. Some undertake a migration to the feeding grounds off the west coast of Greenland or the Faroes before returning several years later as much larger spring-run salmon.

Salmon have traditionally been prized as both a food source and as a sporting fish and commercial exploitation by netting and rod and line fisheries have contributed considerable socio-economic benefits as well as providing a means of monitoring population trends in the species.

Over the last twenty years there has been a steady decline in national salmon stocks. Reasons include high seas exploitation, changes in sea temperature resulting from climate change, disease, poaching and freshwater habitat degradation. The International Council for the Exploration of the Sea (ICES) considers that environmental changes at sea are having an adverse impact on the number of adult salmon surviving to return to our rivers.

Two prestigious salmon rivers flow through the region - the River Severn and the River Wye. The decline in salmon stocks in these rivers is illustrated in figures 9 and 10 reflecting the national picture.

The River Trent was a very important commercial salmon river with a recorded peak run of salmon in 1888 believed to be as high as 10,000 fish. The River Dove is one of the most important breeding tributaries. The rapid development of industry in Birmingham and the subsequent pollution of the River Tame had a significant effect on water quality in the River Trent and led to the disappearance of salmon. This was exacerbated by the creation of impassable structures and navigation weirs.

Since the mid 1980's, the number of salmon caught or reported in the River Trent has increased, reflecting the improved water quality regime, reduced water temperature with the decline of the power stations and improvements to fish passage.

Environment Agency responses and targets

The Environment Agency has a duty to maintain, improve and develop fisheries and, by forming partnerships with others, will take measures to restore salmon stocks to a favourable conservation status.

For the major rivers in England and Wales, the Agency intends to produce Salmon Action Plans (SAPs) by the year 2002, which will set spawning targets for the River Severn and River Wye, with accompanying management plans to afford protection for the species, whilst permitting sustainable exploitation rates.

The National Salmon Management Strategy was launched in 1996 with the principal aim of safeguarding salmon stocks in England and Wales to support sustainable fisheries. A finalised SAP has been produced for the River Wye and the River Severn SAP is nearing completion.

The Agency has introduced new national salmon bylaws introducing compulsory 'catch and release' before June 16 and has put back the date before which commercial nets can operate to June 1.

The Agency has also targeted an education campaign at salmon anglers including a magazine and best practice 'catch and release' video.

When opportunities arise, the Agency takes steps to install fish passes to aid migration and, when possible, seeks measures to limit commercial exploitation. An example of the latter has been the recent closure of the commercial fisheries on the River Wye.

In 2000 the Agency collaborated with some 30 other interested partner organisations to form Salmonid 21C which demonstrates practical actions that can be taken to improve stocks and habitat.

It is also possible to restock salmon from hatcheries. For example in September 2000, nearly 45,000 salmon were stocked in the Upper Severn tributaries including the Rivers Tanat, Teme and Perry and over 160, 000 salmon have been introduced into the River Dove.

Restoring habitat damaged by a legacy of land drainage and changing agricultural practice is a key aim. This is expensive to remedy and only through partnership with other organisations and riparian owners can a more natural regime be restored. One example of this is the Wye Habitat Improvement Project. The value of this project is £1.1 million with £750k coming from European Union and Regional Development Fund sources. The project team, employed largely from the local rural community, undertake a variety of habitat improvement measures including fencing of buffer strips, natural bank revetments and traditional coppicing. The project receives financial support from several partners including the Wye Foundation, Environment Agency Wales, Countryside Council for Wales, Wildlife Trusts, Farmers Union Wales, University of Wales and the Game Conservancy Trust. Private sector support has also been provided by Severn-Trent Water plc.

Salmon stocks are routinely monitored by a combination of techniques including juvenile electrofishing surveys, smolt traps, redd counts, fish counters as well as commercial and rod and line catch returns. In the light of information gleaned from these data sources stock management decisions can be reviewed and Salmon Action Plans amended accordingly.

Top Right
Afon Twrch

Figure 9 River Severn Salmon Catches - Rods

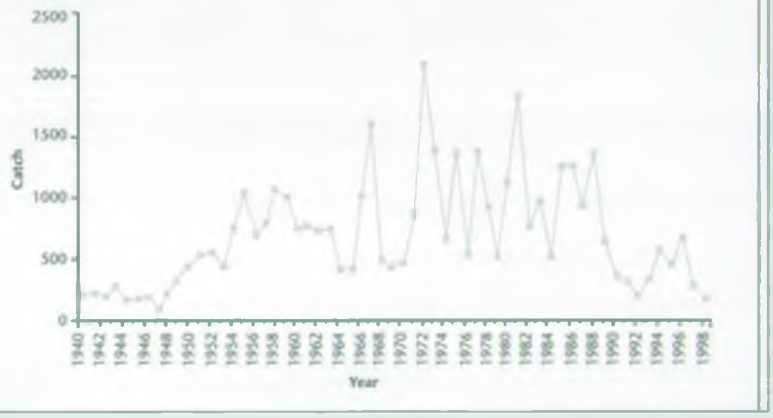
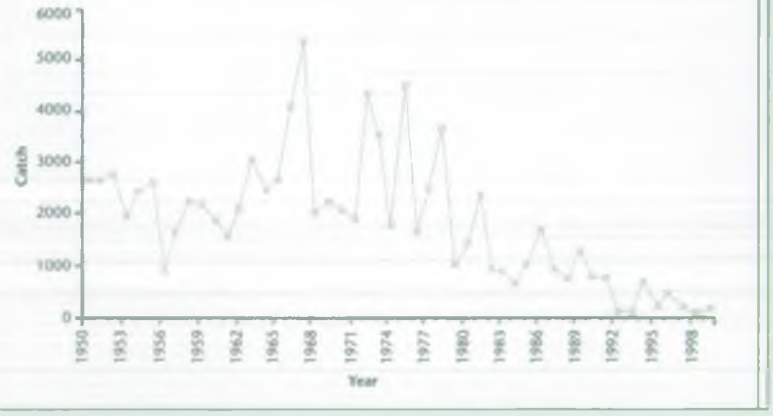


Figure 10 River Wye Salmon Catches



Sites of European Wildlife Importance

Issues and challenges

The Habitats Directive protects the most important wildlife sites in Europe, including Special Areas of Conservation (SACs), and Special Protection Areas (SPAs) selected for wild birds under the European Birds Directive. These are collectively known as Natura 2000 sites and can occur within and away from water environments. The Environment Agency has to ensure that all the operations that it authorises or undertakes do not adversely affect the integrity of these European wildlife sites and we are reviewing all relevant existing authorisations.

The West Midlands has one SPA and sixteen candidate SACs, and is particularly notable for peatland sites (Fenn's and Whixall Moss, Chartley Moss, Clarepool Moss, Brown Moss) and for open water sites holding key species (Fens Pools and Lyppard Grange for great crested newt, Ensors Pool for white clawed crayfish, River Mease for spined loach). There are also riparian wetlands (Mottey Meadows, Pasturefields Salt Marsh), as well as drier habitats such as Cannock Chase.

The West Midlands European wildlife sites can be affected by authorised activities located many miles away from them. Riverine SPAs or candidate SACs can potentially be affected by operations originating upstream, while all SPAs and candidate SACs can be affected by airborne pollution. The Environment Agency's review of existing authorisations exercise should identify and remediate those authorisations shown to be having an adverse effect upon SPA or candidate SAC qualifying features. The joint Environment Agency/English Nature approach to dealing with future new authorisations and activities should lead to earlier identification and avoidance of potential adverse effects in the consenting and planning process.

Environment Agency response and targets

The Environment Agency will be consulting holders of authorisations thought to be having a likely adverse effect on a Natura 2000 site. The Agency is keen to work openly with authorisation holders to discuss the potential implications and information requirements at all stages of the review process. The authorisation holder can expect informed decisions based on the best available information. Applicants for new authorisations are urged to discuss their proposals as early as possible with the Agency, so that any implications of the Habitats Regulations to their proposal can be assessed at an early stage.

The Agency has a duty to review the effects of our authorisations on European sites and take appropriate action by 2004. English Nature's evaluation of the site's condition - favourable or unfavourable - and their conservation objectives to maintain or improve that condition will act as an indicator for the region's SPAs and candidate SACs.

River Habitats

Issues and challenges

River Habitat Survey (RHS) is an objective methodology developed for assessing the character and quality of rivers. Habitat quality is determined according to the occurrence and diversity of habitat features of known value for wildlife, and is derived by comparing observed features at a site with those recorded at sites from rivers of similar character. Habitat features associated with high quality are generally to be found at sites in a predominantly unmodified physical state.

The RHS statistics for any stretch of the river can provide a Habitat Quality Assessment (HQA - the higher the score, the better the riparian habitat quality), and a Habitat Modification Score (HMS) which can be categorised as below:

HMS Score	Descriptive Category of Channel
0	Pristine
0-2	Semi-natural
3-8	Predominantly unmodified
9-20	Obviously modified
21-44	Signficantly modified
45 or more	Severley modified

The quality of riparian habitats generally declined through the last century due to direct works on the rivers as well as land use and development pressures. More recently, improvements to certain stretches of river have been undertaken. The current HQA and HMS scores for the Local Environment Action Plan (LEAP) areas in the West Midlands indicate high habitat quality in the outer, rural fringes of the region, and conversely, highly modified rivers in the conurbation and the wider floodplain of the Severn.

Pressures on river habitats include:

- *River management works, especially for flood defence*
- *Extending navigation*
- *Continuing development*
- *In more rural areas, the intensification of agricultural production, through cultivation to the bank top or heavy grazing down to the water's edge.*

Left
Footbridge at Upper Arley

Map 7 River Habitat Quality Assessment

River Habitats

Environment Agency responses and targets

The Environment Agency has been involved with various collaborative river restoration projects, such as the Severn and Avon Vales, Central Rivers Project, Severn Valley Wetlands, rivers initiatives in Coventry, Gloucester and Stoke, and work with the Farming and Wild Life Advisory Groups (FWAG) on the Bow Brook and River Leam. These focus on improving riparian habitats and re-connecting rivers with their floodplain wetlands.

Future actions will focus on the need to:

- *Protect river habitats through assessment of Environment Agency operations and authorisations and through consultation over planning applications*
- *Ensure that green corridors are sustained along the routes of rivers to enable species to migrate and that buffer strips are encouraged along the margins of fields*
- *Take opportunities to enhance river habitats through Environment Agency works or support for collaborative projects.*

RHS information for rivers in the region will be used to set targets for habitat improvements and to monitor their achievement. Such targets are due to be published in 2002/3 and implemented thereafter.

Top
Stratford upon Avon

Bottom
Rugby

How others can contribute

MAFF has designated the Trent catchment as a 'no-go area' for signal crayfish but this is not the case for the Severn catchment, because the Severn is already affected.

English Nature is undertaking a monitoring programme for all SPAs and candidate SACs to ascertain the condition of each of the qualifying features and identify trends in improvement or deterioration.

Planning authorities and developers should take a positive approach to protecting and enhancing habitats; especially those associated with threatened species. The principles of maintaining and enhancing habitat should be enshrined in planning policy guidance.

Riparian owners can do much to support wildlife by sensitive land management and setting aside small riverside strips and other areas for conservation.

Many improvements are achieved through joint efforts between public, private and voluntary organisations. Being alert to the opportunities and potential partnerships is a part that everyone can play.

Conclusions

- *It is not surprising that wildlife is under pressure in an intensely developed and densely populated area such as the West Midlands*
- *Fragmented responsibilities make it difficult to put remedial action in place*
- *There are already examples of positive strategies that are making a difference to the biodiversity of the region*
- *Future progress will depend on co-operation and partnership*
- *Biodiversity must be seen as a regional asset.*

Chapter Seven

Managing freshwater fisheries

Background

Fish are accepted as a sign of good water quality and can often be the only means of detecting impacts. Fish also provide the basis for the recreational pursuit of angling. Salmon fisheries are funded mainly by the government, whereas the maintenance, development and enhancement of coarse fisheries are funded through the sale of rod fishing licences. The West Midlands contains the highest number of anglers in England and Wales, and in 1999/2000 over 234,000 licences were sold.
The West Midlands contains a significant diversity of angling opportunities in rivers, canals and lakes both in remote rural areas as well as close to the major conurbation's.

The waterways within the region contain most of the 34 species of freshwater fish constituting a significant component of biodiversity. Of particular note in respect of their conservation status are the twaite shad (alosa fallax) which spawn in the River Wye and River Severn, the spined loach (cobitis taenia) found in the Trent catchment in rivers such as the Mease, Sence and Anker and the brook lamprey (lampetra planeri) found in the Churnet and Gayton Brook. These species are listed under Annex II of the EC Species and Habitats Directive and also in the Berne Convention indicating their international importance. A requirement is placed on member states to maintain their favourable conservation status.

The Government's Salmon and Freshwater Fisheries Review Group has recently recommended the following objectives, to:

- *Ensure the conservation and maintain the diversity of freshwater fish, salmon, sea trout and eels and to conserve their aquatic environment*
- *Enhance the contribution salmon and freshwater fisheries make to the economy, particularly in remote rural areas and in areas with low levels of income*
- *Enhance the social value of fishing as a widely available and healthy form of recreation.*

Roles and responsibilities

The Environment Agency is charged with the statutory role of maintaining, improving and developing fisheries. These rely on the co-operation and collaboration of fishery owners/angling clubs in whose ownership or stewardship the fishing rights are held.

The Environment Agency's fisheries work within the region includes:

- *Rod licence and anti-poaching enforcement work*
- *A rolling programme of monitoring fish stocks*
- *Fish rescues and subsequent restocking following pollution incidents*
- *Promotion and advisory work to the large customer base*
- *Commenting on development plans to protect fisheries interests*
- *Regulation of commercial fisheries and fish transfers*
- *Undertaking habitat improvement schemes and participation in a focused research and development programme co-ordinated by the Agency's National Coarse Fish Centre based in Kidderminster.*

Issues and challenges

River Severn

Fish stocks within the River Severn are in a healthy state with generally good water quality. There is an annual run of salmon which has declined in recent years due to other factors (see the biodiversity chapter). Some of the fish populations in the tributaries such as the Rivers Tern and Perry are constrained by degraded habitat resulting from canalisation as part of earlier land drainage schemes. This is further exacerbated by agricultural practice resulting in soil erosion and deposition as sediments on the riverbed. These block the river gravels reducing available fish spawning habitat and invertebrate food supply. Stocks in some other tributaries, including the River Worfe and Blakedown Brook, suffer as a result of low river flows caused by over abstraction.

Right
River Wye at Redbrook

River Trent

The full recovery of fish stocks on the River Trent between Stoke and Burton is still hampered by periodic bouts of poor water quality arising from storm overflow systems. Once this has been rectified further habitat enhancement work will be required to restore the necessary diversity of habitat for fish species such as chub and barbel.

River Tame

The fish population in the River Tame is still seriously constrained by poor water quality from urban run-off from Birmingham and although a coarse fishery now exists downstream of Lea Marston, this is still subject to episodic pollution events. For example, in 1995 some estimated 98% of stocks were killed in one event.

River Avon

The Warwickshire River Avon from Rugby to Tewkesbury is one of the most important river coarse fisheries in the West Midlands with a diverse array of species. Fish growth rates and biomasses are higher than the national average following improvements in biological and water quality over the last decade.

River Wye

The River Wye in Herefordshire contains some of the most diverse and healthy coarse fish populations, although recreational angling for these species is still rather limited. Traditional salmon fisheries between Hay on Wye and Ross on Wye have been adversely affected by the continuing decline in catches of spring run salmon. Degradation of salmon spawning habitat in the main river continues to be an issue as run-off from agricultural land leads to siltation and concretion of spawning gravels.

Fishing at Shrewsbury near English Bridge

Environment Agency responses and targets

The Agency sets a variety of targets each year for improvements to fisheries.

In 2000/2001, fisheries will be developed along 17km of rivers in the West Midlands by stocking of fish following water quality improvements. These include the River Stour, the River Arrow, the River Tame and the River Trent. Continued improvements to those rivers where urban run off through storm sewers is limiting populations is expected as part of the ongoing Asset Management Plan (AMP) process. By restoring fisheries in recovering rivers, the benefits of environment learning opportunities can be extended to children living in catchments that have been polluted for many decades.

Where agricultural run-off is causing habitat degradation, the Agency continues to work in partnership with other parties such as the Farming and Wildlife Advisory Group (FWAG) to deliver agri-environment schemes which help to prevent problems and deliver wider environmental benefits to the river corridor. In 2000/2001, ten schemes are being delivered by the Agency in the West Midlands. These will include improvements to degraded bankside habitats as well as the partnership work on the Wye habitat project in Herefordshire.

Targets to improve salmon stocks are contained within Salmon Action Plans for the River Severn and the River Wye, and to help improve the state of coarse fisheries the Agency has recently consulted on its Coarse Fish Strategy. This has the goal of increasing the availability of coarse fishing through the maintenance, improvement and development of fisheries and by increasing access, information and opportunities for collaboration. A 1994 National Opinion Poll (NOP) survey revealed that a high proportion of angling trips were made within 10 miles of home, and with the majority of anglers in this region living in towns or cities, it is clear that the Environment Agency must help to match supply with demand in these areas.

A programme of urban fisheries improvements aims to:

- *Create new stillwater fisheries on land in public ownership, in partnership with local authorities and angling clubs*
- *Restore poor quality urban stillwaters*
- *Increase the number of fishing pegs on existing fisheries. And to include the provision of access for disabled anglers where possible.*

A considerable number of such initiatives have been undertaken in the past few years including schemes in Redditch, Telford, Stoke on Trent and Lea Marston. Schemes have also been undertaken to promote the wider social benefits of angling as a healthy form of recreation particularly amongst younger people. This has included Agency fisheries staff operating junior coaching sessions and angling proficiency schemes.

In order to communicate with anglers, various publications are produced to inform anglers on issues and the work of the Environment Agency. These include the twice-yearly 'Fisheries News' which is distributed to nearly 30,000 anglers. An angling guide to day ticket waters also gives information on over 400 waters where day ticket fishing takes place.

Fish stocks in the rivers within this region are monitored through a rolling programme of fish population surveys undertaken via a variety of techniques including electrofishing, netting and hydro-acoustic sampling. This allows detection of trends on both a spatial and temporal basis and follow-up management action where problems are detected. The state of the angler's environment is also measured by recording fishing match statistics and the compulsory fishing licence returns from salmon anglers also give a good measure of the state of the salmon stocks.

Whilst fish population survey techniques can reveal changes in fish stocks, if the Environment Agency is to provide a service to licence paying customers we need to also monitor trends in angling. For instance, a 1970 survey revealed that roach were the preferred quarry and river fishing was the most popular, but by 1994 carp was the dominant species and stillwaters were fished most often.

How others can contribute

By:

- *Reporting water pollution and fish kills*
- *Contributing to reducing pollution and improving water quality*
- *Submitting catch returns and co-operating in surveys*
- *Managing land in such a way that run off does not damage fisheries and spawning grounds.*

Conclusions

- *Coarse fish stocks in the West Midlands are improving, although there is still some way to go before sustainable fisheries are achieved in all catchments*
- *Salmon fisheries are showing declining catches*
- *The Agency is working to improve and promote fisheries. Much of this work is in partnership with other angling or conservation groups*
- *The West Midlands contains the highest number of anglers in England and Wales and fishing is a major leisure pursuit.*

Chapter Eight

Air quality

Background

Clean air is essential for human health and the wellbeing of the wider environment. Many human activities are responsible for air pollution and the impacts are equally wide:

Causes		Impacts
Natural	Air Quality	Human health
Industrial		Water quality
Domestic		Soil quality
Transport		Ecology
Waste		Property
Agriculture		Aesthetic quality
Accidents		

Emissions from industry are generally in decline, but those from traffic are rising with increased vehicle use and congestion.

Poor air quality is associated with some major road routes through the West Midlands. Currently 72% of households in the region have access to at least one car.

Poor air quality impacts can be experienced indoors and at the local, regional, national and international scale. Levels of air pollution are influenced heavily by atmospheric processes, including wind speed, wind direction, turbulence, conversion of chemicals in the atmosphere and deposition. Because of these air movements, the impacts are varied and unavoidable for those areas affected.

In some cases, air pollutants emitted in the West Midlands have impacts outside the region without having a significant impact within the region (and visa versa). Examples are the emission of sulphur dioxide and oxides of nitrogen that can cause acidification, and, for the oxides of nitrogen, that can contribute to eutrophication+.

Figure 11 Primary Roles in Air Quality Issues

Many organisations shown here provide advice and guidance on many air quality related issues as well as setting policy or carrying out regulation, this figure tries to show the primary role.

Organisation	Scale of Influence				Issues Influenced					
	Indoor	*Local*	*National*	*International*	*Human Health*	*Quality of Life*	*Soil/Water Quality*	*Ecological Quality*	*Property*	*Climate Change*
Local Authority	■	■			■	■			■	
Environment Agency		■	■		■	■	■	■	■	■
Health & Safety Executive	■				■					
Central Government	■	■	■	■	■	■	■	■	■	■
European Union		■	■	■	■	■	■	■	■	■
United Nations/WHO		■	■	■	■		■	■	■	■

■ *Advice and Guidance Only* ■ *Policy Setting* ■ *Regulation*

Roles and Responsibilties

Figure 11 indicates the range and involvement of the various players involved in setting policy, those providing advice and guidance and those who regulate and measure the quality of the air. Responsibilities are fragmented requiring close co-operation to resolve issues in a co-ordinated manner.

The Environment Agency is responsible for the regulation and control of emissions from the most potentially polluting industrial processes such as those from power stations, industrial chemical plants, incinerator plants and cement kilns.

Top
Ironbridge

Bottom
'Emissions from industry are generally in decline'

+ Acidification - sulphur dioxide and oxides of nitrogen can undergo chemical change in the atmosphere, dissolve into rain causing acidification of sensitive land or waters. Eutrophication - nutrients derived from human activities enrich environmental waters, giving rise to adverse effects on both ecology and the legitimate use of waters.

Issues and challenges

This section outlines the key issues relevant to the West Midlands. Only those pollutants covered by the Government's National Air Quality Strategy (2000) and known to be a significant problem throughout the West Midlands are considered. However, it must not be forgotten that there are a range of other atmospheric pollutants, including volatile organic compounds (VOCs), heavy metals, persistent organic pollutants (such as dioxins and polychlorinated biphenyls), airborne radioactivity, odour, noise and light.

Nitrogen dioxide

High short-term (1 hour) and long-term (annual) nitrogen dioxide concentrations resulting from transport emissions impacting on human health: Problems occur close to motorways, major roads and in urban centres.

Map 9 shows that the highest annual levels of nitrogen dioxide (NO_2) are found close to the north of Birmingham. This is as a result of the levels of traffic from the motorways and major trunk roads. Although the Government's annual standard of 40 micrograms per cubic metre is not exceeded, studies conducted by local authorities show that, currently, hourly concentrations regularly breach the 200 micrograms per cubic metre standard here and in various similar locations throughout the region. Local authorities are responsible for producing air quality action plans to reduce pollution levels where objectives based on these standards are likely to be exceeded.

Weather

Short-term pollution due to weather conditions: Problems range from regional to local (close to source).

Sources are often from outside the region. Short-term incidents due to weather conditions can trap and accumulate emissions of sulphur dioxide from large industrial sources, for example, coal burning power stations.

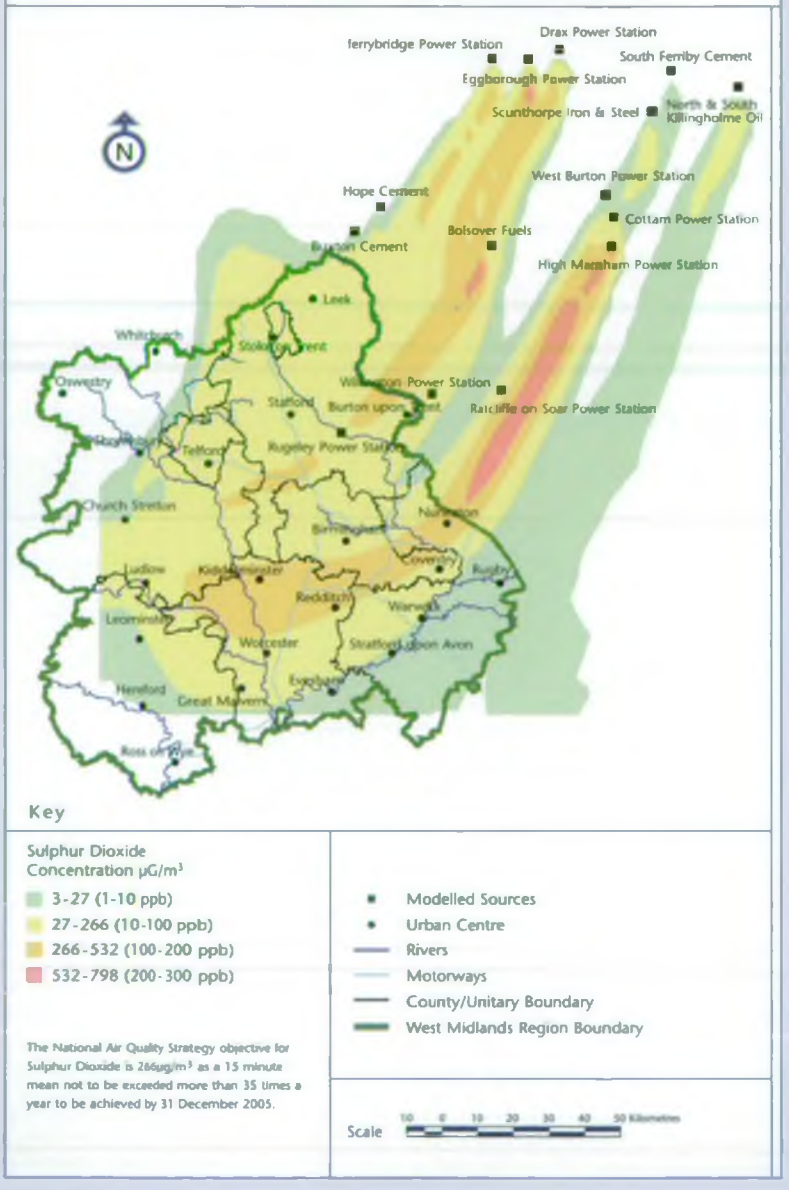
A Case Study

1998 Incident

An example of a regional air pollution episode. Sulphur Dioxide, 2 September 1998, Midlands and South Yorkshire - see map 8.

On 2 September 1998, a significant air pollution episode occurred across a widespread area of the Midlands and South Yorkshire causing harm (as defined in legislation) to some members of the public. They are likely to become less common in the future as a result of emissions of sulphur from coal burning power stations falling by up to 60% by the year 2005, due to controls placed upon the power stations by the Environment Agency.

Map 8 Model Predictions of Hourly Sulphur Dioxide Concentrations µg/m³. 23:00 hours 02/09/1998.



Airborne particle concentrations

High short-term (24 hour mean) airborne particle (PM_{10}) concentrations due to traffic and dust.

PM_{10} concentrations exceed the short-term (24 hour mean) health-based standard in the majority of urban areas and major trunk roads and motorways throughout the region. Levels can be especially high during the winter when pollution from traffic is kept close to the ground and accumulates as a result of anticyclonic weather conditions. In addition to affecting human health, high levels of PM_{10} cause the soiling of buildings, and due to traffic and dust cost the UK millions of pounds each year in clean up. Reducing the high levels of particulates due to traffic and dust is one of the greatest air pollution challenges facing the region.

Oxides of nitrogen and sulphur dioxide

High long-term (annual) oxides of nitrogen (NO_x) and sulphur dioxide (SO_2) levels resulting mainly from industrial emissions and traffic. These cause adverse impacts on vegetation and ecosystems and acidification of soils and the aquatic environment.

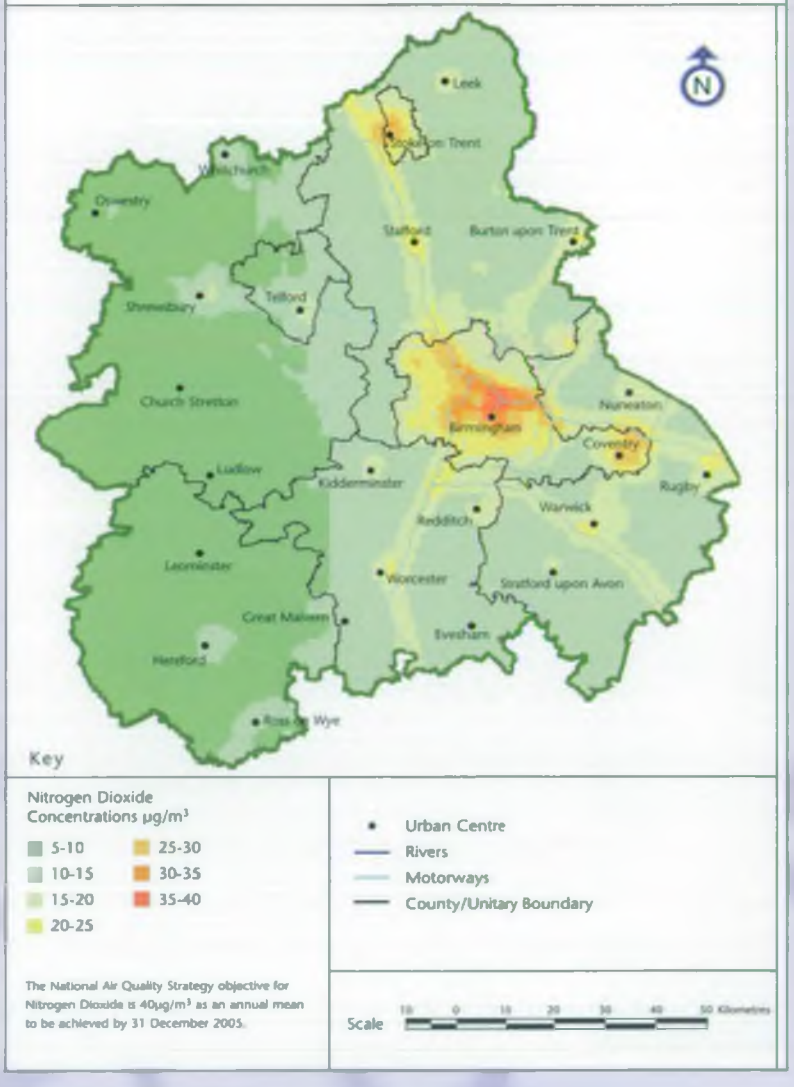
Within the West Midlands region, problems occur mainly close to major roads (NO_x) and within urban centres, where a combination of NO_x from roads and SO_2 from industrial emissions occurs.

Ozone concentrations

High long-term ozone concentrations: ozone (O_3) is a secondary pollutant formed by NO_x and Volatile Organic Compounds (VOCs) reacting in sunlight with oxygen. The causes are emissions from vehicles and solvent use.

High levels of ozone generally occur away from urban centres (where nitric oxide (NO) from traffic reacts with the ozone to form NO_2). In addition, as the chemical reaction to ozone takes many hours or days, highest concentrations are found downwind, often in rural locations. Studies have shown that ozone levels exceed the United Nations Economic Commisssion for Europe (UNECE) growing season mean objective of 50 micrograms per cubic metre (0900-1500 hours, April to September) across the whole of the West Midlands.

Map 9 Predicted Annual Nitrogen Dioxide Concentrations 2005 (µg/m³)



Exceptions are the centres of large urban areas (Stoke on Trent, Birmingham and Coventry). As a result, it is likely that vegetation within the region is significantly affected, resulting for instance, in reduced crop yields. However, due to the ansboundary/national nature of ozone, actions at a regional level are unlikely to have any significant impact on levels within the region.

Environment Agency responses and targets

The Agency's overall long-term objective with respect to air is that:

We will have cleaner and healthier air. The emission of chemical pollutants into the atmosphere will decline greatly and will be below the level at which they can do significant harm.

The Agency will seek to achieve these outcomes by working with partners in the most efficient and effective manner, taking into account the costs and benefits of the options available to do so.

The long-term objective will help achieve these outcomes:

- *Clean air will be valued and demanded by society*
- *Air quality standards will have been set, and met, for all significant pollutants*
- *Air quality will no longer be a significant cause of adverse human health effects and damage to the urban and rural environment*
- *Air pollution will no longer have a detrimental effect on plants, animals or their habitats*
- *Adverse effects on the natural processes of the global atmosphere will have been greatly reduced*
- *All national and international aspects of air pollution will be recognised*
- *All controllable emissions to the air will be regulated on the basis of their environmental impact.*

Right
Motorway traffic in the West Midlands

The Agency works with a wide variety of partners on air quality issues and to deliver improvements in air pollution:

- ***EU*** *and other international organisations - mainly by contributing experts to working groups*
- ***Central Government*** *- liaison on policy development and advice and guidance on regulatory issues*
- ***Local authorities*** *- working with them to identify and quantify key sources of air pollution and assist with local air quality management. The Agency is involved with regional and county groups related to air quality issues*
- ***Industry*** *- the Agency works with trade associations and operators to improve their environmental performance and to ensure that regulation is undertaken in a consistent, transparent and cost effective-manner. The Agency was a founder member of the Environmental Analysis Co-operative, a group made up of industry, regulators, academics, consultants and central Government which provides a forum for discussion and a collaborative approach to solving regulatory issues*
- ***Non-governmental organisations*** *- the Agency works with a number of such groups, for example, the National Society for Clean Air*
- ***Environmental organisations*** *- The Agency collaborates with English Nature in monitoring and assessing the environmental impacts of air pollution, and works with the Forestry Commission on monitoring the impacts of air pollution on tree health.*

+ An Environmental Vision:
The Environment Agency's Contribution to Sustainable Development. January 2001.

How others can contribute

In addition to the partnerships identified above:

- ***Government** needs to continue to reduce the impact from traffic, by such means as: imposing tighter controls on vehicle emissions, the promotion of cleaner fuels and, through the Highways Agency in the development of major traffic management schemes*
- ***Industry** needs to reduce emissions, develop cleaner technologies and improve all aspect of environmental performance*
- *Action is required at both a **national and international level** to reduce levels of particles and ozone. Due to the transboundary nature of these pollutants, action on a European scale will be required*
- ***Local authorities** within the region have to produce an action plan to reduce levels of pollution to within Government objectives for health based air quality standards. The Agency will have a role in reducing industrial emissions where industry it regulates is a significant contributor.*

Local authorities can also assist through actions such as:

- *Locating new development to minimise the need to travel by car*
- *Locating new employment so as to minimise commercial vehicle movements*
- *Promoting better public transport services*
- *Considering critically the permitting of developments within areas that fail to meet Government air quality objectives*
- *Controlling the construction of new developments to minimise dust emissions.*

Conclusions

- *The majority of air pollution problems within the West Midlands are from traffic*
- *At motorway junctions and in urban centres, levels of pollution are high, and Government objectives for health based air quality standards are likely to be exceeded*
- *In addition to impacts on human health, annual levels of nitrogen oxides (mainly from traffic) and sulphur dioxide (mainly from industry) cause air quality standards for the protection of vegetation and ecosystems to be exceeded*
- *The two pollutants of most concern for both health and vegetation are particles and ozone. Levels of particles exceed objectives for health-based standards close to major roads in the majority of urban locations throughout the region. Ozone levels exceed the UNECE standard for the protection of all vegetation in the majority of areas in the region, apart from within the major conurbations. It is likely that these two pollutants will continue to be a problem over the next ten years, unless significant action is taken at a regional, national and international level.*

Chapter Nine

Waste management

Background

The generation of waste and its management cannot be said to be sustainable. Everything that society does, including the re-use and recycling of waste uses resources and produces an environmental impact, so the key is to produce less waste in the first place. However we manage the waste we produce, it presents some degree of risk to people and the environment, even recycling and composting have adverse effects. Managing our waste is about managing the relative risks and the resources involved.

The most sustainable approach is to reduce the wastes generated which runs counter to the continued increase in general living standards. To halt-and eventually reverse-the upward trend in household waste (+3% per year) requires a concerted effort on behalf of all concerned, along with continued efforts to recycle and recover energy from the waste stream. It is therefore imperative that society addresses the generation and management of waste more effectively.

Municipal, industrial and commercial wastes

These are the major waste streams subject to control. Targets have been set in the Government's Waste Strategy 2000 and the EU Landfill Directive to reduce the reliance on landfill. Wastes from households currently going to landfill will be progressively decreased over the next twenty years. By 2020, only one third of the current amount will be permitted, with a corresponding need for an increase in the capacity of alternative treatment facilities.

The West Midlands generates over 16 million tonnes of controlled wastes each year[1], approximately 11 million tonnes of which are disposed of at facilities regulated by the Environment Agency. Some 7 million tonnes (64%) of this waste were deposited at landfill sites in 1998/99.

The region produced approximately 2.76 million tonnes of municipal waste during 1998/99. Figure 13 shows how this waste was managed[2].

Approximately 3.4 million tonnes of industrial and commercial wastes were landfilled within the West Midlands Region in 1998/99. Approximately 1.8 million tonnes of construction and demolition wastes were handled by exempt activities[3] in 1999[4].

Significant movements of municipal waste occurred within the region during 1998/99, in particular from the West Midlands metropolitan districts to Staffordshire and Warwickshire (460,000 tonnes in 1998/99), and municipal wastes from Herefordshire to Worcestershire (65,000 tonnes) and Worcestershire to Warwickshire (30,000 tonnes)[5].

A total of 6.3 million tonnes (83%) of industrial and commercial waste arising within the region were disposed of within the region and 1.29 million tonnes in other regions in 1998/99[6].

The range of hazardous waste types has increased in recent years due to changes in the definition of special wastes. Industry is however increasingly successful in controlling or reducing the specific hazardous waste streams produced. Just under 600,000 tonnes were generated in the region in 1998/99. The co-disposal of non-hazardous and hazardous wastes will cease under the EU Landfill Directive by July 2004 and landfilling of liquid wastes, infectious clinical waste and certain types of hazardous waste by July 2002.

Above
Composting at Cannock

Figure 12 Waste Generated within the West Midlands Region 1998/99 (millions of tonnes)

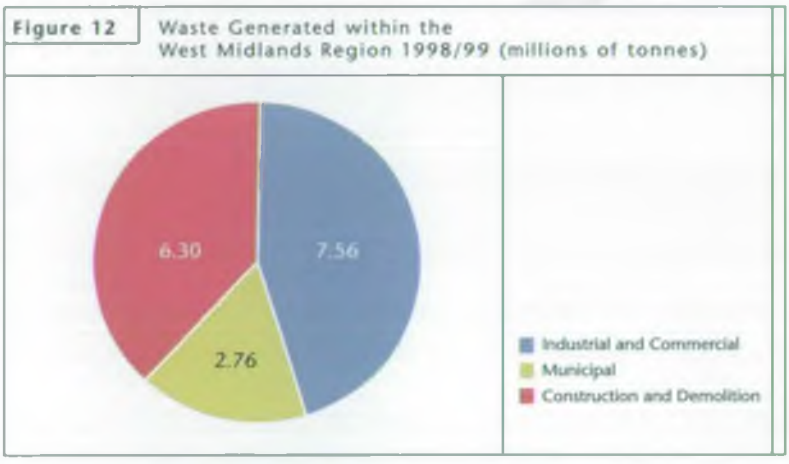
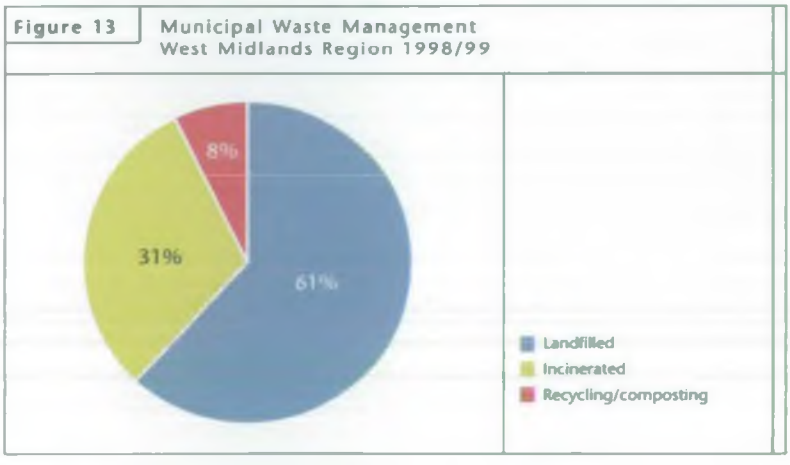


Figure 13 Municipal Waste Management West Midlands Region 1998/99



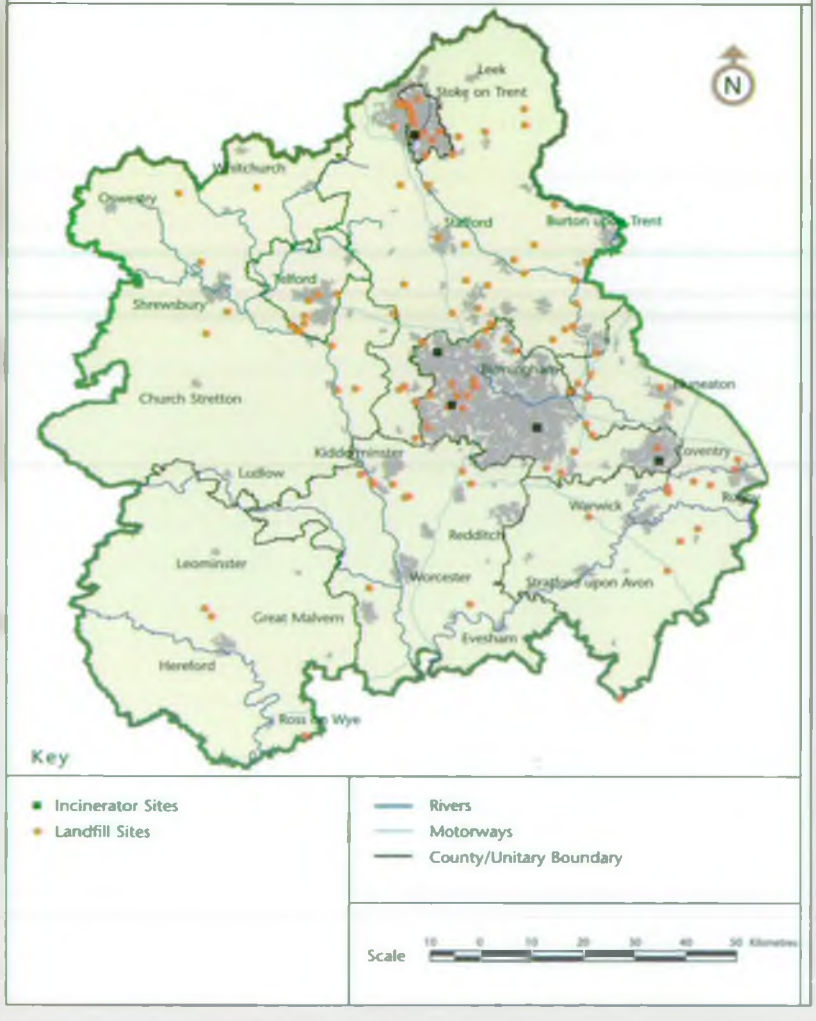
1. Controlled waste includes household, commercial, industrial, special (acids, batteries, solvents, oils etc), and clinical waste; these are controlled under the Environmental Protection Act 1990.
2. Department of Transport and the Regions (DETR) Municipal Waste Statistics 1998/99.
3. Activities exempt from licensing under the Waste Management Licensing Regulations 1994 (as amended).
4. Environment Agency Survey of Construction and Demolition Waste carried out in 2000.
5. Environment Agency Survey of Municipal Wastes.
6. Environment Agency Survey of Industrial and Commercial Waste Production.

Roles and responsibilities

Environment Agency

The Environment Agency is responsible for regulating the treatment, storage and disposal of controlled wastes.[7] The Agency also registers waste carriers, waste brokers, and activities exempt from licensing, and monitors the movements of special (hazardous) wastes and wastes imported or exported from England and Wales to or from counties outside the UK.
The Agency also has an important role in the provision of data, information and advice to ensure that waste strategies are selected in light of reliable information and that the risks of the chosen strategies and facilities are regulated to minimise impacts on people and the environment.

Map 10 Licensed Landfill Sites with Remaining Void Capacity and Authorised Muncipal Waste Incinerators



Local authorities

Local authorities are responsible for allocating land for waste facilities. This is achieved through the production of Regional Planning Guidance (RPG), waste local plans or unitary development plans, and decisions on planning applications. Local authorities also produce local integrated strategies for the management of municipal wastes and handle contracts for waste collection, recycling, recovery and disposal.

Regional Technical Advisory Bodies for Waste (RTABs)

RTABs are officer level groups to be set up in each standard planning region. The West Midlands group is well established with representatives from the local authorities, the waste management industry, the Environment Agency and the Government Office.

The RTAB is tasked with assembling data on waste arisings, assessing the need for waste management facilities and identifying options for meeting regional waste management requirements.

7. Industrial, household and commercial wastes but excluding mine and quarry wastes, agricultural wastes, sewage sludge (except that disposed of to landfill), radioactive waste and explosives.
8. Municipal waste includes household waste and any other wastes, collected by a Waste Collection Authority, or its agents, such as municipal parks and gardens waste, beach cleansing waste, commercial or industrial waste, and waste resulting from the clearance of fly-tipped materials.
9. Waste Strategy 2000.

Above
Composting at Cannock

Opposite page
Stoke on Trent - Waste to energy plant

Issues and challenges

The EU Landfill Directive and Waste Strategy 2000

The Landfill Directive introduces mandatory targets to reduce reliance on the landfilling of biodegradable municipal wastes[8]. The Directive also places new regulatory requirements on operators of landfill sites.

Waste Strategy 2000 concentrates on using waste more wisely and reducing the amount of waste that is landfilled, including targets for industrial and commercial wastes. The Government anticipates reduced landfilling of industrial and commercial wastes through the application of the Landfill Tax, Packaging Regulations and other producer responsibilities.

Managing municipal wastes

Municipal wastes have been increasing annually by around 3% nationally in recent years[9]. If this rate of increase is not arrested, municipal waste production will increase by around 80% in the West Midlands over the next 20 years. Figure 14 illustrates the effect of potential growth rates of 3% and 1% in municipal waste arisings projected to the year 2020.

The imperative is therefore to reduce the waste that we generate and this should become the emphasis of local strategies to meet the requirements of the Landfill Directive. Unless household waste can be reduced, the diversion from landfill implies a much greater need for recycling and the recovery of value from waste, which will be difficult to provide in terms of the Directive.

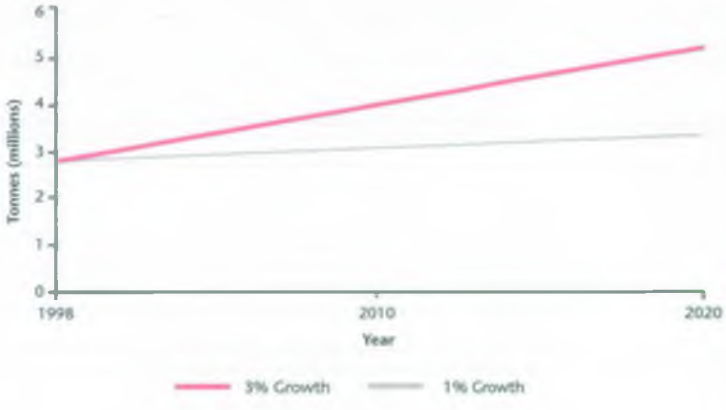
Managing industrial and commercial wastes

The Government has set a target to reduce the amount of commercial and industrial waste landfilled to 85% of its 1998 level by 2005. If current trends are maintained away from heavy industry towards modern, high technology industries and commercial services that have relatively low waste production and high recyclability, this target is likely to be met.

Managing hazardous wastes

The Landfill Directive will reduce very substantially the number of landfill sites taking hazardous waste. There is a concern that alternative capacity for treatment and disposal of hazardous waste on the scale needed may not be possible within the timetable of the Directive. The West Midlands had 19 co-disposal sites during 1998/99.

Figure 14 Potential Growth of Municipal Wastes



Environment Agency responses and targets

Unless the growth rate in household waste is tackled, substantial new facilities will be needed. The Environment Agency believes that a much greater emphasis should be given to reversing the current growth rate of household waste as an alternative to further additional treatment facilities.

The Landfill Tax has encouraged waste away from landfill. However in many cases, the waste has gone to 'exempt' sites through exploitation of gaps in the legislation. The Environment Agency, working with the Department of Transport and the Regions (DETR), proposes more effective control over these activities through revised licensing regulations.

Right
Inkberrow -
'To reverse the growth in household waste requires a concerted effort on behalf of all concerned'

Thermal treatment (Incinerators)

Less landfill can imply more incineration, which needs to be considered when developing a sustainable integrated waste management strategy.

The Environment Agency has no objection to incineration provided that:

- *Incineration does not undermine better waste management options within the waste hierarchy and represents the Best Practicable Environmental Option (BPEO)*
- *Incineration forms part of a regional or local strategy for the area combining reduction, reuse, recycling, recovery and disposal*
- *Energy generated by incineration is recovered as far as practicable using Combined Heat and Power (CHP) schemes*
- *Incinerators meet stringent controls so as to minimise pollution of the environment, impact on human health and the effects on the local amenity*
- *Where additional incinerators are necessary, the Environment Agency will encourage the adoption of standards for construction, maintenance and operation that go beyond statutory requirements*
- *The Agency would like to see parallel tracking of planning and environmental permit decisions to minimise duplication and delay for industry and to ensure the two processes work together effectively.*

Availability of information

In October 2000 the Environment Agency published Strategic Waste Management Assessments (SWMAs) for all the regions of England and Wales. The data contained in the West Midlands SWMA provides the best current opportunity to assess the likely demand for new waste management facilities.

How others can contribute

While it is the Environment Agency's view that reducing household waste is imperative, new facilities will still inevitably be needed. The views of stakeholders need to be considered along with facts, trends and all available options for drawing up a comprehensive waste strategy.

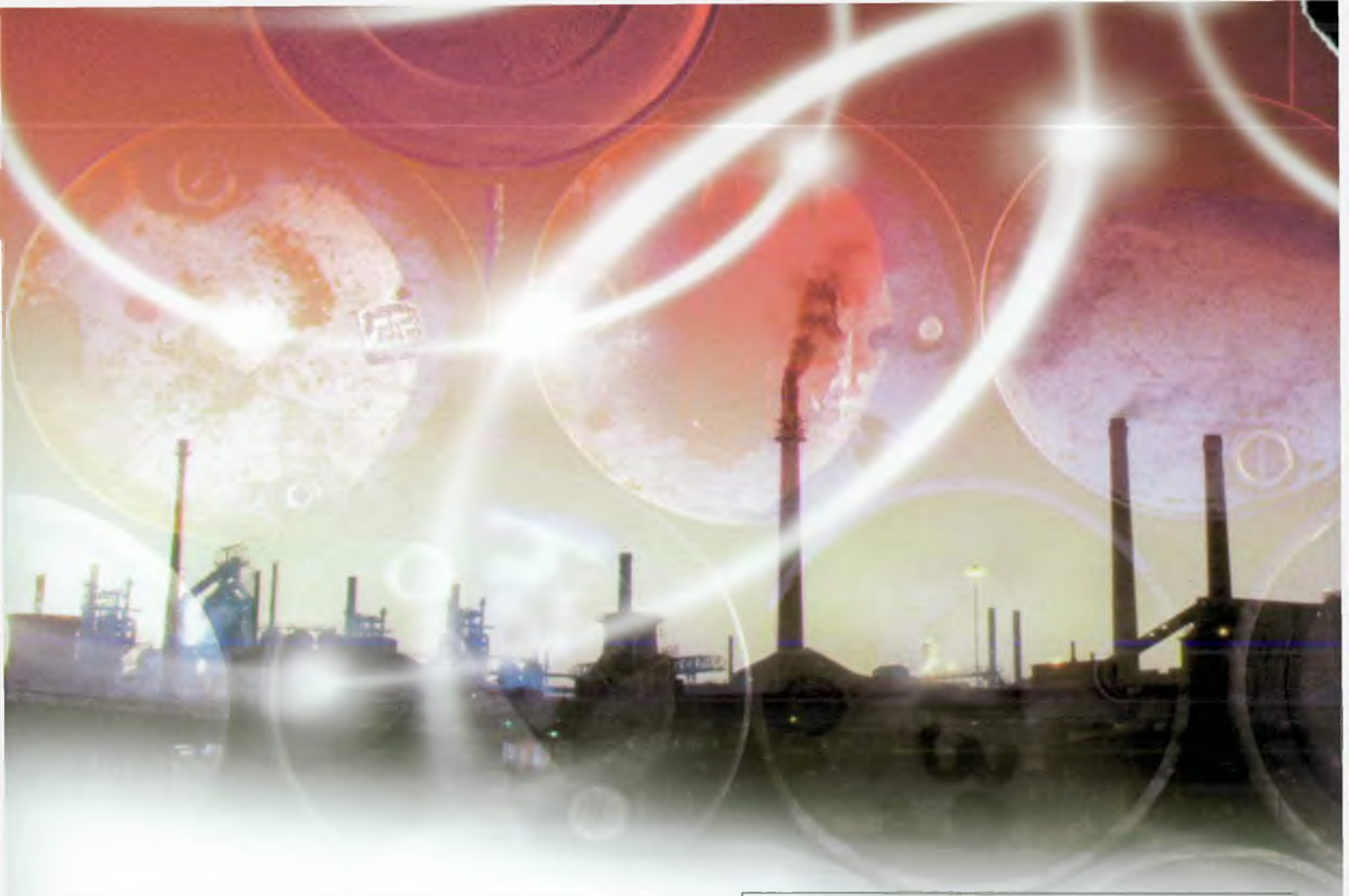
The Environment Agency believes that regional and local waste plans should:

- *Demonstrate an expectation of meeting statutory targets*
- *Fully reflect government policies for waste*
- *Be developed in accordance with the Best Practicable Environment Option (BPEO), taking account of the social, financial and environmental impacts over the whole life cycle*
- *Review all options for the management of wastes and separate waste fractions to produce an integrated strategy*
- *Promote social inclusion by involving local people in meaningful consultation.*

The environmental impact of the movement of waste from areas generating waste is a major factor in the location and sizing of future facilities. Strategies need to minimise both the quantity of waste to be moved and the distances involved. This requires a clear framework at regional level through the Regional Technical Advisory Bodies for waste (RTABs) and Regional Planning Guidance (RPG).

Conclusions

- *If current trends of waste generation are maintained, it is likely that landfill reduction targets for industrial and commercial waste will be met*
- *Household waste is increasing at around 3% each year. Stabilising and reducing the size of the waste stream will require concerted and integrated action by all concerned*
- *Even if successful, significant investment in new waste treatment, recycling and composting facilities will be needed along with some continuing demand for landfill capacity for the next twenty years. This will require a commensurate increase in the funding available to local authorities. The dependence of successful recycling of household waste on fluctuating commodity prices, will place further pressure on local authorities in meeting the Government's Waste Strategy targets*
- *These challenges place significant pressures on the development plan system and municipal waste strategies. This in turn requires robust regional planning guidance to support development plans in identifying sites for the necessary facilities in an integrated way across local authority boundaries*
- *There is a need to explain waste management issues and options to the public. Waste facilities are never popular but need to be provided if a more sustainable approach to waste is to be assured*
- *There is a concern that alternative capacity for treatment and disposal of hazardous waste on the scale needed may not be possible within the timetable of the Directive.*



Chapter Ten

Land contamination

Background

Land contamination is widespread in the West Midlands, with significant areas of the West Midlands conurbation affected, usually as a result of previous industrial use. The level of contamination in terms of particular land's physical and chemical condition varies considerably depending on the former use of the site.

The quality of the land and of the soils needs to be protected and restored, to enable them to be used beneficially and safely, and so that they are not a source of contamination of water, air, and other environmental assets.

Above
Basford gas works site, Nottingham - Replacing washed soil from the soil washing plant, after remixing coarse and fine components

Roles and responsibilities

Prevention of new contamination of land is achieved by a number of organisations including local authorities and the Environment Agency. The main instruments used by local authorities are their land use planning powers, building control, and statutory nuisance controls. The Agency uses a variety of powers such as Integrated Pollution Prevention and Control (IPPC), waste management licensing and control of aqueous discharges to land and anti-pollution works notices.

Many of these controls are used to alleviate contamination and restore the quality of the land. These powers have supported large and successful regeneration initiatives over the last few decades by development commissions, corporations and companies, as well as by the local authorities themselves. The Agency and its predecessors have also cleaned up some land, often in pursuing remediation of water and air quality.

The principal means of securing remediation of historic land contamination has been, and is still, the Town and Country Planning system. However, there are many sites with significant historic contamination which are unlikely to be remediated voluntarily, or through any of the regulatory controls. The introduction of a new contaminated land regime places duties and powers on local authorities and the Environment Agency to secure the remediation of areas of contaminated land which are a significant threat to human health, controlled waters or the environment. The 34 metropolitan, unitary and district local authorities in the West Midlands are the principal regulators of contaminated land.

Top
Basford gas works site, Nottingham - Receiving bunkers

Bottom
Telford - Playground built on reclaimed land

Above
Lincoln - Soil washing

Above
'Land contamination is widespread in the West Midlands'

Issues and challenges

Redevelopment of brown field sites is to be encouraged as the land, if it is contaminated, can be cleaned up and brought back into use. The risk posed by such sites to the environment will be reduced and the land made suitable for reuse. There are often tensions between the need to redevelop brown field sites and the costs involved in clean up of the land for re-use.

The financial constraints on brown field remediation can often favour development of sites out of towns where no clean up is required. Cheaper houses can often therefore be built in green field sites, but there may be more pressure on the environment by building in such locations. The economics of brown field redevelopment need to be considered in conjunction with the great benefits to the environment gained, when cleaning up polluted land and bringing it into use again, and the knock-on benefit of the regeneration and rejuvenation of the community environment. The tensions need to be balanced to ensure the environment benefits as much as possible.

Bottom
Darley Dale - Mineral waste tip

As an example, there are a number of grossly polluted tracts of land resulting from former gas works activities and the financial implications of cleaning up such land compared to the undoubted environmental benefits, have to be taken into account by developers and planning authorities alike.

Not all of the industrial legacy of the region gives rise to a need for regeneration. Some former mineral mining sites are in Areas of Outstanding Natural Beauty (AONB) or have become important in their contaminated state because of the bio-diversity they sustain.

Conversely, land which is classed as 'greenfield' and has not been developed in the past, can have significant levels of natural chemical, physical or biological contamination.

In addition to closed gas work sites there are other land uses which are commonly identified with land contamination. A prime example is petrol stations - where underground storage tanks and associated pipework are often in poor condition and investigation will usually reveal associated hydrocarbon pollution of the ground and water.

Although many such sites have closed in recent years, and problems have been cleaned up, where there are new sites being built, the necessary pollution prevention measures should be included.
In vulnerable areas such as a Source Protection Zone, this can prove very costly and sometimes render such schemes non-viable. A better environmental and economic solution may be to locate such sites in less vulnerable areas.

Redevelopment of former industrial areas will not always require the clean up of the underlying groundwater, but any treatment of the land will usually require a reduction in the input of polluted water to the groundwater.

A Case Study

Redundant Petrol Station

In 1995, hydrocarbon pollution was found during the removal of underground storage tanks, at a redundant fuel filling station in Shrewsbury. The site was on the Bridgnorth Sandstone which is classed by the Agency as a major aquifer of high vulnerability to surface contamination. Groundwater was encountered at a depth of about 5 metres below ground level.

Upon identification of ground contamination, the landowners commissioned consultants to undertake a phased site investigation. The works involved defining the extent of the contamination and the aquifer characteristics. Ten groundwater-monitoring wells were installed which revealed a layer of petroleum up to 0.9m thick floating on the groundwater and extending off the site.

The remedial plan had two parts; firstly to substantially remove the free product reduced to a thickness of 0.01m or less and then to set targets for the maximum concentration of hydrocarbons dissolved in the underlying groundwater.

Remediation of the site still continues more than five years after the discovery of the contamination and although removal of petroleum has been successful, the layer of free product has not yet reduced to the target thickness and remedial targets for the groundwater have yet to be set.

Environment Agency responses and targets

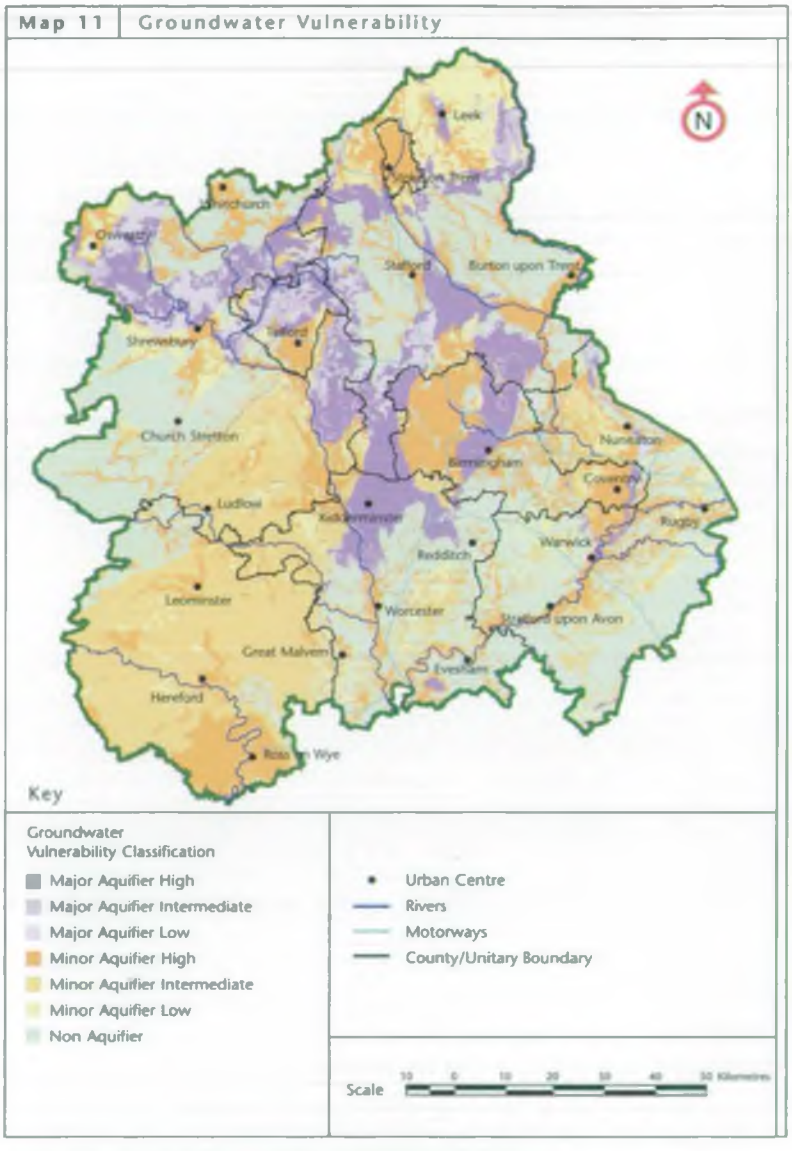
Remediation of contamination has been carried out to permit redevelopment for a range of uses mostly under Town and Country Planning controls, or with derelict land grant. Large areas of the West Midlands, including the Black Country, have been cleaned up over the last ten to fifteen years. The Agency has advised local authorities, development agencies and developers on the aspects of remediation where it has particular knowledge - alleviation or prevention of water pollution, waste management and authorised industrial processes. Information on the extent and remediation of contaminated land in the West Midlands is sparse and unreliable.

Contaminated Land Inspection Strategies formulated by the local authorities identify the locations within each area where significant contaminants and sensitive receptors are most likely to co-exist, and therefore where pollutant linkages, comprising contaminant, pathway and receptor are most likely to be found. To assist local authorities in this task, the Agency has provided sets of data relating to catchment areas, groundwater vulnerability zones, water abstraction and discharge points, licensed and closed landfills, permitted integrated pollution control sites, licensed nuclear/radioactive substances sites, etc. Local authorities are required to publish their Inspection Strategies before the end of June 2001.

The Inspection Strategies, and the inspection programmes that will follow, will help to dispel the current ignorance about the extent and seriousness of contamination, and this new data will greatly assist the planning for physical and financial resources required to inspect and remediate priority sites. The inspections will reveal sites that have been developed on formerly contaminated land, and which will need to be re-examined in the light of the much higher standards of risk assessment, remediation and verification that the regulators will be applying.

The timetable for remediation of land contamination is controlled by development planning, and the determination to use brownfield land for a high percentage of new houses in the period up to 2016 should reduce considerably the national stock of such land. The target for the historic contaminated land, to which the new controls may be applied, is for the majority to be cleaned up 'within a generation', say by 2030.

Map 11 Groundwater Vulnerability



The Agency's policies for land contamination are based on two presumptions:

- *Prevent new contamination, stop any current contamination, clean up any contamination from an authorised process, then remediate historic pollution*
- *Voluntary action is preferred to regulatory action.*

The Agency will be making a practical contribution by carrying out remediation works on a number of Special Sites. The size of this programme is difficult to estimate until the inspection strategies and programmes have been undertaken, but the Agency is basing its resource planning on one site per three local authorities per year, which equates to about 10 to 12 sites per year in the West Midlands.

How others can contribute

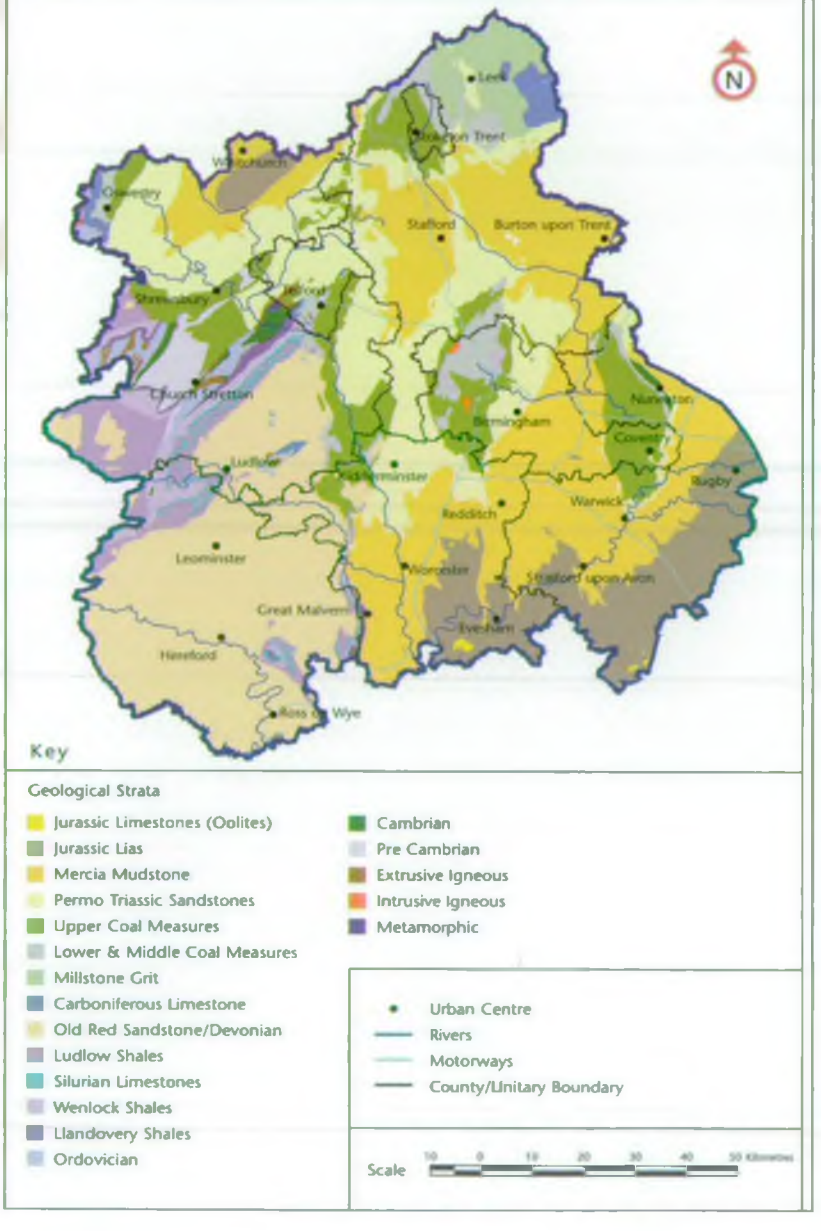
Local authorities are required to develop Inspection Strategies and subsequently to require remediation of the categories of contaminated land defined in the legislation. The Environment Agency has an advisory role to local authorities for such sites and becomes the prime regulator for those sites that are defined in the regulations as Special Sites. The advisory role concentrates on those areas of Environment Agency special expertise, whilst the Special Sites regulation involves the Agency in the full range of pollution receptors, including human health. It is very important for the regulators to work in partnership.

Landowners and developers can make a large contribution to remediation. Although the main driver is always going to be making the land suitable for redevelopment or disposal, preservation of environmental image and avoidance of regulatory action both have their place.

In the West Midlands, for example, former gas works can be found throughout the region, even in small rural settlements, and care needs to be taken to protect the environment and human health during and after redevelopment. Many industries have their own associated types of potential pollution of the land and water in the vicinity. For instance, Sandwell is closely linked to heavy engineering activities and this has provided a legacy of sites contaminated with heavy metals and chemicals. While many factories have now closed, reuse of such land needs to consider the particular pollutants involved. Much of the West Midlands and Black Country has been associated with the car industry with its associated solvent and metal pollution of ground and groundwater.

Map 12 - Geology - shows the relationship of the industrial centres to outcrops of the major aquifers and illustrates why the Environment Agency is keen to remove contaminants because they are in sensitive areas. Map 11 shows groundwater vulnerability.

Map 12 Geology



Conclusions

- *Significant areas of land across the West Midlands metropolitan areas are contaminated*
- *Comprehensive and reliable information about the extent and nature of contaminated land in the West Midlands is not available. People often do not know that their premises are built on formerly contaminated land and do not have access to the information necessary to allow proper assessment of these significant social and economic disadvantages. The inspection strategies that will be prepared by local authorities will identify the extent of the contaminated land issue in the West Midlands*
- *Greater benefit to the environment will result by cleaning and redeveloping brownfield land in preference to greenfield sites, and the identification and remediation of contaminated land is essential for meeting targets for new housing in the West Midlands.*
  There may be a lack of available suitable land for development in the urban areas, which in turn may cause problems in meeting the regions' development targets.

Above
Cannock

Chapter Eleven

Towards a sustainable region

Sustainable development

Sustainability is increasingly becoming part of thinking at all levels of society. It is a difficult concept to get to grips with, but perhaps the Government's definition of "a better quality of life for everyone, now and for future generations to come"[1] is more accessible than most.

Development in the West Midlands is essential if the region is to move forward and provide improved conditions for the communities which make it up.

However, if this development is to be truly sustainable it must result in:

- *social progress which recognises the needs of everyone*
- *effective protection of the environment*
- *the prudent use of natural resources*
- *the maintenance of high and stable levels of economic growth and employment*

The challenge to the region, and to society as a whole, is to reconcile the often competing and conflicting consequences of pursuing these objectives. A blueprint for meeting this challenge has been produced for the West Midlands in the shape of a Regional Sustainability Framework[2]. Driven by the West Midlands Round Table for Sustainable Development, this document was prepared and endorsed by a wide range of regional partners.

Achieving sustainable development therefore requires the co-operation of a wide range of individuals and organisations within the West Midlands.

A shared responsibility

Many national and local bodies are charged by Central Government with bringing about sustainable development, including all levels of Local Government and Government Agencies such as the Countryside Agency and English Nature. There is also a wide range of voluntary groups and other organisations with similar objectives.

In recent years decisions affecting sustainability are increasingly being made at the regional level. In the West Midlands, the regional development agency (Advantage West Midlands), the Government Office, the Local Government Association and the Regional Round Table for Sustainable Development all have key roles to play in moving towards a more sustainable region.

Implementation of strategic policy and development is becoming a more collaborative and inclusive process through the emergence of Sub-Regional Partnerships, Local Strategic Partnerships and Community Strategies. These represent a significant opportunity for everyone with an interest in sustainable development to contribute to decision-making processes at a strategic and local level.

Right
Kidderminster

Bottom
Cannock

Below
Brindley Place, Birmingham

1 A Better Quality of Life DETR May 1999
2 Quality of Life - The Future Starts Here, West Midlands Round Table for Sustainable Development, 2000

The Environment Agency and sustainability

The Environment Agency has a principal aim, under the 1995 Environment Act, of contributing to the achievement of sustainable development. It receives guidance from Government on what that contribution should be.

This guidance requires the Agency:

- *To build on the work of its predecessor bodies in protecting and enhancing the environment.*
- *To lay greater emphasis on the need to look at the environment as a whole, through an integrated approach, rather than at individual media in isolation, and*
- *To place the Agency's activities more firmly in the context of sustainable development.*

The earlier sections of this report show how the Environment Agency delivers these responsibilities at a functional level by applying the legislation in its regulatory role and by working with others.

An early initiative to engage a wider number of people in environmental decision-making was the production of a national set of Local Environment Agency Plans (LEAPs). Each LEAP was developed with help and support from people and organisations with local knowledge of the area. They were also the subject of widespread local consultation to attempt to secure more input and ownership.

Top
Stafford

Bottom
Pavillions, Birmingham

The completed documents now cover the whole of the West Midlands (based on river catchments) and provide a detailed appraisal of the state of various aspects of the environment which are regulated by the Agency. Copies are available from our local offices.

The Agency's recently-published 'Environmental Vision'[3] sets out in detail how we will seek to make a major contribution to sustainable development in the long-term. The Vision recognises that we need to change the way in which we work, relying not only on our regulatory powers but also through making the most of opportunities to work with others to influence, educate and campaign on a wider range of issues. Only by working with others, including those we regulate, can we maximise our contribution to bringing about sustainable development.
The production of this report is part of that process. Here we present the Agency's strategic snapshot of the health of the region's environment and some of the challenges that we all face. We have deliberately not restricted ourselves to commenting on areas where we have large degrees of control. We know that a better environment for the West Midlands can only be achieved through the efforts of a wide range of partners from environmental, social and economic backgrounds.

3 An Environmental Vision - the Environment Agency's contribution to sustainable development.

Conclusion

- *There are many challenges for the environment of the region in the future. Some are not new but are becoming increasingly important. The problems of waste continue, air pollution remains an issue although concern about its cause is shifting away from industry and towards vehicle emissions, and problems with major historic water pollutants have been replaced by uncertainty over newer forms of contamination.*

- *And there are new challenges. Climate change is likely to affect temperature and rainfall patterns in the West Midlands, having knock-on effects on flooding, water resources, biodiversity and business viability. Finding a short-term solution to halt and reverse climate change is highly unlikely and the region, therefore, needs to consider how it is going to manage and adapt to its impact.*

- *It is also important that the region recognises that the environment is one of its most valuable assets. The West Midlands has a unique portfolio of environmental treasures, from the unspoilt landscape of the Shropshire Hills to the industrial archaeology of the Black Country. The contribution that it makes to the social wellbeing and economic prosperity of the region should not be forgotten or underestimated. A recent study [4] revealed that the environmental economy of the West Midlands employs over 90,000 people (more than the telecommunications and transport sectors combined). It also identifies that it is a buoyant and confident sector capable of significant future growth - an important factor in a region that is highly reliant on traditional industry and in need of diversification opportunities.*

- *The maintenance of a high quality and healthy environment in the West Midlands is in everyone's interests. The challenges we face in achieving it are significant but not insurmountable. We look forward to taking a full and active part in addressing them and hope that we will be joined by a range of partners from across the region.*

Sustainable Development Objectives

From 'A better quality of life: A strategy for sustainable development in the UK', DTER, May 1999.

- **Social progress which recognises the needs of everyone**
  Everyone should share in the benefits of increased prosperity and a clean and safe environment. We have to improve access to services, tackle social exclusion and reduce the harm to health caused by poverty, poor housing, unemployment and pollution. Our needs must not be met by treating others, including future generations and people elsewhere in the world, unfairly

- **Effective protection of the environment**
  We must act to limit global environmental threats, such as climate change; to protect human health and safety from hazards such as poor air quality and toxic chemicals; and to protect things which people need or value such as wildlife, landscapes and historic buildings

- **Prudent use of natural resources**
  This does not mean denying ourselves the use of non-renewable resources like oil and gas, but we do need to make sure that we use them efficiently and that alternatives are developed to replace them in due course. Renewable resources, such as water, should be used in ways that do not endanger the resource or cause serious damage or pollution

- **Maintenance of high and stable levels of economic growth and employment**
  So that everyone can share in high living standards and greater job opportunities. The UK is a trading nation in a rapidly changing world. For our country to prosper, our businesses must produce the high quality goods and services that consumers throughout the world want, at prices they are prepared to pay. To achieve that, we need a workforce that is equipped with the education and skills for the 21st century. And we need business ready to invest, and an infrastructure to support them.

4 The Environmental Economy of the West Midlands, AWM/Environment Agency, 2001

Chapter Twelve

Measuring progress towards sustainability

The Environment Agency has produced a set of environmental indicators chosen to show the state of the environment and to measure pressures on it. These will reflect activities over which the Agency has a regulatory role or where it has major concerns. A small selection of issues relevant to the West Midlands and which mainly reflect the Agency's responsibilities are shown below. Indicators are being developed for each issue, which will use the best available data meaningful to the region and will fully reflect the work being undertaken by our partners in this field.

The Agency intends to develop these and other regionally relevant indicators during the coming year, by which to review performance towards the future aims and we would like our partners to assist us in that task. It is then intended to report indicators on a regular basis using the most recent available data.

Issues	Current Trend	Future Aims
Water, Water Everywhere		
River Water Quality	The underlying trend has been one of improving water quality and increasing compliance with objectives since 1990. These improvements reflect capital investment in improved sewerage systems raising discharge quality and tighter enforcement of discharge consents by the Agency. Between 1993 and 1999 there has been an increase of 12% in the length of river classified as having good or fair quality.	The aim is for continued improvements in river quality and greater compliance with objectives. The Government has set a target to halve non-compliance by 2005. The Water Company's Asset Management Plan (AMP3) will assist in meeting this aim.
Groundwater Quality	Concentrations of nitrate in groundwater are increasing in many boreholes across the region. The EU drinking water standard is 50 mg/l as NO_3. Nitrate Vulnerable Zones (NVZs) are being designated to reduce the quantity of nitrate reaching groundwater from agricultural sources.	The aim is to reduce nitrate inputs to groundwater so that the EU drinking water standard for public water supply is achieved.
Groundwater Resources	Groundwater levels generally reflect the balance between input of water from rainfall recharge and removal of water by abstraction. Levels fall during drought years and show recovery during wetter periods. The Agency monitors groundwater levels in a number of boreholes across the region. In some areas in the West Midlands falling groundwater levels due to over abstraction continue to be a problem. Conversely the Birmingham area suffers from problems of flooding and water contamination due to rising groundwater levels.	The aim is to ensure that groundwater resources are managed in a sustainable manner. If this is achieved abstraction from groundwater will be able to add to water supply without having detrimental environmental effects such as lowering of river baseflows.
Flooding	The number of significant flood warnings issued has increased in recent years. Flood risks continue to be present in many riverside locations and may be increased by possible future climate change. However, this indicator alone is not reliable for identification of climatic change. More reliable indicators for the problem of flooding are being developed.	The aim is to provide more efficient and effective flood warning. This will help others to identify areas at risk and protect themselves from flooding.
The Air We Breathe		
Air Pollution	Urban air quality generally continues to improve. Industrial sources of air pollution are generally decreasing but pollution from traffic and individual incidents remains a problem.	The aim is for the number of days of moderate or high pollution to continue to decrease.
Road Traffic	Traffic volumes showed a 17% increase between 1990 and 1999 in the West Midlands. Vehicle miles covered by cars in the West Midlands accounted for more than 10% of the total for England over this period.	The UK Government Integrated Transport Policy has a target of reducing rates of traffic growth. The Agency policy is to reduce vehicle use in the carrying out of its work.

Key

- Decreasing trend
- Increasing trend
- Stable Trend
- Variable trend

Issues	Current Trend	Future Aims
A Throw Away Society		
Waste	The amount of waste generated in the West Midlands is rising. Deposits in 1998/99 in the West Midlands Region were 11million tonnes. In 1998/99 461 Kg of household waste was produced per person, a rise of 3% since 1996/97. Of this 32 Kg per person was recycled or composted, a rise of 36% since 1996/97.	The aim is to reduce the quantity of waste arising by encouraging waste minimisation at source and recycling of waste. European legislation will require significant investment in new waste treatment, recycling and composting capacity. There will also be significant changes to how waste is managed with EU directives requiring diversion of waste from landfill.
Rebuilding for the Future		
Pollution Incidents	Oil and fuels are the most significant pollutant type accounting for 30% of incidents. The construction industry is the most frequently identified source of industrial pollution.	The aim is to continuously reduce the number of pollution incidents occurring in any one year.
Use of Brownfield Land	50% of new homes were built on previously developed land in 1996 (the most recent available data). This was an increase of 1% on the 1990 figure.	The Government has set a target that by 2008 60% of additional housing in England should be provided on previously developed land.
Biodiversity		
Salmon	Catches of salmon have been in long term decline. Factors include access to spawning areas, changes in agriculture and effects of development. New byelaws on catch and release came into force in 1999.	The aim is to see a recovery of the existing salmon stocks.
Coarse Fish	Catches have been increasing reflecting improved water quality and management of the river. The AMP3 programme should deliver improved water quality where urban runoff via storm sewers has limited coarse fish populations.	The aim is to see continued improvement in coarse fish stocks.
Key Species	Otters are becoming more frequent across the region expanding from their strongholds in the upper reaches of the River Severn. Water voles have been lost from a significant proportion of the region during the last decade White-clawed crayfish are rare and declining across the region.	The aim is for this trend to continue in line with the Biodiversity Action Plan (BAP) target. The aim is to maintain and restore populations in line with the BAP target. The aim is to maintain and restore populations in line with the BAP target.

Key

- Decreasing trend
- Increasing trend
- Stable Trend
- Variable trend

Appendix One - References

A Better Quality of Life - a strategy for sustainable development for the UK - Department of Environment, Transport and the Regions (DETR) 1999

Environmental Vision, the Environment Agency's contribution to sustainable development - Environment Agency 2000

Environmental Indicators: A set of environmental indicators for Environment Agency use - Environment Agency 2000

Regional Planning Guidance Review - West Midlands Local Government Association 2000

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Climate Change Study - University of Derby 2000

Groundwater Vulnerability Maps - Environment Agency

Source Protection Zones - Environment Agency

Taking Water Responsibly - Department of the Environment, Transport and the Regions (DETR) 1999

Water Resources for the Future - A strategy for the Midlands region - Environment Agency 2001

A Price Worth Paying-the Environment Agency's proposals for the National Environment Programme for Water Companies 2000 - 2005 - Proposals to Government May 1998

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Biodiversity: The UK Action Plan-Department of the Environment (DOE) 1994

Bioversity: The Steering Group Report - DOE 1995

Focus on Biodiversity-Environment Agency 2000

West Midlands Regional Biodiversity Forum, 2001

National appraisal of assets at risk from flooding and coastal erosion - Ministry for Agriculture, Fisheries and Food (MAFF) 2000

Floodplain Maps-Environment Agency 1999

Development and Flood risk - DETR 2000

Report on the review of the National Air Quality proposals - DETR 1999

UK National Air Quality Strategy - DOE 1997

Waste Strategy 2000 - DETR 2000

Strategic Waste Management Assessments - Environment Agency 2000

Appendix Two - List of maps on CD

In document and on CD:

1. The West Midlands Region
2. Pollution incidents 1999
3. River quality objectives 1999
4. River ecosystem compliance 1999
5. Annual average rainfall in mm from1961 to 1990
6. Areas prone to flooding
7. River habitat quality assessment
8. Air pollution incident involving sulphur dioxide on 2 September 1998
9. Predicted annual average nitrogen dioxide concentrations ($\mu g/m^3$) in 2005
10. Licensed landfill sites with remaining void capacity and authorised municipal waste incinerators
11. Groundwater vulnerability
12. Geology of the region

On CD only:

13. The region in context
14. Topography
15. Regional land use
16. Predicted annual average sulphur dioxide concentrations ($\mu g/m^3$) in 2005
17. Predicted annual average particulate matter concentrations ($\mu g/m^3$) in 2005
18. Nitrate vulnerable zones
19. Special protection areas and special areas of conservation (EC Habitats Directive)
20. River habitat modification
21. Distribution of otters
22. Distributions of crayfish
23. Distribution of water voles 1989/90
24. Distribution of water voles 1996/98

Note

The maps may be viewed using the Windows Explorer(tm) to display the contents of the CD and then clicking on the map of interest. Maps are provided in the portable document 'pdf' format. The Adobe Acrobat Reader(tm) software will be needed to read the maps. If Adobe Acrobat is not installed on the machine it can be obtained free of charge from the internet at the Adobe site: http://www.adobe.co.uk

MIDLANDS REGION ADDRESSES

REGIONAL OFFICE
Environment Agency
Sapphire East
550 Streetsbrook Road
Solihull
West Midlands B91 1QT
Tel: 0121 711 2324
Fax: 0121 711 5824

UPPER SEVERN AREA OFFICE
Environment Agency
Hafren House
Welshpool Road
Shelton
Shrewsbury SY3 8BB
Tel: 01743 272 828
Fax: 01743 272 138

LOWER SEVERN AREA OFFICE
Environment Agency
Riversmeet House
Newtown Industrial Estate
Northway Lane
Tewkesbury GL20 8JG
Tel: 01684 850 951
Fax: 01684 293 599

UPPER TRENT AREA OFFICE
Environment Agency
Sentinel House
Wellington Crescent
Fradley Park
Lichfield WS13 8RR
Tel: 01543 444 141
Fax: 01543 444 161

LOWER TRENT AREA OFFICE
Environment Agency
Trentside Offices
Scarrington Road
West Bridgford
Nottingham NG2 5FA
Tel: 0115 945 5722
Fax: 0115 981 7743

— Area Administrative Boundaries

— Regional Boundary

● Area Office

▲ Regional Headquarters

■ West Midlands Region

www.environment-agency.gov.uk

ENVIRONMENT AGENCY
GENERAL ENQUIRY LINE
0845 933 3111

ENVIRONMENT AGENCY
FLOODLINE
0845 988 1188

ENVIRONMENT AGENCY
EMERGENCY HOTLINE
0800 80 70 60

ENVIRONMENT AGENCY