ENVIRONMENT IN FOCUS 2006

Environmental Indicators for Ireland

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

ENVIRONMENTAL PROTECTION AGENCY

Agency Status

The Environmental Protection Agency (EPA) is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Heritage and Local Government.

The EPA is managed by a full time Executive Board consisting of a Director General and four Directors. Independence is assured through the selection procedures for the Director General and Directors and the freedom, as provided in the legislation, to act on its own initiative. The assignment, under the legislation, of direct responsibility for a wide range of functions underpins this independence. Under legislation, it is a specific offence to attempt to influence the Agency, or anyone acting on its behalf, in an improper manner.

The Agency is assisted by an Advisory Committee of twelve members, appointed by the Minister for the Environment, Heritage and Local Government.

Responsibilities

The EPA has a wide range of statutory duties and powers under the Environmental Protection Act. In addition, the capacity of the EPA in relation to enforcement has been enhanced by powers contained in the Protection of the Environment Act 2003. The main responsibilities of the EPA include the following:

- licensing large/complex industrial and other processes with significant polluting potential;
- monitoring environmental quality, including the establishment of databases to which the public have access;
- publishing periodic reports on the state of the environment;
- promoting environmentally sound practices;
- promoting and co-ordinating environmental research;
- licensing all significant waste disposal and recovery activities, including landfills, and the preparation of a national hazardous waste management plan;
- implementing a system of permitting for the control of VOC emissions resulting from the storage of significant quantities of petrol at terminals;
- implementing and enforcing the GMO Regulations for the contained and deliberate release of GMOs into the environment;
- preparing and implementing a national hydrometric programme;
- implementing key reports of the Air and Water Framework Directives;
- drafting a National Allocation Plan for greenhouse gas emissions allowance trading; the establishment of a National Competent Authority for the issuing of trading permits and allowances to those covered by the scheme; the monitoring, overseeing and verification of emissions from participating companies; and the establishment of a National Emissions Trading Registry;
- preparing and implementing the National Waste Prevention Programme with specific focus on enterprise and local authority activities;
- enforcing producer responsibility obligations in relation to the management of waste electrical and electronic equipment (WEEE) and the restriction on hazardous substances (RoHS) in electrical and electronic equipment;
- co-ordinating the implementation of the EU ozone depleting regulation in Ireland;

and, under the Office of Environmental Enforcement, established in 2003 and dedicated to the implementation and enforcement of environmental legislation in Ireland:

- improving overall compliance with environmental protection legislation in Ireland;
- raising awareness about the importance of enforcement of environmental protection legislation in Ireland;
- enforcing IPPC licences and Waste licences issued by the EPA;
- auditing and reporting on the performance of local authorities in the discharge of their environmental protection functions, including:
  - enforcement in respect of breaches of waste permits,
  - taking action in relation to illegal dumping,
  - implementation of waste collection permits, and
  - enforcement of producer responsibility initiatives (for example, in the area of packaging waste);
- taking action against local authorities that are not discharging their environmental protection functions in an adequate manner;
- prosecuting, or assisting local authorities to prosecute, significant breaches of environmental protection legislation, in a timely manner; and
- assisting local authorities to improve their environmental protection performance on a case by case basis, through the establishment of an enforcement network to promote information exchange and best practice, and by the provision of appropriate guidance.

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Environmental Indicators for Ireland

Compiled by the
ENVIRONMENTAL INFORMATICS AND REPORTING UNIT

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PREFACE

Environment in Focus 06 is the third environmental indicator report prepared by the Environmental Protection Agency. The report sets out the current state of play, the trends over time, a commentary on the underlying causes of environmental damage or degradation and the potential consequences for the environment and human health. It also examines the main environmental challenges for the key economic sectors in Ireland. The aim of the report is to provide an overall picture of developments in the state of the environment using key indicators. These indicators should provide valuable information for policy makers both in developing new policies and in evaluating existing ones.

In our previous indicator report in 2002, the challenges we identified were meeting international obligations, particularly in relation to acidifying gases and greenhouse gas emissions to air and meeting obligations in relation to water quality. In addition, we identified the urgent need to modernise our waste management infrastructure and increase the use of the public transport system. The integration of biodiversity concerns into all relevant sectors was seen as a key feature of biodiversity policy. High priority also needed to be given to energy conservation and efficiency and to the further development of renewable energy sources.

Although Ireland has made some progress in the past four years in meeting the challenges, the nature of the big challenges remains essentially the same, necessitating sustained, and in some cases greater, efforts.

On acidifying gases, the attainment of the nitrogen oxide emission limit value by 2010 remains a significant challenge. The modest improvement in emissions of greenhouse gases reported in 2004 was not sustained in the following year. All of the requirements to date necessitated by the EU water framework directive have been met by Ireland. Efforts are now required in developing and implementing, in consultation with all stakeholders, the essential plans required to secure the objective of good status for all water bodies in the years ahead. Progress has been made in modernising our waste infrastructure in terms of available landfill and provision for thermal treatment capacity, along with much improved recycling facilities. Nonetheless, waste prevention, the cornerstone of waste policy, and halting illegal waste activities such as fly tipping and backyard burning remain a significant challenge.

Significant state funding has been committed from 2006 for public transport to provide much needed choice and an alternative to the private car, particularly in urban areas. Nonetheless, making transport users fully aware of the external costs of transport in terms of air pollution, noise and emissions of acidifying gases and greenhouse gases is essential in order to help change travel patterns and consumer purchasing habits. While our energy consumption per GDP is one of the lowest in Europe and growth in renewable energy has increased in recent years, Ireland is overly dependent on fossil fuels and imported energy. Though some progress can be reported on implementing the National Biodiversity Plan, much greater efforts are required if we are to play our part in achieving the EU target of halting biodiversity loss by the end of this current decade.

This report is published at a particularly timely moment when drafting of the new National Development Plan is underway. This provides a unique opportunity for integration of environmental considerations into sectoral policies. This report should provide valuable input into preparation of the National Development Plan so that the environment is factored more fully into our medium and long term goals and strategies.

Finally, a report of this nature would not be possible without the information provided by many different organisations along with EPA data sources. I would like to express my appreciation and thanks to all those who supplied data or expertise to produce this volume.

Mary Kelly

Director General

ACKNOWLEDGEMENTS

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Tom Stafford, Annmarie Tuohy, Gerard O'Leary, George McHugh, Yvonne Furlong and John Delaney.

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1. INTRODUCTION

Environmental indicators are key statistics that summarise a particular environmental issue. Their strength is in delivering concise scientifically credible information that can be readily accessed by decision makers. In essence their purpose is to simplify, to quantify and to communicate.

In 1999, the EPA published the first national environmental indicators report for Ireland, entitled *Environment in Focus*. The report provided an assessment and synopsis on the environment in Ireland through the use of key environmental indicators. A second report in the series was published in 2002, building on the indicators used in the 1999 report.

This present report, *Environment in Focus 2006*, is the third national environmental indicator report for Ireland. Its main objectives are:

- to inform the public and policy makers of the status of key environmental areas,
- to assess how this has changed over time,
- to evaluate progress in meeting our legal obligations,
- to outline key environmental challenges remaining within the sectors reviewed, and
- to help guide further environmental policy development where needed.

This report is divided into two parts: Part I, State of the Environment Indicators, focusing on the current state of the environment including sections on air, water, waste and land cover and biodiversity, and: Part II, Sectoral Environmental Indicators, which examine the main environmental issues within the transport, industry, energy, agriculture, forestry and fisheries sectors.

In all, 60 indicators are presented within this report. Where possible we have retained indicators used in the previous reports. Twenty-six of the indicators presented have been included in both previous reports and an additional 12 were presented in the last report (2002) and this report. We have also revisited 6 indicators which were presented in the 1999 report but which were not included in 2002. Sixteen new indicators have been included in this report which address areas of growing concern such as greenhouse gases and climate change, land use and transport.

For each indicator we include a brief comment, which represents our view on the trend or, where relevant, the actions required on that particular topic. In addition, at the end of each section we outline what we see as the key challenges for that sector. In doing so we identify the environmental issues and the actions now necessary to tackle the key challenges.

2. POPULATION AND THE ECONOMY

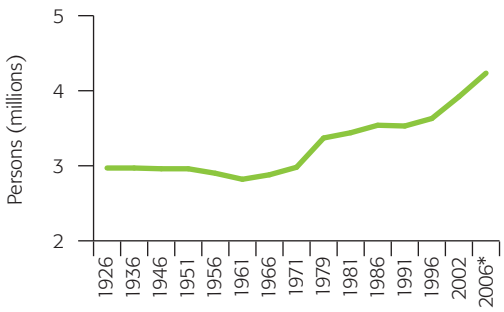
Preliminary totals for the 2006 census show that the population has reached 4.23 million people.

Our growing prosperity has increased the level of personal expenditure on goods and services and the potential for environmental damage.

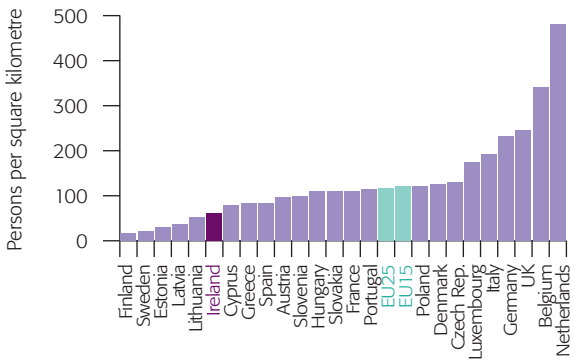
2.1 POPULATION

The preliminary totals for the 2006 census show that the population of the State has reached over 4.23 million people, as compared with 3.9 million people in 2002. The census figure represents an 8.1 per cent increase on the 2002 figure and is the highest population count since 1861. The greater part of the total increase (317,000) in the period was attributable to net inward migration estimated at 186,000 people, with natural population increases, births (245,000) in conjunction with deaths (114,000), accounting for an increase of 131,000. Despite the marked rate of Irish population increase (five times the EU average in the years 1990-2000) the population density (61 persons/km^2) of the State is still relatively low compared to that in other EU countries.

Census Population



Population Density



** Preliminary Totals.*
Source: CSO

Source: Eurostat NewCronos & FAO Area data 2002

The bulk of the increase in the national population has occurred in Leinster. The population of Leinster in 2006 (2.3 million) accounted for just over 54 per cent of the national total, with Munster (1.17 million) accounting for 27.7 per cent and Connacht with just over half a million people constituting 11.9 per cent. The three counties within Ulster accounted for 6.3 per cent (266 thousand) of the State's population.

The local authority areas that make up the greater part of the Dublin metropolitan area show little growth between 2002 and 2006 (Dublin City (+2%), Dún Laoghaire-Rathdown (+1%) and Dublin South (+3.4%)). However, population growth in counties immediately adjacent to the Dublin area was significantly above the national average of 8.1 per cent; Fingal (+22.1%), Meath (+21.4%) and Kildare (+13.5%).

A similar situation is evident in Cork and Limerick, where the population has decreased within the city boundaries while increasing significantly in adjacent county areas. In Cork, the city population fell by 3.2 per cent while the population of Cork county increased by 11.4 per cent, the fastest in Munster. In Limerick City the population fell by 2.7 per cent with a concomitant 8.3 per cent increase in the county population. Galway City population growth moderated to 9.3 per cent between 2002 and 2006 while Galway county experienced an 11 per cent increase.

These figures illustrate the growing influence of urbanisation on the national population distribution, at least from the 1960s. It is notable that the proportion of the State's population located in urban centres increased from 32 per cent at the time of the 1926 census to 60 per cent in 2002. In addition, the figures for the counties around Dublin reflect the increasing difficulty for people employed in the metropolitan area in finding affordable accommodation there, leading to the large-scale development of housing in the nearer provincial towns. In general, urbanisation carries a risk of environmental damage, arising in particular from increased traffic flows and the need for increased water supplies, sewerage and waste disposal facilities.

2.2 THE ECONOMY

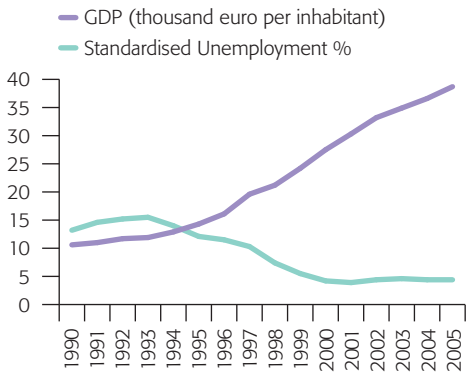
This section is not an exhaustive review of the subject matter and is intended only to put the indicators that follow in this publication into context.

Ireland has had rapid economic growth in recent years. In 2004 Ireland's Gross Domestic Product (GDP) stood at €148 billion or €36,000 per person, the second highest in Europe (after Luxembourg). When Ireland joined the EEC in 1973, it was its poorest member. Economic growth remains strong in Ireland with GDP growth of 4.7 per cent in 2005, almost 4 times higher than that of the Eurozone (1.3% over the same period).

It should be noted, however, that while GDP for larger European nations such as the UK, Germany and France is broadly equivalent to their Gross National Product (GNP), a measure of national income, this is not the case for Ireland. As a result of a successful campaign to attract inward investment, a large proportion of Ireland's key industry sectors, such as pharmaceuticals, electronics and medical devices, is foreign owned. A proportion of profits from such companies is repatriated to their parent company and nation. This in effect means that Ireland's GDP exceeds its GNP by between 20 to 25 per cent.

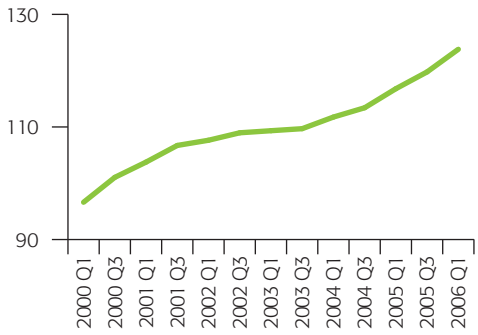
One of the most striking results of our recent economic success is the rapid reduction in the number of people unemployed, from a high of 302,178 on the Live Register in January 1993, to current levels of 152,560 (June 2006). When the figure is annualised and taking population growth into account this equates to a fall from 15.5 per cent unemployed in 1993 to 4.4 per cent in 2005.

GDP and Unemployment



Source: CSO

Seasonally Adjusted Volume Indices of Retail Sales (excluding Motor Trade) (2000 = 100)



Source: CSO

The growing prosperity of the State in the past decade is clearly reflected in the level of personal expenditure on goods and services, which increased by nearly 60 per cent between 1995 and 2002. For many, increased spending resources are used to purchase consumer goods, holidays and, in particular, new cars. Recent statistics from the CSO on Retail Sales (excluding motor trade) show that in 2005 sales volumes grew by about 5 per cent on a year on year basis and by approximately 20 per cent since 2000. This figure excludes motor trades which are also growing rapidly, with new car registrations increasing by 11.3 per cent in 2005. Early indications for 2006 suggest that private car sales will increase substantially on 2005 figures.

In summary, there are more people living in Ireland than there have been over the past 100 years, and we are generating more wealth than ever before. In economic terms the situation is extremely positive; what follows is an examination of the environmental trends that have occurred in recent years and the impact of our growing prosperity on the environment.

3. AIR

Emissions of pollutants from road traffic are one of the main threats to air quality in Ireland and contribute significantly to increases in GHG emissions.

In the absence of significant reduction of nitrogen oxides from the road transport sector, which have grown rapidly over the past decade, Ireland is unlikely to meet its commitments under the National Emissions Ceilings (NEC) Directive by 2010.

Substantial investment is required to reduce emissions of greenhouse gases to the atmosphere, and to adapt to the adverse impacts of unavoidable climate change.

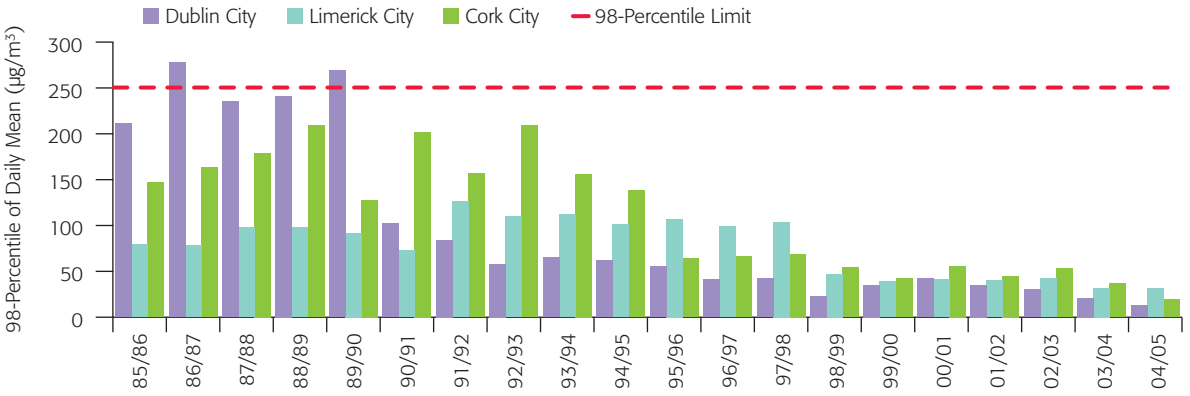
3.1 AIR QUALITY – BLACK SMOKE

Black smoke consists of fine solid particles suspended in air, which mainly arise from the incomplete burning of fossil fuels such as coal, oil and peat, in the domestic, industrial or transport sectors. Open fires in dwelling houses are a major source of the particulate material emitted to air as smoke. The main concern associated with particulates is their potential effect on human health, notably the respiratory system, as particles of small size can be inhaled into and deposited in the respiratory system and remain there for long periods of time.

Legislation

Black smoke measurements were the main method used to assess ambient particulate matter (PM) levels in Ireland up to 2005. The black smoke standards were based on Directive 80/779/EEC (CEC, 1980) in which the values are specified for annual (April to March), winter (October to March), and daily reference periods. The Directive also specifies guide values in respect of the mean for daily and annual averaging periods, intended for the further protection of human health and the environment. The annual 98-percentile limit for black smoke was 250 µg/m^3.

Black Smoke Concentrations in Major Urban Areas



Source: EPA

Trend over time

98-percentile smoke concentrations across the Dublin, Limerick and Cork monitoring networks from 1985 to 2005 are shown above. Smoke levels across all the networks have reduced significantly since the 1990s and have stabilised well below the 98 Percentile Limit. This reduction underlines the effectiveness of smoke control legislation introduced in the Greater Dublin area in 1990, which banned the marketing, sale and distribution of bituminous coal. This ban now covers Cork City (since 1995) Arklow, Drogheda, Dundalk, Limerick, Wexford (since 1998) Celbridge, Galway, Leixlip, Naas, Waterford (since 2000) Bray, Kilkenny, Sligo and Tralee (since 2003).

Comment

A significant improvement in urban air quality is evident from the black smoke measurements. This shows the success of national regulatory measures such as the ban on the sale of bituminous coal in a number of cities and large towns. Black smoke is an important component of PM_{10} and the reductions achieved in the 1990s mean that current ambient PM_{10} levels are relatively low.

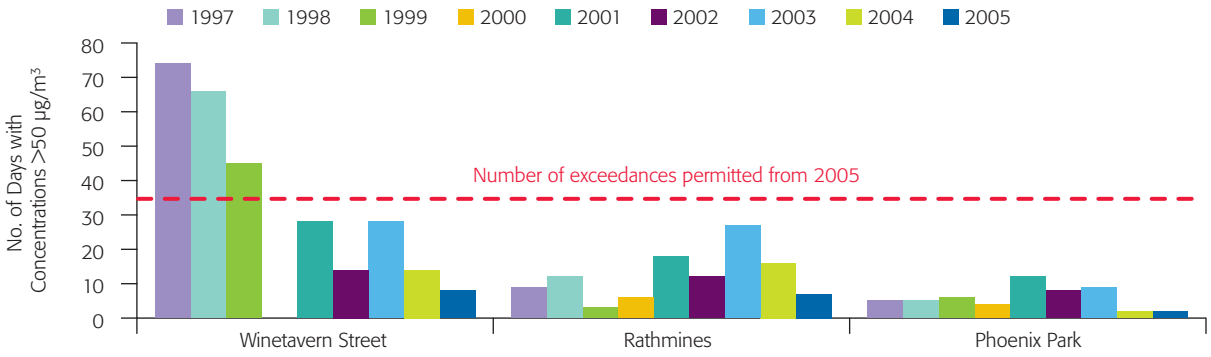
3.2 AIR QUALITY – PARTICULATE MATTER (PM_{10})

Particulate Matter (PM) less than ten micrometres in size (PM_{10}) can penetrate deep into the respiratory system increasing the risk of respiratory and cardiovascular disorders. PM_{10} arises from direct emissions of primary particulate such as black smoke and formation of secondary PM in the atmosphere by reactions of gases such as sulphur dioxide and ammonia. The main sources of primary PM_{10} are incomplete burning of fossil fuels such as coal, oil and peat and emissions from road traffic, in particular diesel engines. Other sources of particulates include re-suspended dust from roads. Natural PM includes sea-salt and organic materials such as pollens. The diverse sources and impacts of PM make it one of the most challenging issues to address.

Legislation

In 2005 the black smoke standards were replaced by PM monitoring requirements based on Directive 1999/30/EC (CEC, 1999). This Directive established limit values for PM_{10} mass concentration levels. The PM_{10} daily mean limit of 50 µg/m^3 should not be exceeded more than 35 times per calendar year. The annual mean PM_{10} limit value is 40 µg/m^3.

PM_{10} Concentrations greater than 50 µg/m^3 in Dublin



Source: EPA

Trend over Time

The number of days exceeding 50 µg/m^3 recorded at Winetavern Street, Rathmines and the Phoenix Park in Dublin from 1997 to 2005 are shown above. Concentration levels have decreased significantly at Winetavern Street since 1997 and have met the standard since 2001. Concentrations recorded at the suburban site in Rathmines increased over the initial monitoring period but have steadily declined since 2003. Significantly lower concentrations were recorded at the urban background station located in the Phoenix Park site over the same period.

Comment

Elevated PM levels can occur if meteorological conditions favouring poor dispersion of local emissions persist for an appreciable length of time, i.e. days to weeks. These types of events occur during stable warm or cold periods, which are often associated with conditions that favour transport of air from other European countries to Ireland. These air masses typically contains high concentrations of pollutants such as PM and contribute to increased levels across Ireland.

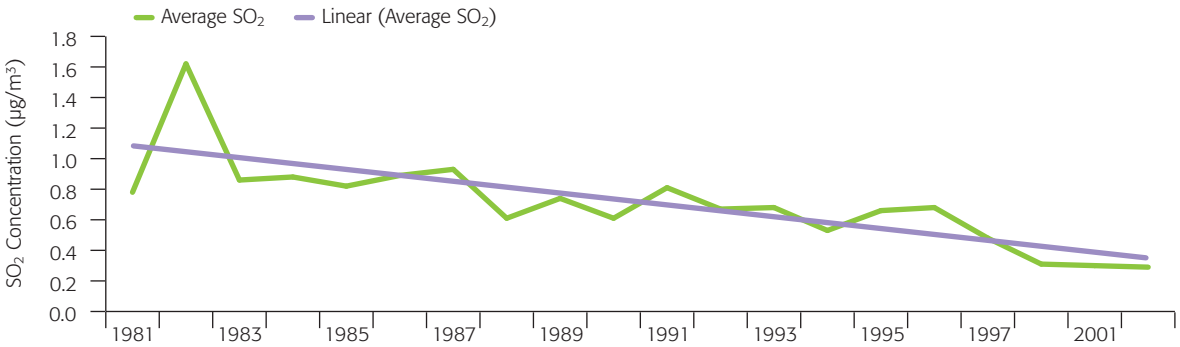
3.3 AIR QUALITY – SULPHUR DIOXIDE (SO_2)

Sulphur dioxide (SO_2) is formed when fuel (mainly coal, peat and oil) containing sulphur is burned at power plants and elsewhere. High concentrations of SO_2 can result in temporary breathing impairment for asthmatics. SO_2 is a major precursor to acid rain, which is associated with the acidification of soils, lakes, and streams and accelerated corrosion of buildings and monuments.

Legislation

Directive 1999/30/EC (CEC, 1999) established an hourly limit of 350 µg/m^3 and an annual mean limit of 20 µg/m^3 in respect of SO_2. No more than 24 exceedances of the hourly limit values are allowed per year. Both limit values came into force on 1 January 2005.

Annual Average SO_2 Concentrations at Valentia



Source: Met Éireann

Trend over Time

Annual average SO_2 concentrations are recorded at the Met Éireann Observatory in Valentia, Co Kerry. As well as being a national regional background observations site, it is also part of a European wide pollutant monitoring network. The results indicate that SO_2 levels have significantly declined at this location. This reflects a general decline at measurement sites in Ireland and over Europe.

Comment

Significant reductions in ambient SO_2 levels have been observed due to fuel switching and the use of technologies to reduce end-of-pipe SO_2 emissions.

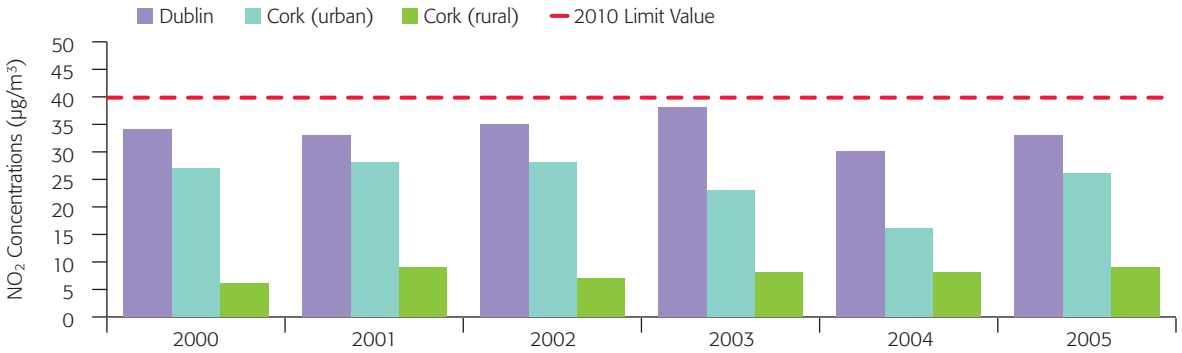
3.4 AIR QUALITY – NITROGEN OXIDES (NO_X)

Nitrogen oxides include nitric oxide (NO) and nitrogen dioxide (NO_2), which are produced by high temperature combustion such as occurs in power generation plants and motor vehicles. NO_X contributes to the formation of acid rain and is also a recognised ozone precursor. Short-term exposure to NO_2 is associated with reduced lung function and airway responsiveness, and increased reactivity to natural allergens. Long-term exposure is associated with increased risk of respiratory infection in children.

Legislation

Directive 1999/30/EC (CEC, 1999) established an hourly limit of 200 µg/m^3 and an annual mean limit of 40 µg/m^3 in respect of NO_2. No more than 18 exceedances of the hourly limit values are allowed per year. Both limit values come into force on 1 January 2010.

Annual Mean Levels of NO_2



Source: EPA

Trend over Time

The annual average NO_2 concentrations recorded at urban locations at Winetavern Street in Dublin and at Old Station Road in Cork and at a rural station at Glashaboy, Co. Cork from 2000 to 2005 are shown above. The results indicate that NO_2 levels in urban areas, particularly Dublin, are close to the 2010 air quality standards.

Comment

Continued increase in NO_X emissions within urban centres may give rise to breaches of the limit. Although NO_X emissions from individual vehicles continue to fall as a result of technological advances and cleaner fuel, improvements to date have been largely offset by the significant increase in the number of vehicles on the road. The achievement of the NO_2 standards in urban areas will therefore depend largely on the effectiveness of traffic management measures and on the degree to which further growth in road traffic can be curtailed in cities.

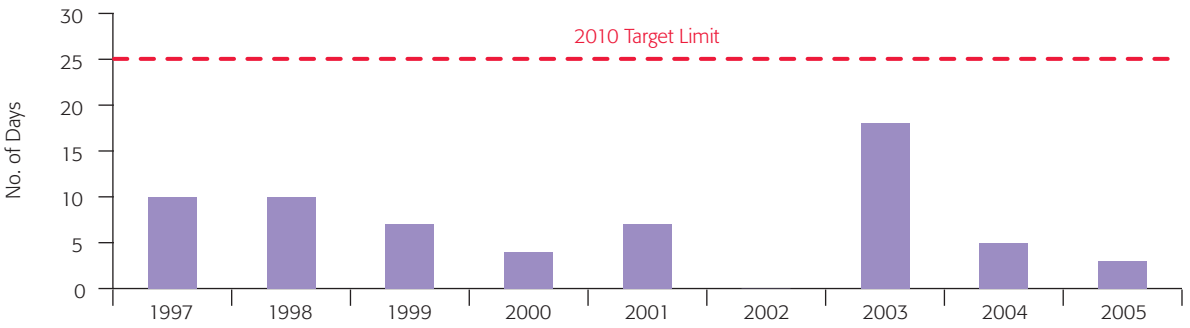
3.5 AIR QUALITY – GROUND LEVEL OZONE (O_3)

The formation of ground level ozone (O_3) is complex. It is formed from reactions between pollutants such as NO_X, carbon monoxide and various volatile organic compounds (VOCs) in the presence of sunlight. Ozone is also a transboundary pollutant whose impacts mainly affect central and southern Europe during the summer months. Ozone levels over Ireland can be influenced by the transport of pollutants from other European regions and across the Atlantic from North America. High concentrations of ground level ozone can affect the functioning of the respiratory system and damage crops and other vegetation.

Legislation

Directive 2002/3/EC relates to ozone in ambient air (CEC, 2002) and incorporates specific EU ozone target levels for the first time in addition to hourly thresholds. The maximum daily 8-hour mean concentration, determined from 8-hour running averages over the day, is the parameter on which the EU ozone target value for the protection of human health is based. The target value for 2010 is that the maximum daily 8-hour mean concentration should not exceed 120 µg/m^3 on more than 25 days per calendar year averaged over 3 years.

Number of Days with Ozone Concentrations greater than 120 µg/m^3



Source: EPA

Trend over Time

Ozone pollution is a transboundary problem that continues to affect large parts of Europe in summer months. When compared with mainland Europe, Ireland does not experience notable ozone pollution, however, levels can rise significantly when summer temperatures increase. Ozone concentrations recorded in 2005 were similar to those measured in 2004. The new 2010 8-hr target value of 120 µg/m^3 for the protection of human health was exceeded on 2 days at Valentia, Co. Kerry and 1 day at Kilkitt, Co. Monaghan, in 2005, both well within the 25 days which are permitted under the Directive.

Comment

The hourly information threshold for human health protection of 180 µg/m^3 was exceeded at a number of locations in Ireland on the 18th and 19th July in 2006. Levels returned below the threshold on the 20th and have remained below the threshold since then. The very young, the very old and those with respiratory problems should avoid strenuous activity when levels are high (>180 µg/m^3). Short-term acute ozone pollution episodes are not a common feature of Ireland's air quality. However, if trends in background levels continue to rise this may pose future problems for human health and vulnerable crop species.

3.6 AIR EMISSIONS – SULPHUR DIOXIDE (SO_2)

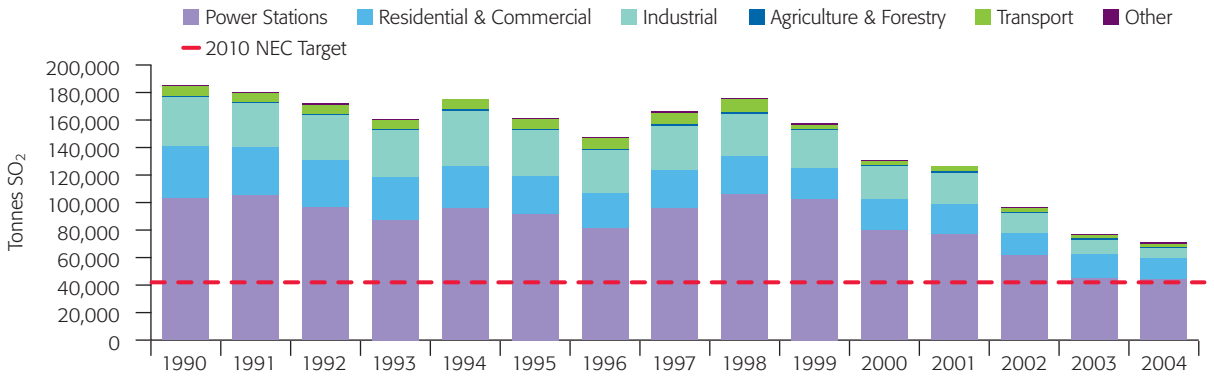
The emissions of a variety of substances into the atmosphere are subject to legally binding limits under relevant international agreements entered into by the State. These substances include greenhouse gases, key acidifying gases and ozone pre-cursors. The remaining indicators in this chapter deal with emissions levels in the context of their relevant national emissions ceilings.

Together SO_2 and NO_X are the major pre-cursors to acid rain, which is associated with the acidification of soils, lakes and streams and accelerated corrosion of buildings and monuments.

Legislation

The EU National Emissions Ceilings (NEC) Directive has set a target of 42 thousand tonnes of SO_2 emissions in Ireland by 2010. This is equivalent to a 77 per cent reduction in emissions from the 185 thousand tonnes 1990 baseline figure.

Trends in SO_2 Emissions



Source: EPA

Trend over Time

Power stations remain the principal source of SO_2 emissions, contributing approximately 62 per cent of the total in 2004, even though emissions in this sector decreased by 57 per cent from 1990. Combustion sources in the industrial and residential/commercial sectors account for a significant proportion of emissions, with contributions of 10 and 23 per cent, respectively in 2004. The remainder of emissions are from agriculture, forestry, road transport, railways and international aviation. The emissions from industrial sources decreased by 80 per cent from 1990 while the emissions in the residential and commercial sectors decreased by approximately 58 per cent.

Comment

Ireland has made significant progress towards achieving the SO_2 NEC target. Reductions corresponding to 62 per cent have been achieved from 1990 to 2004. More advanced technology-based controls are planned to further reduce emissions.

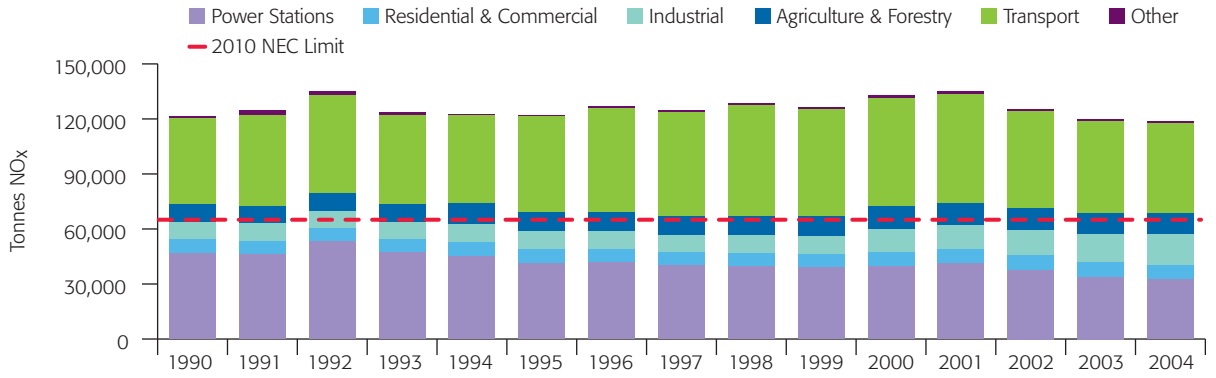
3.7 AIR EMISSIONS – NITROGEN OXIDES (NO_X)

Power generation plants and motor vehicles are the principal sources of nitrogen oxides (NO_X), through high-temperature combustion.

Legislation

The EU NEC Directive has set an emission target of 65 thousand tonnes of NO_X in Ireland by 2010. Achieving this target will require a 47 per cent reduction from the 1990 baseline emission figure of 122 thousand tonnes.

Trends in NO_X Emissions



Source: EPA

Trend over Time

NO_X emissions in Ireland have remained relatively constant since 1990. The latest figures indicate a marginal decrease from 121,716 tonnes in 1990 to 118,954 tonnes in 2004. The transport sector, which mainly consists of road transport emissions, is the principal source of NO_X emissions, contributing approximately 41 per cent of the total in 2004. The power generation sector is the other main source of NO_X emissions, accounting for 27 per cent of emissions in 2004.

The application of low-NO_X burner technology in several major power stations and the increased use of natural gas have reduced NO_X emissions from electricity generation by 30 per cent from 1990, even though electricity demand has increased by 59 per cent over the same period. The remainder of NO_X emissions emanate from the industrial, agriculture and residential/commercial sectors, which together produced 32 per cent of the total in 2004.

The benefits achieved by the installation of catalyst controls in cars and heavy-duty vehicles, which achieved substantial reductions in NO_X emissions from road transport from the mid-1990s, have been offset by the large increases in traffic volumes and the associated fuel use. The trend in NO_X emissions from road transport has been exaggerated somewhat in latter years by so-called 'fuel tourism', whereby a significant proportion of the automotive fuels sold in Ireland are used by vehicles in the UK and other EU countries. The proportion was estimated to be approximately 12 per cent for petrol in 2001-2004 and averaged 25 per cent in the case of diesel in the same period.

Comment

The increase in vehicle numbers and in road transport in general is sustaining emissions of NO_X even though improved technologies are reducing the emissions from individual vehicles. Progress toward the NO_X ceiling of 65 kt has therefore been limited. Meeting this target largely depends on future reduction in the emissions from road traffic and on the widespread application of control technologies in the electricity and industrial sectors.

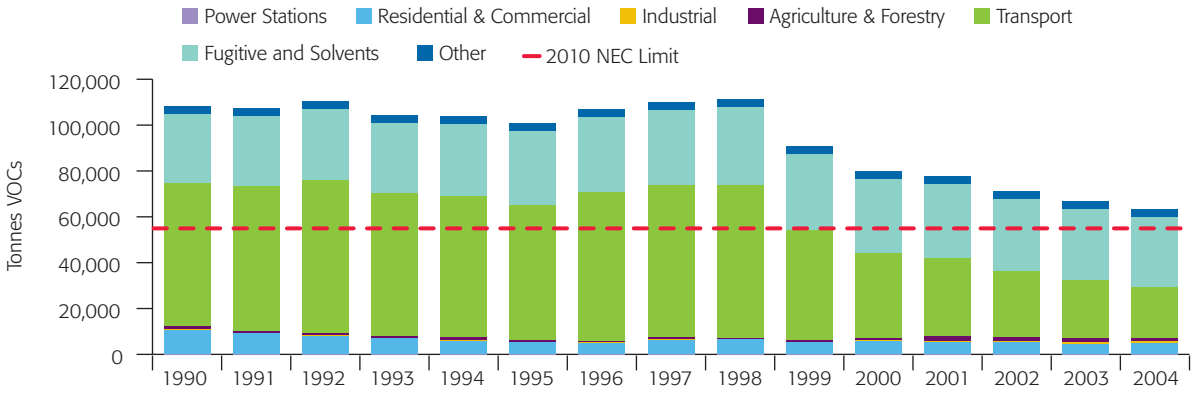
3.8 AIR EMISSIONS – VOLATILE ORGANIC COMPOUNDS

Volatile organic compounds (VOCs) are emitted as gases by a wide array of products including paints, paint strippers, glues, adhesives and cleaning agents. They also arise as a product of incomplete combustion of fuels and as such are a component of car exhaust emissions.

Legislation

The EU NEC Directive has set a target of 55 thousand tonnes of VOC emissions in Ireland by 2010. This is equivalent to a 49 per cent reduction in emissions from the 108 thousand tonnes 1990 baseline figure.

Trends in VOC Emissions



Source: EPA

Trend over Time

The main sources of VOC emissions in Ireland are transport and solvent use. These sources produce over 80 per cent of the annual total. Coal burning in the residential sector is another important but declining source as coal consumption decreases. Significant progress has been made in achieving the VOC NEC target, with reductions corresponding to 42 per cent being achieved from 1990 to 2004. Technological controls for VOCs in motor vehicles, which have led to a significant reduction in emissions from road transport, have largely been responsible for the decrease in overall emissions. Paint application and the domestic use of various solvent-based products account for most of the emissions in the 'other' category.

Comment

Further reduction in VOC emissions depends largely on the speed of implementation of a range of legislative controls relating to hydrocarbon emissions from road vehicles and on the reduction of emissions of solvents and related products from a wide variety of activities including painting, printing, dry-cleaning and the domestic use of solvents, for which the emissions are generally not well quantified.

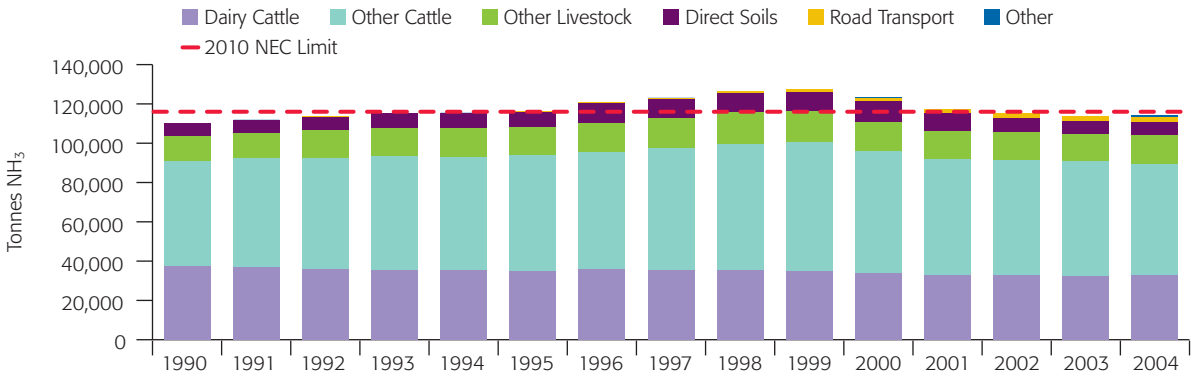
3.9 AIR EMISSIONS – AMMONIA (NH_3)

The agriculture sector accounts for virtually all ammonia (NH_3) emissions in Ireland. Grasslands ultimately receive the bulk of the 60 million tonnes (Mt) of animal manures and farm effluents produced annually in Ireland along with some 300,000 tonnes of nitrogenous fertilisers. A proportion of the nitrogen in these inputs is volatilised into the air as ammonia.

Legislation

The EU NEC Directive has set a target of 116 kt of NH_3 emissions in Ireland by 2010. This is equivalent to a 5 per cent permitted increase in emissions from the 110 kt 1990 baseline figure.

Trends in NH_3 Emissions



Source: EPA

Trend over Time

Animal manures produce about 85 per cent of ammonia emissions in agriculture and chemical fertilisers account for the remainder. It is estimated that approximately 17 per cent of the nitrogen in animal wastes and 4 per cent of nitrogen contained in chemical fertilisers is lost to the atmosphere as NH_3. The NH_3 emissions trend is largely determined by the cattle population and showed a steady increase up to almost 127,000 tonnes in 1999. There has been some decline in the populations of cattle and sheep since 1999, as well as a decrease in fertiliser use, which contributed to a downturn in NH_3 emissions in the period 2000 to 2003. The emissions in 2004 were 114,272 tonnes, 4 per cent higher than in 1990.

Comment

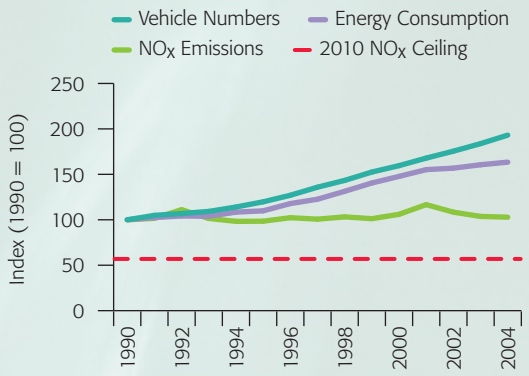
At 114 kt in 2004, the emissions of NH_3 are already compliant with the 2010 ceiling limit. It is anticipated that this position can be maintained into the future under if the reduction in national herd numbers envisaged as a result of decoupling of farm subsidies is achieved.

3.10 KEY CHALLENGES – AIR QUALITY

Acidifying Gases – NO_X

The reduction of NO_X emissions and the attainment of the NO_X ceiling under the NEC Directive in 2010 is a major challenge. The transport and power generation sectors are the major contributors of NO_X emissions. The increase in vehicle numbers, and in road transport in general, is sustaining emissions of NO_X, despite improved technologies that reduce emissions from individual vehicles. Should the current trends continue Ireland will not achieve the 65 kt limit set out in the NEC Directive by 2010.

Vehicle Numbers, Energy Consumption and NO_X Emissions



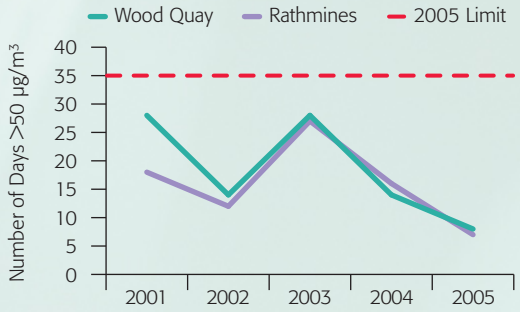
Source: EPA, SEI, DEHLG

Air Quality – PM_{10}

The key challenge in relation to air quality is to ensure compliance with the daily and annual limit values for particulate matter (PM_{10}). Levels have approached the limit values in recent years and there is a risk that limits could be exceeded in urban areas. PM_{10} levels vary significantly depending on meteorological conditions. As such, average levels need to be well below the limit to ensure that compliance is maintained.

Traffic is the main local source of this pollutant in urban areas, therefore maintaining compliance with the limit is largely dependent on the effectiveness of traffic management measures currently being developed and deployed in Irish towns and cities.

Daily PM_{10} Exceedances

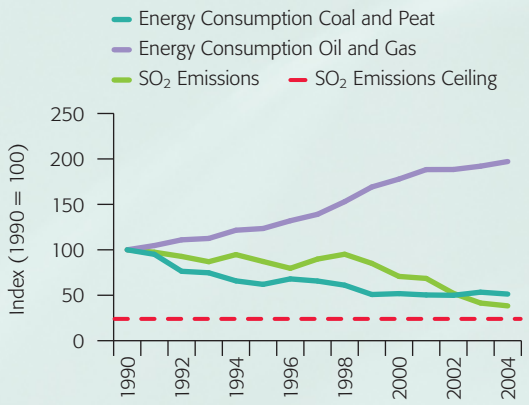


Source: EPA

Acidifying Gases – SO_X

Significant progress has been achieved in relation to achieving the NEC limit for SO_2. The reductions have been made through fuel switching from high sulphur containing fossil fuels in favour of natural gas and coal. Further SO_2 emissions reductions through the use of natural gas and low-sulphur fuel oils are now limited, which means that more advanced technology-based controls are necessary. Flue-gas desulphurisation (FGD) is planned at Moneypoint coal-fired power station, to comply with the SO_2 ceiling of 42 kt in 2010. There has been successful decoupling of SO_2 emissions from energy production.

Energy Consumption by Fuel and SO_2 Emissions



Source: EPA, SEI

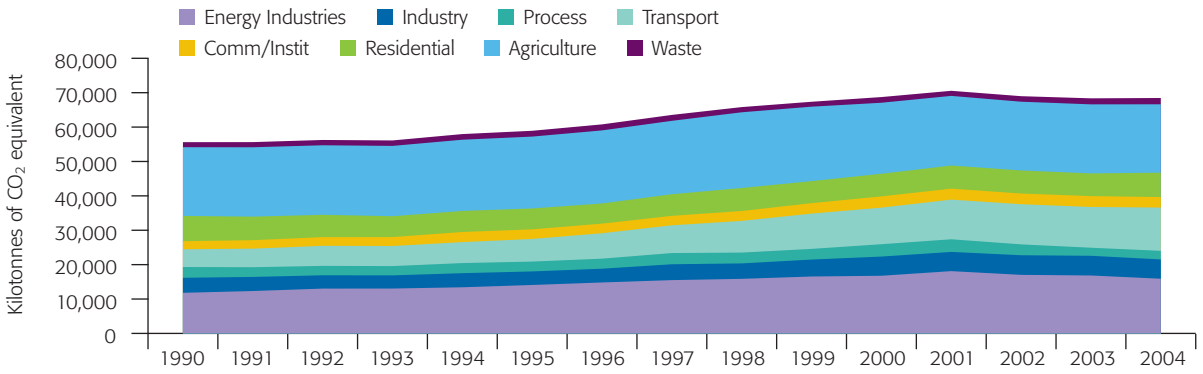
3.11 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

Increased levels of atmospheric greenhouse gases (GHGs) such as carbon dioxide (CO_2) act to enhance the natural greenhouse effect and cause climate change. Carbon dioxide arises from the burning of fossil fuels and land use changes. Other GHGs include methane (CH_4), from agriculture and waste sectors and nitrous oxide (N_2O), primarily arising from agriculture. Industrial gases including chlorofluorocarbons (CFCs) hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) also act as powerful greenhouse gases but are emitted in much smaller quantities.

Legislation

The UN Framework Convention on Climate Change objective is to stabilise atmospheric greenhouse gases at a level that would prevent dangerous interference with the climate system. The Kyoto Protocol is a step in achieving this objective. It established emissions reduction targets for developing countries. Ireland's emission target for the basket of six GHGs is to limit the increase in their combined emissions during the five-year period 2008-2012 to 13 per cent above 1990 levels.

GHG Emission Estimates 1990 to 2004



Source: EPA

Trend over Time

Following two successive years of reductions there was a slight increase in overall emissions of GHGs in 2004. The latest trend data show that emissions of GHGs increased by 23.1 per cent from 55.61 Mt of CO_2 equivalent in 1990 to 68.46 Mt in 2004. The most significant and sustained increase in emissions has been in the transport sector. For the sector overall, the emissions are well over double what they were in 1990 (an increase of 144 per cent). This increase is due almost entirely to road transport and it occurred mainly between 1994 and 2004, when emissions increased from 5.66 Mt to 12.13 Mt of CO_2 equivalent.

Emissions from the energy industries sector in 2004 were almost 35 per cent above 1990 levels, but a downward trend is evident since 2001. Emissions in the agriculture sector increased over the course of the 1990s but have reduced since the end of that decade, due to a decline in both livestock populations and fertiliser use, with the net result that emissions from agriculture in 2004 were marginally lower than in 1990.

The variations in emissions from the residential sector over the period reflects a shift from coal and peat to oil and natural gas, tending to reduce emissions, but countered, particularly in more recent years, by increases in population and housing stock, tending to increase emissions.

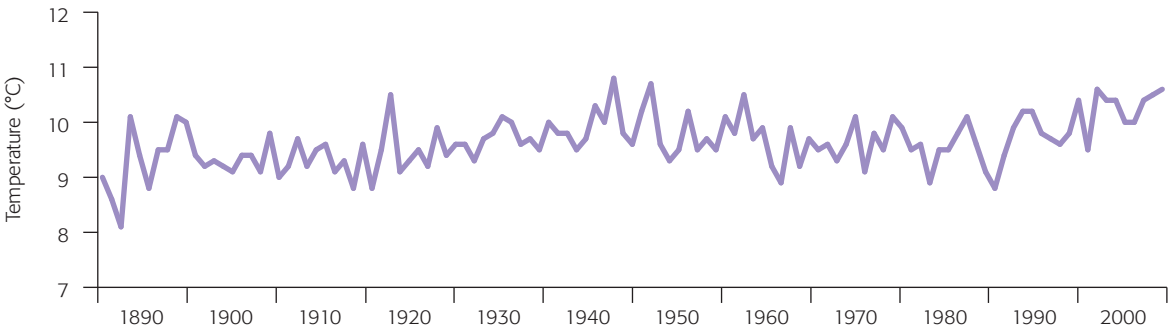
Comment

Ireland's total allocation of GHGs for the five-year period 2008-2012 will be 315 Mt CO_2 equivalent, i.e. an average of 63 Mt per annum over the period. In order to meet this target, significant investment is required to reduce emissions. Investment at home will reduce the requirement to purchase certified emissions reduction credits through the flexible mechanisms provided for under the Kyoto Protocol.

3.12 TEMPERATURE

The trend in global temperatures provides the clearest signal that GHGs are trapping more energy in the atmosphere. This is sometimes referred to as global warming. The global average temperature is estimated to have increased by 0.6°C since the industrial revolution. Globally the 1990s were the warmest decade of the last millennium.

Trends in Average Temperature in Ireland



Source: Met Éireann

Trend over Time

The graph shows the mean annual air index derived from the average temperature since 1890 for the four long-term stations in Ireland – Malin Head, Valentia, Birr, and Armagh.

The temperature record shows considerable inter-annual variability. However, the trend in the average temperature record for Ireland is similar to that observed globally. The average temperature in Ireland increased by 0.7°C during the period 1890-2004, at an average rate of 0.06°C per decade. In Ireland this warming is most evident during the periods 1910 to 1949 and 1980 to 2004. The temperature increase in the latter period has been larger, and the rate of increase more rapid than in the 1910-1949 period.

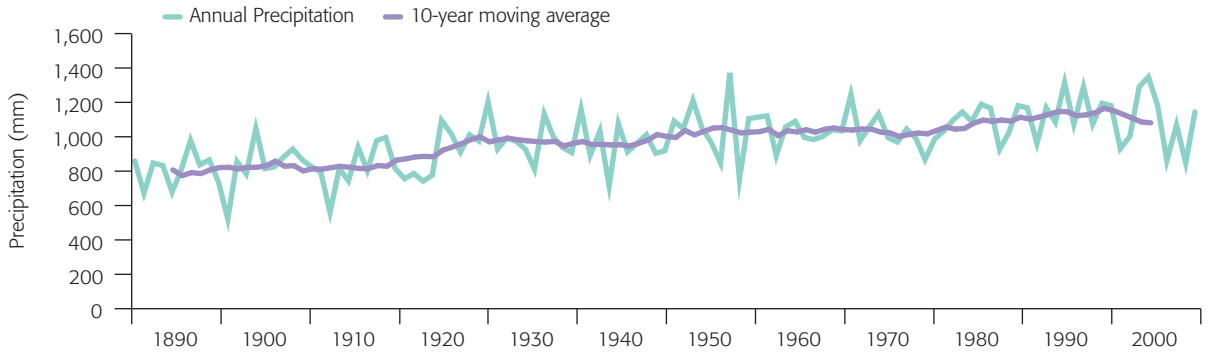
Comment

Climate models suggest that at current atmospheric GHG levels global temperature will increase by a further 0.6°C over the coming decades. The Intergovernmental Panel on Climate Change (IPCC) reports indicate that severe climate change impacts will increase significantly if global temperatures increase by more than 2°C above pre-industrial times.

3.13 PRECIPITATION

Climate change will cause changes in weather patterns including the amounts and characteristics of precipitation. Precipitation in Ireland is generally in the form of rain or drizzle, with hail and snow accounting for very small percentages of annual totals. An intensified hydrological cycle, i.e. heavier rain over short periods is expected.

Trends in Annual Precipitation at Malin Head



Source: Met Éireann

Trend over Time

Rainfall levels at Malin Head in Co. Donegal are highly variable. However, the data show a significant increase in rainfall levels over more than a century at this location. An index of total annual precipitation for Ireland, based on averaging 11 of 14 weather stations, shows a general trend of increasing precipitation over a 40-year period, with notable increases since the 1970s. However, 2001 and 2003 were two of the driest years recorded since 1960. An increased gradient in precipitation with wetter winters and drier summers, particularly in the south-east, is becoming evident from the meteorological records.

Comment

Climate change signals are evident in meteorological records and in ecosystem changes. These changes are projected to increase over the next decades regardless of international action to reduce GHG emissions. Investment in adaptation measures will be required to reduce the adverse impact of unavoidable climate change, e.g. infrastructural investment including water management systems to deal with more intense floods and droughts.

3.14 KEY CHALLENGES – GHGs

GHGs – Meeting the Kyoto Target

Meeting international commitments on GHGs is one of the key environmental challenges facing Ireland. In 2004, Ireland's GHG emissions were 23.1 per cent higher than in 1990. The most significant and sustained increase in emissions has been in the transport sector. For this sector overall, emissions are well over double what they were in 1990. Emissions from energy industries in 2004 were almost 35 per cent above 1990 figures but a downward trend is evident since 2001. Opportunities for reduction on a sector-by-sector basis must be identified and delivered. Investment is therefore required to reduce emissions to meet our Kyoto protocol target of 13% above 1990 emissions.

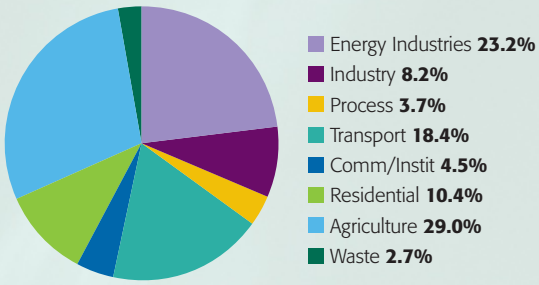
GHGs – Development of Adaptation Measures for Dealing with Inevitable Climate Change

Even if we reduce GHG levels now, some impacts of climate change are unavoidable. These include increased risk of run-off flooding due to intense rain events: coastal flooding due to sea-level rise and storm surge intensity, water shortages, and impacts on agriculture and biodiversity.

Adaptation to these changes will be a major challenge. Ireland, along with other countries, will need to develop strategies to reduce the adverse impacts of climate change.

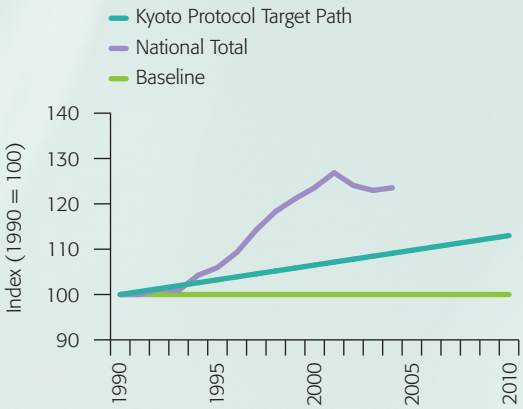
Current analysis of future climate projections indicates that additional investment in flood prevention schemes, sea-walls, water management and irrigation systems will be required. Engineering solutions will not always be possible. It will be necessary to identify vulnerabilities to climate change and associated risks.

Sectoral Breakdown of Greenhouse Gas Emissions in 2004



Source: EPA

Distance from Kyoto Protocol Target Path for Ireland



Source: EPA

4. WATER

Municipal sewage and diffuse agricultural sources continue to be the main threat to the quality of Ireland's surface waters.

Measures to improve water quality need to be put in place quickly in order to achieve the Water Framework Directive's targets.

River Basin Management Plans currently being developed will be the main vehicle for achieving improved chemical and ecological status of our waters.

4.1 RIVER WATER QUALITY

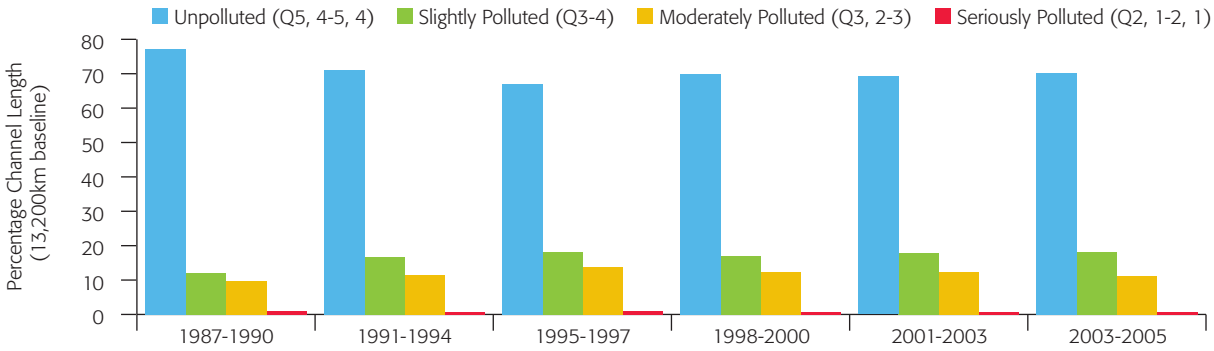
Ireland is fortunate in having a relatively abundant supply of fresh water, which constitutes a key resource in economic, amenity and aesthetic terms. Approximately 50 per cent of the land area of the State is drained by just nine river systems.

Legislation

The principal legislation governing water quality in Ireland is the European Communities (Water Policy) Regulations 2003 (S.I. 722 of 2003), which transposed Directive 2000/60/EC (the Water Framework Directive, WFD) into Irish law. The WFD sets out that a Member State shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water, and shall protect, enhance and restore all bodies of surface water with the aim of achieving good status by 2015.

River water quality is also governed in Ireland by the Phosphorus Regulations, prepared under Article 4(4) of the Local Government (Water Pollution) Act, 1977. The Phosphorus Regulations require that river water quality be maintained or improved by reference to a phosphorus standard or the biological quality ratings.

River Water Quality (13,200 km baseline)



Source: EPA

Trend over Time

Based on a baseline network of 13,200 km, the proportion of river and stream channel length with an overall satisfactory water quality status has increased by one percentage point in the latest period (70.2%) compared to the previous period of assessment (69.2%). There was a reduction (–1.2%) in the moderately polluted length but a small increase in the proportion of slightly polluted channel (+0.2%). In contrast, the overall proportion of seriously polluted channel has remained unchanged between the two periods.

Comment

The majority of the recorded instances of slight and moderate pollution can be attributed to the impact of nutrients inputs from agriculture and municipal sources. The main effect of these contributions is eutrophication (i.e. the enrichment of water by nitrogen and phosphorus, which are plant nutrients, leading to excessive plant and algal growth).

Good status as defined by the WFD equates approximately to Q4 in the national scheme of biological classification and is required to be achieved for those river water bodies of lesser status by 2015. Based on the most recent evaluation, 70.2 per cent of the river channel length would achieve this target. However, significant efforts are required to improve the remaining 29.8 per cent. An even greater challenge will be to prevent the deterioration of the Q5 and Q4-5 channels, which equate to high-status sites under the WFD, and which have continuously been lost since reporting was established in the 1970s. The reduction in the highest quality Q5 stations is of particular concern: where the number of Q5 sites has almost halved between the reporting periods 1995-1997 and 2001-2003, with a decrease from 4.6 per cent to 2.7 per cent of all river stations.

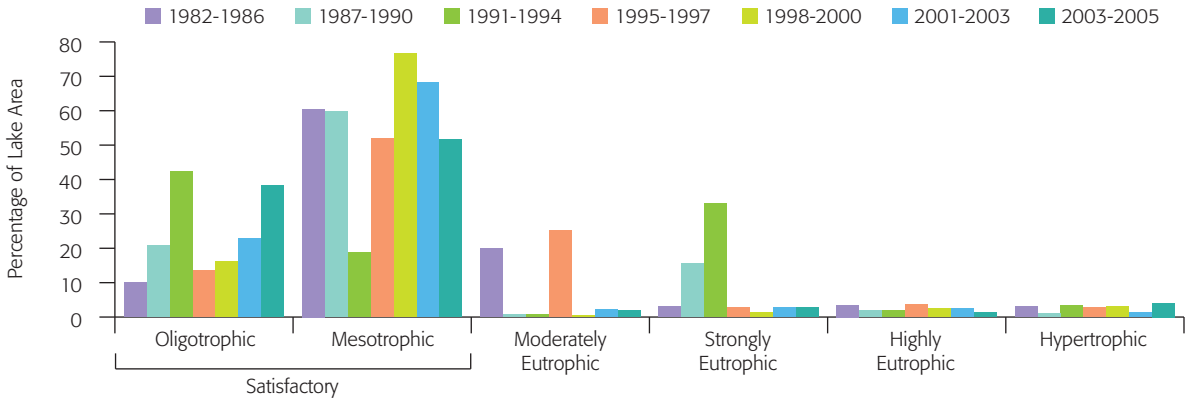
4.2 LAKE WATER QUALITY

Lakes are a national asset on which we depend for many services and amenities. They are an important source of drinking water, water used in industry and for agricultural purposes. In addition they provide for recreational activities such as angling, sailing, bathing and many other water-based sports. Eutrophication is the principal threat to lake water quality in Ireland. This is caused by the over-enrichment of lake waters by nutrients, especially phosphorus, which results in accelerated growth of planktonic algae, Cyanobacteria and higher forms of plant life.

Legislation

The principal legislation governing lake water quality in Ireland is the Phosphorus Regulations, prepared under Article 4(4) of the Local Government (Water Pollution) Act, 1977 (Water Quality Standards of Phosphorus) Regulations, 1998 (S.I. 258 of 1998). The Phosphorus Regulations require that water quality be maintained or improved by reference to the trophic status assigned by the EPA with a target of oligotrophic or mesotrophic status in all our lakes.

Lake Water Quality



Lake Quality 2003-2005

Trophic Status	Number of Lakes	Surface Area (km^2)
Oligotrophic and Mesotrophic	353 (83.8%)	942.8 (89.9%)
Moderately Eutrophic	18 (4.3%)	19.3 (1.8%)
Highly and Strongly Eutrophic	37 (8.8%)	43.6 (4.2%)
Hypertrophic	13 (3.1%)	42.8 (4.1%)

Source: EPA

Trend over Time

The EPA monitored 421 lakes over the 2003-2005 monitoring period with a surface area of 1048.5 km^2. Of the 421 lakes examined, 353 had satisfactory water quality, being either oligotrophic or mesotrophic. This represents approximately 90 per cent of lake surface surveyed. The water quality of the remaining 68 lakes was less than satisfactory, with 13 classified as hypertrophic, the most polluted status. These findings are broadly in line with those of the previous monitoring period, 2001-2003, where 91 per cent of lake surface area was found to have satisfactory water quality.

Comment

The most recent survey results suggest that measures, primarily aimed at reducing diffuse source pollution, need to be put in place to improve the water quality of those lakes that did not have satisfactory water quality status. The water framework directive requires that lakes be of 'high' or 'good' water status which in terms of lakes is broadly considered to equate to oligotrophic or mesotrophic respectively.

4.3 ESTUARINE AND COASTAL WATER QUALITY

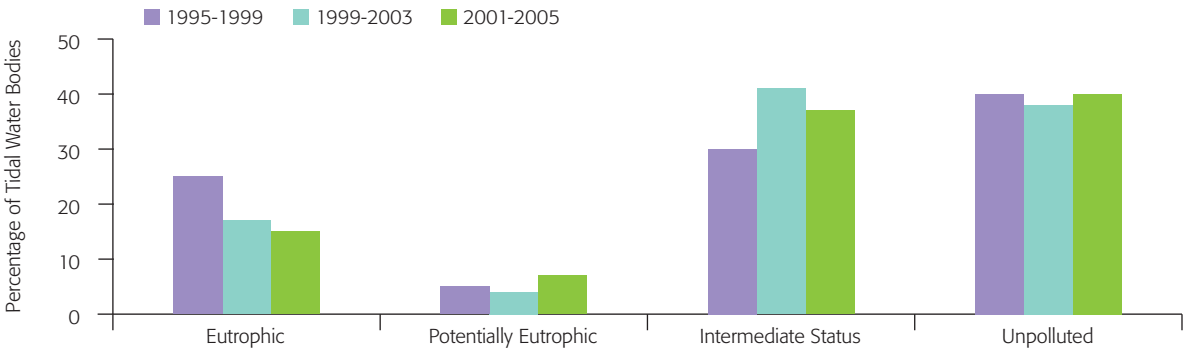
The estuarine and coastal environment is subject to a wide variety of pressures. These include inputs of organic matter, nutrients and contaminants from sources such as urban waste water, industrial discharges, riverine inputs and accidental spillages. Local impacts can also arise from marine-based activities such as dredging and aquaculture. The quality of Ireland's tidal waters is determined by the composition of the waters of the North East Atlantic that bathe our coasts and the degree to which this is altered by inputs of organic matter, nutrients and other materials from the land and atmosphere.

Legislation

The principal legislation governing water quality in Ireland is the European Communities (Water Policy) Regulations 2003 (S.I. 722 of 2003), which transposed the requirements of Directive 2000/60/EC, establishing a framework for Community action in the field of water policy (the Water Framework Directive, WFD) into Irish law.

The WFD has set out that a Member State shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water, and shall protect, enhance and restore all bodies of surface water with the aim of achieving good status by 2015.

Estuarine and Coastal Water Quality



Source: EPA

Trend over Time

The status of estuarine water bodies in Ireland remained relatively unchanged between the periods of assessment 1999-2003 and 2001-2005. Of those assessed, 94 per cent remained unchanged and only one area showed a decrease in status. In the 1999-2003 assessment 12 water bodies were classed as eutrophic while for the latest period 10 were so classed, with an increase in quality indicated by a decrease in chlorophyll levels.

There was a decline in the proportion of water bodies classed as eutrophic, from 25 per cent in the 1995-1999 period to 15 per cent in 2001-2005.

Comment

Fifteen water bodies were classified as eutrophic in the 1995-99 assessment. The number had fallen to 10 in the 2001-05 assessment. A number of the areas where improvements are evident have had treatment plants installed or upgraded in recent years. The proportion of water bodies classed as unpolluted has remained practically unchanged, at around 40 per cent.

4.4 BATHING WATER QUALITY

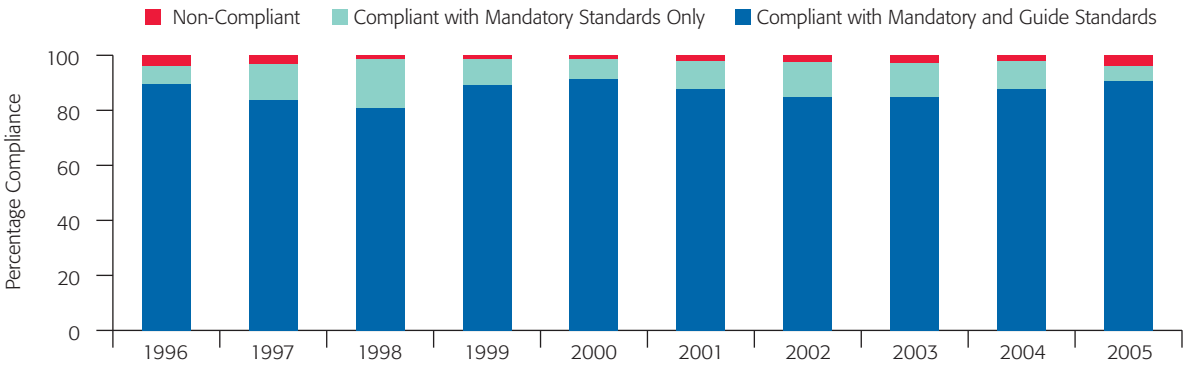
In Ireland, monitoring of water quality at designated bathing areas is undertaken in accordance with the provisions of the EU Directive concerning the quality of bathing waters. Local authorities are responsible for bathing water quality in their areas in addition to monitoring bathing water quality and making information available to the public on water quality during the summer bathing season. The number of designated bathing areas increased over the years, to 131 sites comprising 122 seawater and 9 freshwater bathing areas.

The Blue Flag Scheme is a voluntary scheme to identify high-quality bathing water areas, administered in Ireland by An Taisce and at European level by the Foundation for Environmental Education in Europe (FEEE). To receive a blue flag, a bathing site, in addition to maintaining a high standard of water quality, must meet specified objectives with regard to the provision of safety services and facilities, environmental management of the beach area and environmental education.

Legislation

The Quality of Bathing Water Regulations (S.I. 155 of 1992) implemented the requirements of the Bathing Water Directive (76/160/EC) in Irish law. The purpose of the legislation is to ensure that the quality of bathing water is maintained and, where necessary, improved so that it complies with specified standards designed to protect public health and the environment. A new Bathing Water Directive will enter into force in March 2008, focusing more particularly on the microbiological quality of bathing water.

Bathing Water Quality



Source: EPA

Trend over Time

In general, the water quality at bathing areas in Ireland has remained at a high standard. Results for 2005 show that 96 per cent of the sites monitored complied with the minimum mandatory standards laid down by EU legislation. The proportion of sites complying with the more stringent guideline standards fell from 91.5 per cent in 2000 to 91 per cent in 2005. However, it is clear that the long-term trends in compliance with both mandatory and guideline standards have been towards improved water quality.

In 2005, 81 beaches throughout Ireland were awarded Blue Flag status. This represents just 62 per cent of bathing areas designated under the bathing water regulations in Ireland. This is an increase of 6 percentage points from 2004.

Comment

Overall, designated bathing areas in Ireland compare favourably with those in other EU Member States. However, the number of sites designated in Ireland is low, with just 34 designated bathing areas per million population. This ranks Ireland 11th out of 18 EU Member States.

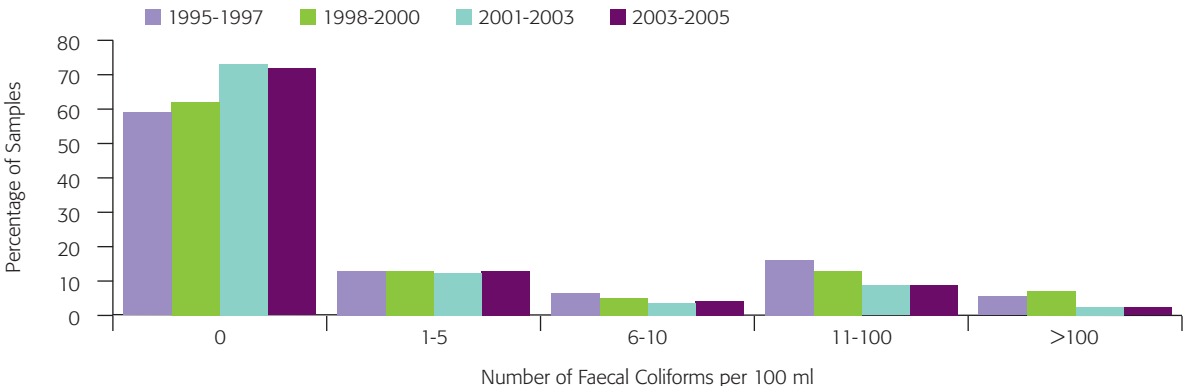
4.5 GROUNDWATER QUALITY

In Ireland, groundwater quality is mainly of concern in relation to its suitability for use as a source for drinking water supply, in food processing and related industrial operations and in the bottled water industry. Groundwater and springs account for approximately 16 per cent of the total drinking water supplied in Ireland, rising to 86 per cent in some rural areas. A large number of groundwater supplies exist nationally: it is estimated that there are at least 200,000 wells in the country, although many of these may no longer be in use.

Legislation

Groundwater quality and quantity must be protected in their own right under the requirements of the WFD (2000/60/EC). The Groundwater Directive (80/68/EEC) and the WFD are the relevant pieces of EU legislation relating specifically to groundwater. The only specific standards related to groundwater in Irish legislation are the environmental quality standards set for Schedule 1 and Schedule 2 substances in the water pollution regulations (S.I. 271 of 1992). Article 17 of the WFD requires that the European Parliament and Council adopt measures to prevent and control groundwater pollution. These measures will be in the form of a new Groundwater Directive, which is being discussed at a European level at the moment.

Groundwater Quality



Source: EPA

Trend over Time

Approximately 30 per cent of all samples taken by the EPA between 2003 and 2005 showed bacteriological contamination, with 11 per cent of the samples having greater than 10 faecal coliforms/100 ml. Since 1995, there has generally been an increasing trend in the percentage of samples showing zero contamination, with a decreasing trend in the percentage of samples showing gross contamination. However, 52 per cent of all EPA monitoring locations showed bacteriological contamination at least once between 2003 and 2005, with 30 per cent of all EPA monitoring locations being grossly contaminated at least once during this period.

Comment

The results of the EPA groundwater surveys and earlier studies indicate that there are widespread groundwater quality problems associated with local microbiological contamination. The two most likely causes of faecal contamination are land spreading of animal manures and poorly sited waste water treatment systems. In practice, the presence of faecal coliform bacteria (e.g. *Escherichia coli*) in water samples is taken as an indicator of faecal contamination and thus of the potential presence of associated pathogenic microorganisms.

The data show that there has been a decline in the number of samples with faecal contamination over the past 10 years. Any indication of faecal contamination must be regarded as a matter of serious concern and the circumstances promptly investigated.

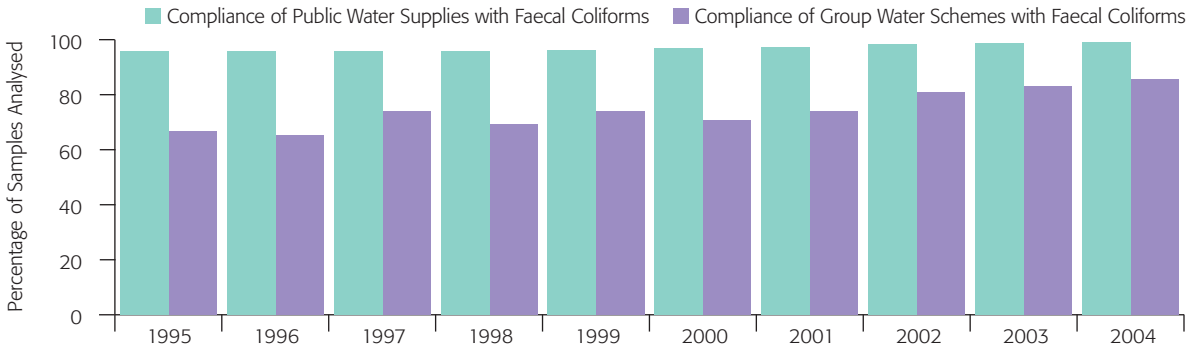
4.6 DRINKING WATER QUALITY

In Ireland, most drinking water originates from surface water (i.e. rivers and lakes). This is particularly so for public water supplies, whereas group water schemes and small private supplies tend to be slightly more reliant on groundwater or spring water. The most important indicators of drinking water quality in Ireland are the microbiological parameters and, in particular, *E. coli*. *E. coli* is present in very high numbers in human or animal faeces and is rarely found in the absence of faecal pollution. As such its presence in drinking water is a good indication that either the source of the water has become contaminated or the treatment process at the water treatment plant is not operating adequately. *E. coli* is often not in itself a harmful organism but indicates that harmful organisms may be present.

Legislation

Drinking water is regulated by the European Communities (Drinking Water) Regulations, 2000. Under this legislation there are two microbiological, 26 chemical and 20 indicator standards that must be adhered to. More stringent standards will apply in 2008 for two chemical parameters, the current level of 25 µg/l for bromate will fall to 10 µg/l and the current level of 150 µg/l for trihalomethanes will fall to 100 µg/l. In 2013 the current level of 25 µg/l for lead will fall to 10 µg/l.

Drinking Water Quality



Source: EPA

Trend over Time

In 2004 the majority of the *E. coli* exceedances were moderate (<20 cfu/100 ml) and one-off: they were not detected in follow-up samples. The majority of exceedances in public water supplies (those that serve 80 per cent of the population) were found in the smaller supplies. The rate of compliance in the large public water supplies (serving more than 5,000 people) was 99.4 per cent in 2004. Just under 20 per cent of the total number of water schemes were contaminated with *E. coli* at least once during 2004. The majority of these were private group water schemes.

The quality of group water schemes has historically been inferior to that of the public water supplies. It was always understood that the private group water schemes were the main cause of concern in the group water scheme sector. Public water supplies have had a 95 per cent and above compliance rate for the past 10 years, compared to a compliance rate as low as 66 per cent for the group water schemes in 1995. The group water compliance rate had increased to 85 per cent in 2004.

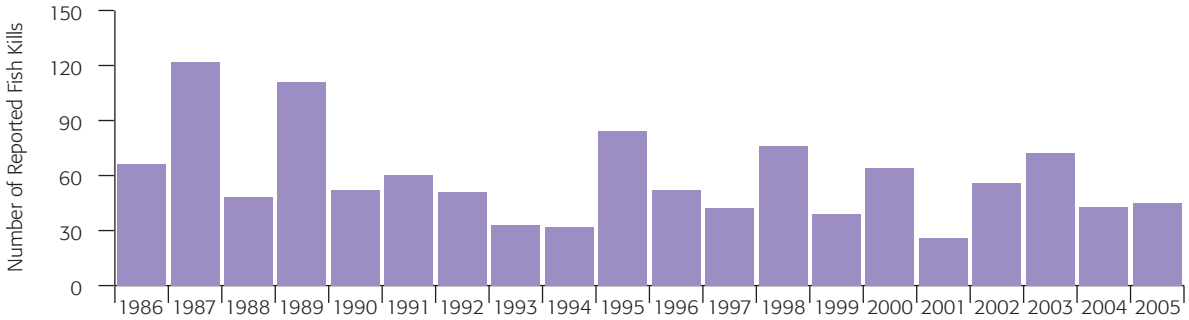
Comment

The poor microbiological quality of the private group water schemes is the most challenging issue facing the authorities charged with responsibility for drinking water in Ireland. Though the majority of these schemes have plans in place to be upgraded as part of a Design Build Operate (DBO) bundle, there are a significant number of poor-quality schemes which are not participating in this process.

4.7 FISH KILLS

Fish kills are a symptom of extreme environmental disruption and are among the most dramatic and damaging impacts of water pollution. Untreated sewage, industrial effluents, farmyard run-off and slurry discharges are the usual causes of fish kill incidents.

Fish Kills



Source: CFB

Trend over Time

The trend in fish kills over the past 20 years shows that the years 1987 and 1989 were the worst, with in excess of 100 fish kills reported, while 2001 had the least number. In 2003 the relatively high number of fish kills (72) was inflated by recurring deaths of fish in the Avoca River due to acid mine leachate, while in 2004 and 2005 reduced numbers of fish kills were recorded.

Comment

The number of reported fish kills remains unacceptably high. More effective control measures of sewage and industrial discharges are required to prevent accidental spillages. Better implementation of good farm practices is required to ensure that farmyard run-off and slurries are managed correctly. Such measures will form an integral part of the River Basin Management Plans due to be completed under the WFD for all Ireland's river basins by 2009.

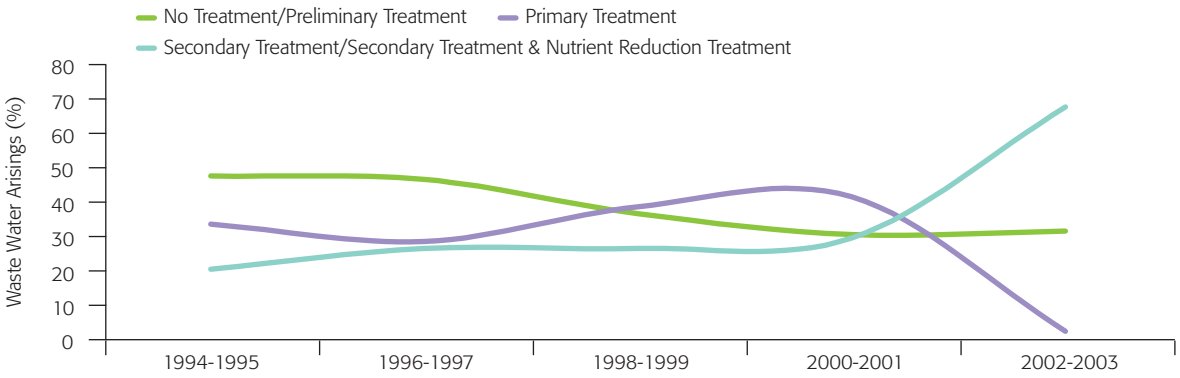
4.8 URBAN WASTE WATER TREATMENT

Urban waste water can be described as domestic waste water or a mixture of domestic waste water and industrial waste water and/or run-off rain water. Data on 443 agglomerations with a population equivalent (p.e.) greater than 500 persons were reported to the EPA for the 2002/2003 period. An agglomeration is an area where the population and/or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point. Of the 443 agglomerations, 295 receive secondary treatment (of which 38 also receive nutrient reduction), 94 receive primary treatment and 54 either preliminary treatment or no treatment. There are five agglomerations (Dublin City (Ringsend Treatment Plant), North Dublin, Cork, Dundalk and Killybegs) with a population equivalent greater than 150,000 persons and collectively they represent over 60 per cent of all municipal waste water.

Legislation

The Urban Waste Water Treatment Regulations, 2001 (S.I. 254 of 2001), were made on 14 June 2001 and amended on 15 July 2004. The Regulations give further effect to the provisions of EU Council Directive 91/271/EEC of 21 May 1991, as amended concerning urban waste water treatment, and Directive 2000/60/EC of 23 October 2000.

Urban Waste Water Treatment



Source: EPA

Trend over Time

The proportion of waste water subject to secondary treatment has increased significantly from 21 per cent to 62 per cent since the 2000-2001 period. This is due to the new sewage treatment plant at Ringsend, Dublin. The waste water now treated at Ringsend was previously accounted for in the primary treatment category, which has significantly reduced. The provision of secondary treatment with nutrient reduction continues to increase.

Comment

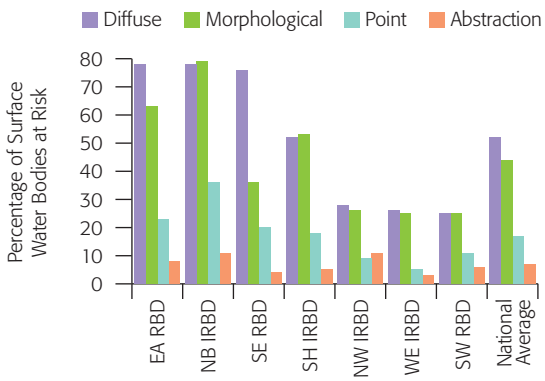
The quantity of municipal urban waste water has increased significantly, though much of this is accounted for by improved monitoring at existing plants and more accurate assessments of the population equivalent at new treatment plants in addition to increased economic activity and population growth.

Progress on the high levels of untreated waste water from some of our large urban areas has occurred since 2003 with the provision of secondary treatment to the cities of Cork, Limerick and Galway.

4.9 WATER FRAMEWORK DIRECTIVE AND RIVER BASIN MANAGEMENT PLANNING

The WFD requires 'good water status' for all European waters by 2015, to be achieved through a system of river basin management planning and extensive monitoring. In Ireland there are 4 river basin districts (RBDs) wholly within the State: the Eastern, South Eastern, Western and South Western. The Shannon, Neagh-Bann and North Western RBDs are shared with Northern Ireland and are thus classified as International River Basin Districts. In 2004 a characterisation and analysis of all RBDs in Ireland was undertaken as required by Article 5 of the WFD. In this characterisation study the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015. Measures to address and alleviate these pressures are to be included in a formal programme of measures to be submitted to the European Commission by 2009.

Percentage of Surface Water Bodies at Risk from Various Pressures in each RBD*



Source: EPA

Numbers of water bodies and percentage at risk of failing to meet WFD objectives by 2015 based on the 2004 characterisation and analysis of Ireland's River Basin Districts

Water Body Category	Total No. of Water Bodies	No. at Risk*	Percentage at Risk*
Groundwater	757	471	62
Rivers	4467	2854	64
Lakes (>50 ha)	210	134	64
Estuarine Waters	196	104	53
Coastal Waters	113	30	27

Source: EPA

** While a water body may be assessed as 'at risk', that does not imply that it does not currently have good water quality status, rather that there is a risk that it may deteriorate below this level.*

Trend over Time

A comprehensive assessment was undertaken under the WFD to establish the current situation with regard to all aspects of water management within the State at a river basin scale. The analyses undertaken involved gathering information on all environmental pressures likely to affect the waters concerned and all available information on the current condition of water bodies arising from the water quality survey work of the local authorities, the EPA and the fishery agencies. Criteria and thresholds were developed for each type of pressure and impact in relation to the level of risk that these represented. The outcome is a quantification of water bodies at risk of not achieving the WFD objectives due to various pressures as presented in the chart and table above.

Comment

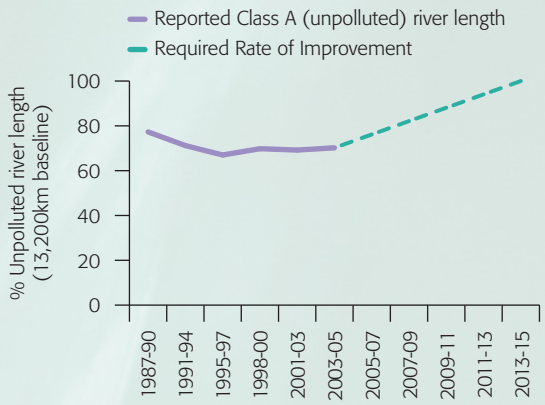
In contrast to the aims of many of the existing water directives, which seek to protect specific uses of water, the WFD is concerned with the protection of the aquatic ecosystem. The aim is to achieve conditions (good status) in all waters that are only slightly degraded from those of the natural or reference state. This target, which must be achieved by 2015, is likely to be very demanding in many cases, especially in waters where there has been a long history of pollution or, as with many surface waters, physical disturbance.

4.10 KEY CHALLENGES

Attaining Good Water Status by 2015

Achieving the objectives set in the WFD is the primary challenge that Ireland faces over the next decade in water resource management. The WFD sets out that a Member State shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water, and shall protect, enhance and restore all bodies of surface water with the aim of achieving good status in degraded aquatic ecosystems by 2015. Not all waters in Ireland currently meet this objective. Progress has been made in reducing emissions to the water environment. The decline in the percentage of unpolluted river length appears to have been halted, and in recent years there has been a slight improvement. However, major efforts in river basin management are required to ensure that the objectives of the WFD are achieved. River Basin Management Plans are currently being developed for this purpose.

Percentage of Unpolluted River Length (13,200 km baseline) and Projection to meet WFD Objectives for 2015



Source: EPA

Reducing Nutrient Loss from Diffuse Pollution

Diffuse loss of phosphorus and nitrates from soil to water is a major cause of degraded surface water and groundwater quality in Ireland. Agriculture, and in particular poor agricultural practice, is the main diffuse source of both nutrients to the water environment. Improved farm management and the use of best agricultural practices are required to ensure better management of this diffuse pollution source. River Basin Management Plans will therefore need to ensure that management measures such as the Rural Environmental Protection Scheme, nutrient management planning and control of farmyard run-off are further expanded to control diffuse emissions of nutrients to water.

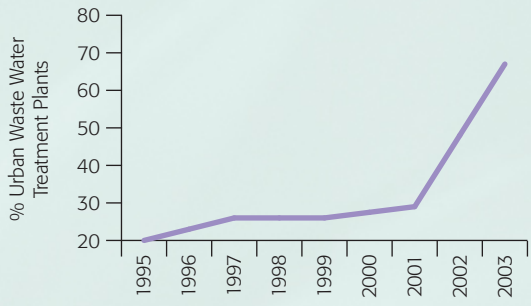
REPS Uptake

Source: DAF

Reducing Emissions from Point Source Pollution

The absence of urban waste water treatment plants or the poor operation of such plants has been identified as the primary cause of serious point source pollution to waters within the State. However, recent investments in increasing the percentage of urban waste water treatment plant discharges subject to secondary treatment or better are having a significant impact on reducing pollutants being discharged into our waterways. The further installation and upgrading of sewage and industrial waste treatment plants and continued improvement in their operation and maintenance are required to ensure that good status is achieved for all waters by 2015.

Percentage of Urban Waste Water Treatment Plants Receiving Secondary Treatment or Better



Source: EPA

5. WASTE

Good progress continues to be made towards national and EU waste recycling targets.

A cornerstone of waste management is prevention through sustainable use of resources. In the absence of significant progress on waste prevention, Ireland will continue to rely on less favourable waste management options.

The infrastructure outlined in the Regional Waste Management Plans should be put in place without delay in order to meet the needs of a growing economy.

5.1 GENERATION AND MANAGEMENT OF MUNICIPAL WASTE

Municipal waste comprises waste from households and other waste that by its nature and composition is similar to household waste. It includes household waste, commercial waste and street cleaning waste.

Legislation

A key objective of the EU 6th Environment Action Programme is to achieve a significant overall reduction in the volume of waste generated through waste prevention initiatives, better resource efficiency and a shift towards more sustainable production and consumption patterns.

National policy (*Changing Our Ways*), published in 1998, set out targets over a 15-year period to reach a recycling rate of 35 per cent of municipal waste. Subsequent policy documents *Preventing and Recycling Waste – Delivering Change* (DELG, 2002) and *Taking Stock and Moving Forward* (DEHLG, 2004) have proposed ambitious programmes aimed to increase waste recycling, diversion of waste from landfill, waste prevention and improving waste management infrastructure.

Recovery and Disposal of Municipal Waste

Source: EPA

Trend over Time

In 2004, a total of 3 million tonnes of municipal waste was generated in Ireland, an increase of 64 per cent since 1995. While the rate of increase is slowing, 12 per cent between 2001 and 2004, the direction is still upward.

In absolute terms, the quantity of municipal waste landfilled has decreased by 0.8 per cent since 2003, while the quantity of material recycled has increased by 26.5 per cent. Combined, this results in an overall increase in municipal waste recovery from 28.4 per cent in 2003 to 33.6 per cent in 2004.

Comment

By achieving 34 per cent recovery in 2004 the national target of 35 per cent recycling of municipal waste by 2013 has almost been achieved. A revised target to present new challenges and build on this success is required. Household waste diversion from landfill (i.e. recycling) now stands at 19 per cent, compared to 13 per cent in 2003.

The European Environment Agency (EEA) has reported that Ireland ranks as the largest *per capita* generator of municipal waste in the EU. The EEA acknowledges however that the data it has collected are not comparable as, in many countries, the data are based mainly on household waste and often exclude recycled wastes. In Ireland, in contrast, 40 per cent of municipal waste generation in 2004 was commercial waste and 34 per cent was recycled waste. It is clear therefore that many countries do not define municipal waste generation as broadly as in Ireland. The 2002 EU Waste Statistics Regulation is intended to harmonise EU-wide reporting on waste and it is anticipated that comparable results for 2004, from across the EU, will be available in 2006/7.

5.2 RECOVERY RATES OF PACKAGING WASTE

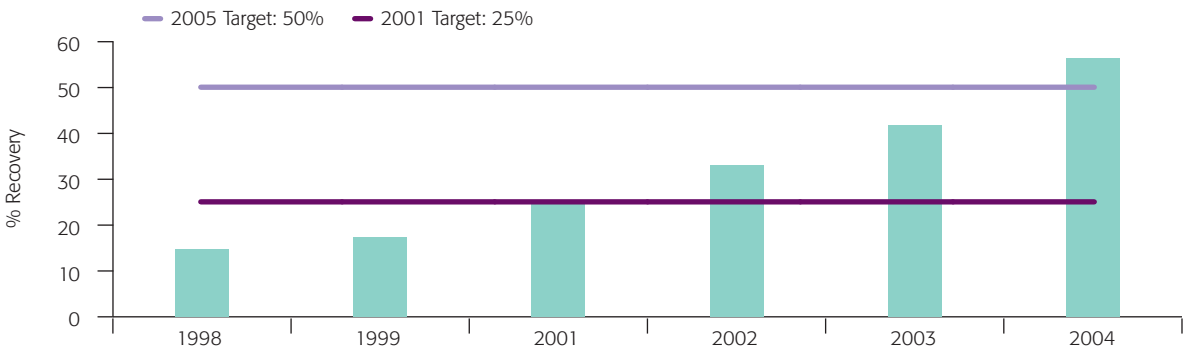
Packaging waste includes materials such as cardboard, paper, glass, plastic, steel, aluminium and wood, in addition to composite materials such as those used in milk and juice cartons.

Legislation

The Waste Management (Packaging) Regulations, 2003 (S.I. No. 61 of 2003) and amendments specify measures designed to achieve the targets set out in the EU Packaging and Packaging Waste Directive (94/62/EC) by placing obligations on the producers that place packaging on the Irish market.

The Directive established targets to be met for the recovery and recycling of packaging waste. By June 2001, Member States had to achieve 50-65 per cent recovery of packaging waste, of which 25-45 per cent was recycled. Ireland received a derogation from this, only having to achieve at least 25 per cent recovery by 2001 and 50 per cent recovery by 2005. Directive 2004/12/EC amending Directive 94/62/EC came into force in February 2004. The amended Directive includes an overall packaging waste recovery target of 60 per cent, of which 55-80 per cent must be recycled, together with material-specific targets. These targets must be achieved by 31 December 2008 for all Member States except Ireland, Portugal and Greece, which must achieve them by 31 December 2011.

Recovery of Packaging Waste 1998-2004



Source: EPA

Trend over Time

An estimated 851 thousand tonnes of packaging waste was generated in 2004. The recovery of packaging waste increased by 14.3 per cent in 2004. This was due to the increased availability of recyclables collections from households and increased obligations on commercial premises to segregate and recycle packaging waste. Much of the infrastructure for the collection and recycling of packaging waste has been funded by the REPAK scheme. The largest fraction by weight recycled is paper and cardboard, followed by wood and glass. The packaging waste recovery rate was 56.4 per cent in 2004, a year ahead of the EU minimum target for 2005 of 50 per cent. The quantity of packaging waste landfilled decreased by 37 per cent between 2003 and 2004.

Comment

The trend in packaging waste recycling has been very strong. Ireland met its 2001 target on time and exceeded its 2005 target one year in advance. This trend is expected to have continued in 2005. The National Waste Prevention Programme is working with REPAK to develop a Packaging Waste Prevention Programme.

European Environment Agency figures state that Ireland generates more packaging waste *per capita* than any other country in Europe. Each person in Ireland produces 210 kg of packaging waste against the EU-15 average of 172 kg/capita. However, there is considerable variation in the definition and methods used by the EU Member States in calculating packaging waste generation, making EU comparisons difficult.

5.3 BRING BANKS AND CIVIC AMENITY SITES

Infrastructure for the collection of recyclable waste has improved considerably over the past few years and is contributing to the successful diversion of waste from landfills. Kerbside collection is now available to most householders but bring banks and civic amenity sites continue to be necessary where material cannot be presented for kerbside collection. This includes, for example, glass, wood, garden waste and waste electrical and electronic equipment (WEEE).

Obligation

Regional waste management plans recommend the provision of 85 modern civic amenity centres strategically situated throughout the country.

Bring Banks and Civic Amenities

Source: EPA

Trend over Time

The number of bring banks in operation increased from 1,692 in 2003 to 1,929 in 2004. The number of civic amenity sites in operation increased from 60 in 2003 to 69 in 2004. In 2004 the quantity of waste collected at bring banks was 76,023 tonnes compared to 53,001 in 2003 and the quantity collected at civic amenity sites rose to 83,562 tonnes in 2004 from 47,686 in 2003. Municipal waste recovery in 2004 stands at 33.6 per cent compared to 28.4 per cent in 2003, and the national target of 35 per cent recycling by 2013 has almost been achieved well ahead of schedule. The use of bring banks and civic amenities has made a significant contribution to meeting these targets. With increasing charges for household waste collection services, it is likely that we will see an increase in the use of bring facilities in the future.

A total of 316 thousand tonnes of material was recycled in Ireland in 2004, an increase of 10.5 per cent over 2003. There has also been an increase in the overall proportion of recyclable materials actually recycled within the State, accounting for 26.2 per cent of the total in 2004. This shows that Ireland continues to rely substantially on foreign materials-recycling infrastructure, accounting for 73.8 per cent of recycled waste in 2004.

Comment

Exporting of collected recyclables will continue while markets do not exist locally. The creation of an indigenous recycling industry, where technically and economically feasible, has merits including job creation, industrial development and a supply of recycled materials for use in, for example, manufacturing and construction.

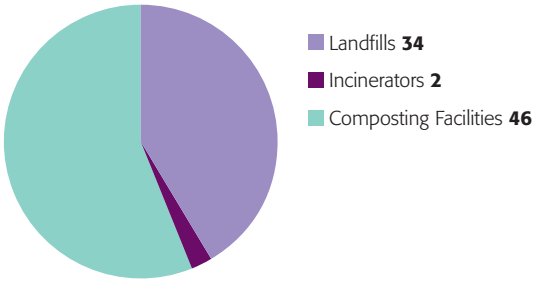
5.4 MUNICIPAL WASTE INFRASTRUCTURE

Ireland's waste management infrastructure is still greatly dependent on landfill as a means of waste disposal. Currently the trends in municipal waste management are mostly positive: landfill is decreasing and recovery is increasing. Household waste diversion from landfill now stands at 19 per cent, compared to 13 per cent in 2003. There is however still some way to go to the 50 per cent landfill diversion target for household waste for 2013.

Legislation

Changing Our Ways set out targets over a 15-year timescale for the diversion of 50 per cent of household waste from landfill. The Landfill Directive (1999/31/EC) set progressive targets for the diversion of biodegradable municipal waste from landfill. In April 2006, the National Strategy on Biodegradable Waste was published.

Number of Licensed Activities



Source: EPA

Trend over Time

In 2004, 1.82 million tonnes of municipal waste was accepted for disposal at 34 active landfills, compared to 1.83 million tonnes accepted at 35 landfills in 2003.

A total of 39 composting facilities were in operation in 2005, and a further 7 have commenced or are due to commence operations in 2006. The compost facilities can be broadly split into two categories, facilities that produce compost for sale to mushroom growers, and waste management facilities that make compost waste for landscaping or landfill cover. Nineteen of the compost facilities accept household organic waste while 16 compost green waste.

Two waste incinerators have been licensed by the EPA (one exclusively municipal waste, the other dealing with municipal and hazardous waste). Neither of these activities has commenced operations at the time of publication.

Comment

Local and regional authorities should anticipate proactively the need for additional waste management facilities within the regional waste management plan framework on an ongoing basis.

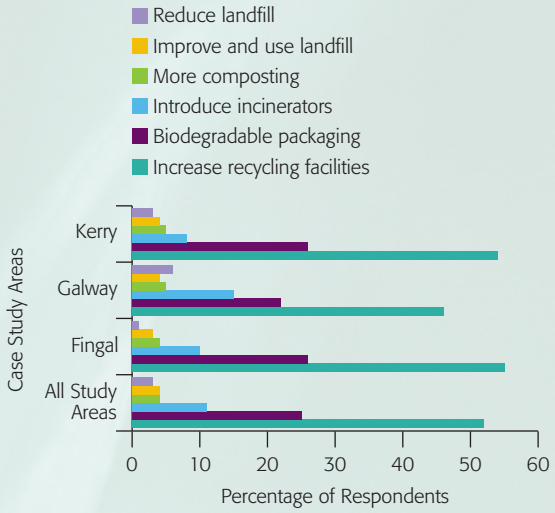
5.5 KEY CHALLENGES

Waste Generation Still Unchecked

In the past ten years waste management in Ireland has moved in a positive direction. Over 100 unlined and unregulated dumps have been closed and replaced with 34 modern municipal waste sites. Recycling has increased visibly and the proportion of household waste being sent to landfill has fallen. Substantial progress has also been made on redressing the waste infrastructure deficit.

In a recent EPA-sponsored research study, 52 per cent of respondents selected recycling facilities as the key to solving waste problems, more than double the number that chose biodegradable packaging as a priority. Incineration was the only other solution selected by more than 10 per cent of respondents. These three options for addressing waste management are all end-of-pipe solutions rather than preventive measures. Though improvements in recycling in recent years are encouraging, the real challenge of waste prevention remains. In the absence of significant waste prevention efforts, waste quantities produced will grow and Ireland will continue to rely on less environmentally favourable waste management options.

Public Perceptions of Priorities for Future Irish Waste Management Policy

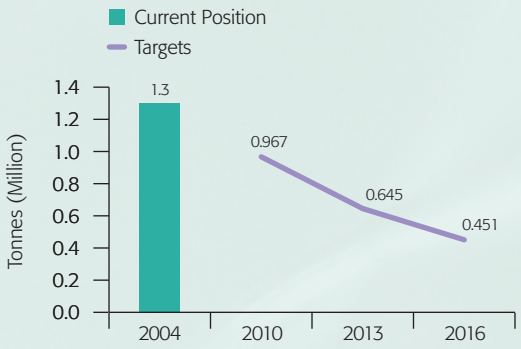


Source: Davies et al

Diversion of Waste from Landfill

Biodegradable waste generation increased by approximately 50 per cent in the 9-year period up to 2004. The targets set in Directive 1999/31/EC (Landfill Directive) require a progressive reduction in landfilling to 35 per cent of the quantity of biodegradable waste generated in 1995 (i.e. 451,469 tonnes) going to landfill by 2016. There are interim targets of reduction to 75 per cent by 2006 and 50 per cent by 2009 (Ireland has however availed of derogations from 2006 to 2010 and 2009 to 2013). This reduction represents a significant challenge. The measures recently published in the National Strategy for Biodegradable Waste to achieve the targets need to be acted upon without delay.

Biodegradable Municipal Waste Diversion from Landfill Targets



Source: EPA

6. LAND COVER AND BIODIVERSITY

Preliminary results from the 2006 Census of Population show that the greatest population growth has occurred on the outskirts of our cities. This reflects the extent of residential development, primarily low-density housing, on or beyond the city fringe. This type of urban sprawl presents particular problems for the provision of public services, such as public transport and sanitary services, because of its low density and dispersed nature.

"While climate change takes up much of the media attention … biodiversity loss is an even more serious threat. The degradation of ecosystems often reaches a point of no return – and extinction is for ever."

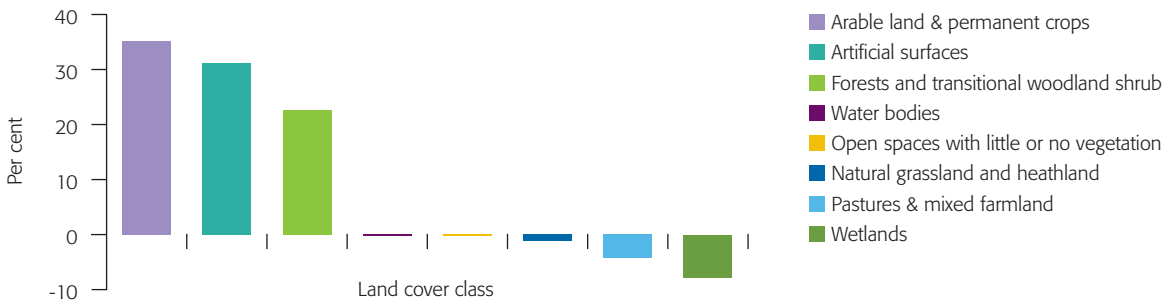
Stavros Dimas
EU Environment Commissioner
May 2006

6.1 LAND COVER

Information on land cover is becoming increasingly important in the making of environmental policy and the implementation of environmental legislation. The CORINE Land Cover (CLC) project has provided a pan-European inventory of land cover using satellite images. CORINE classifies land cover under 44 headings such as artificial land cover, arable, pasture, and wetlands. In Ireland CLC datasets have been produced to show the land cover situation in the reference years of 1990 and 2000 and the changes in land cover in the interim. The latter dataset has been analysed to produce land cover change statistics for the period 1990 to 2000.

The EPA has undertaken land cover mapping in Ireland as part of the CLC project. Other bodies involved in land mapping are Teagasc, Ordnance Survey Ireland, the Department of Agriculture, the Land Commission, the National Parks and Wildlife Service and the Forest Service.

Change in Land Cover Area between 1990 and 2000



Source: EPA/EEA

Trend over Time

When land cover change from 1990 to 2000 is expressed as a percentage of the existing land cover area in 1990, the largest change occurs in the arable land class (including land used for silage production), which increased in area by 35 per cent, followed closely by artificial surfaces (including all urban development, transport infrastructure, landfill, etc.), which increased by 31 per cent. Despite the growth in artificial land cover, artificial land constituted only 1.8 per cent of the national land cover in 2000. There was also an increase of 23 per cent in the area of forested land. These increases were mainly at the expense of pasture, mixed farmland and wetlands. It is likely that the reduction in wetlands arose as a consequence of afforestation on peat bogs in earlier decades, the full effect of which only became evident during the 1990s. The largest change in absolute areas of land cover between 1990 and 2000 was a reduction in the land used as pasture and mixed farmland.

Comment

Pasture and arable land has been converted to (sub)urban and infrastructural uses for the development of dispersed housing and the expansion of villages and towns. It is most likely that the trends identified as occurring in the period 1990-2000 have continued or intensified into the new century.

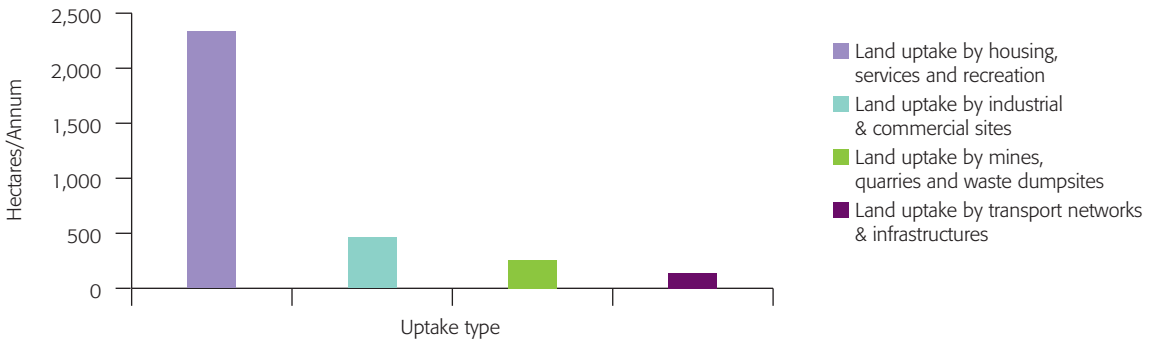
6.2 URBANISATION

Since the 1990s there has been a sustained movement of population from rural to urban centres, leading to rapid fringe development in most of our cities and towns. Growth in the economy has also resulted in significant infrastructural development over the past decade, particularly road construction. Landscapes have been affected by urban sprawl, rural housing development, and the growth of industry.

Legislation

The Planning and Development Act, 2000, together with the Planning and Development Regulations, 2001, the Planning and Development Regulations, 2002 and the Planning and Development (Amendment) Act, 2002, is the most recent planning legislation in Ireland.

Increase in Artificial Land Cover 1990-2000



Source: EPA/EEA

Trend over Time

As noted above, artificial surfaces grew by 31 per cent between 1990 and 2000 but still constituted only 1.8 per cent of national land cover in 2000. The predominant drivers of urban land development from 1990 to 2000 were housing, services and recreational facilities, which were more than double the combined total of the remaining changes.

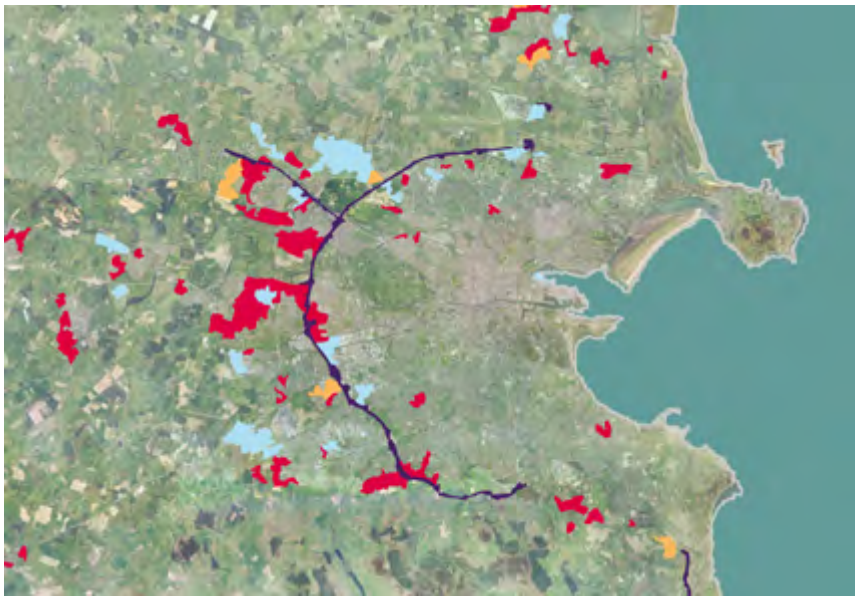
The preliminary report on the 2006 Census of Population shows that the population of Dublin City, Dun Laoghaire-Rathdown and Dublin South grew slightly between 2002 and 2006, while population growth in Fingal, Meath and Kildare was significantly above the national average of 8.1 per cent. In Cork and Limerick the population has decreased within the city boundaries while increasing significantly in adjacent county areas. Galway City is an exception, with the population within the city boundary continuing to increase. Development on the periphery of metropolitan areas is contributing to increased urban sprawl.

Comment

The rapid increase in housing costs in our major cities has reduced the ability of many to afford city living, leading to migration from established areas to new development in the urban fringes or to towns in adjoining counties. These developments, most of which comprise low-density housing, are contributing to the urban sprawl around our major cities and towns and increasing the long-distance traffic volume on our roads, resulting in higher levels of engine emissions.

The National Spatial Strategy recognises that unbalanced development is affecting the quality of life. Long-distance commuting from residential developments located at greater and greater distance from where people work is not sustainable in the longer term. More balanced regional development is required, and needs to be achieved by appropriate planning and land use (including housing) policies.

Land Cover Change in the Dublin Area 1990 to 2000



New urban/suburban developments
New industrial or commercial units
New road networks
Construction under way in 2000

Source: EPA/EEA

Urban development in Dublin has extended the city towards the West and towards the foothills of the Dublin Mountains. Most urbanisation was contiguous to the M50 or other major traffic arteries. The developments in Blanchardstown, Liffey Valley/Clondalkin and Tallaght are visible.

Land Cover Change in the Cork Area 1990 to 2000

New urban/suburban developments
New industrial or commercial units
New road networks
Construction under way in 2000

Source: EPA/EEA

This image shows the development under way in 2000 in Little Island and Carrigaline. Urban development completed during this period can be seen at Ringaskiddy, Carrigaline, Grange and Donnybrook.

6.3 PROTECTED AREAS

Many plants and animals are unable to adapt to changes in the environment brought about by human activities. For example, species inhabiting meadows are at risk of decline from intensive agricultural practices, such as silage production. In an effort to provide sufficient habitats for species at risk, special land areas have been designated for protection under wildlife legislation. These are areas where practices potentially harmful to flora and fauna are prohibited or restricted. Ten principal nature conservation designations applying in Ireland are described in the table below.

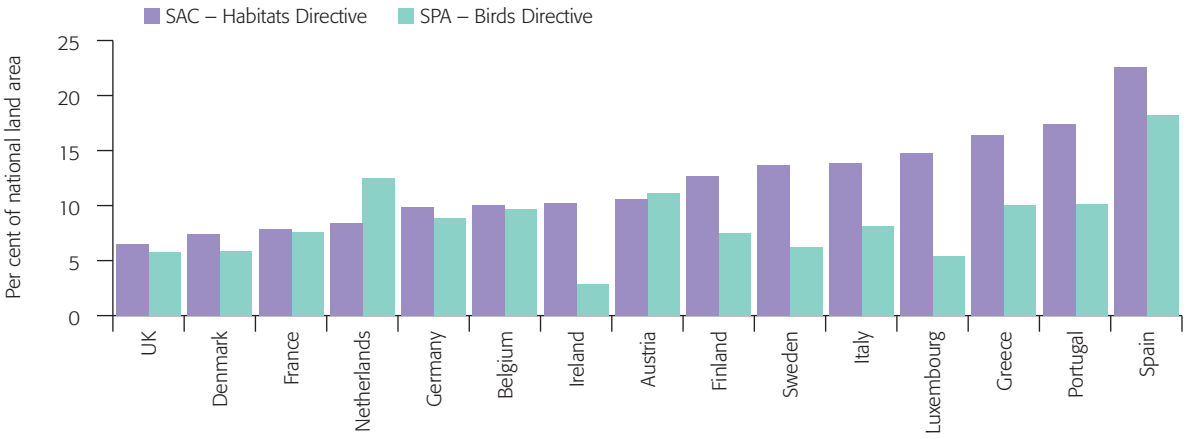
Legislation

The most important legislation on nature conservation is the Wildlife Act, 1976, the Wildlife (Amendment) Act, 2000 and the European Union (Natural Habitats) Regulations, S.I. 94/1997 (which have been amended twice with S.I. 233/1998 & S.I. 378/2005). At European level the Habitats Directive (92/43/EEC) and the Birds Directive (79/409/EEC) mandate the identification and protection of key Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) respectively in all EU Member States. In addition, Natural Heritage Areas (NHAs) are designated under the Wildlife (Amendment) Act, 2000.

The Habitats Directive requires Member States to maintain or restore the favourable conservation status of the habitats and species listed in its annexes. Thus designation of a site as an SAC has wide-ranging implications. Land use practices that may be affected include farming, aquaculture, grazing, sporting and turf-cutting rights.

Certain activities restricted within SACs, SPAs and NHAs can only be carried out with the permission of the Minister for the Environment, Heritage and Local Government, and these 'Notifiable Actions' vary depending on the type of habitat on the site. These and several other activities can only be undertaken with permits or licences.

Designated Terrestrial Protected Areas (Habitats and Birds Directives) in EU15 Countries



Source: EU DG Environment Nature Conservation Barometer June 2006

Trend over Time

The total area designated for conservation continues to increase. Ireland has formally advertised 424 sites as proposed candidate SACs (pcSACs), of which 410 have been transmitted and formally adopted by the EU as candidate SACs (cSACs). The remaining sites awaiting adoption as cSACs are either only recently advertised (marine offshore sites) or under appeal; a number of cSACs are subject to boundary amendments, principally for the inclusion of areas important for the conservation of salmon. Current cSAC/pcSAC proposals cover an area of 1,349,945 hectares.

Ireland has designated 128 sites as SPAs for birds under the Birds Directive, with a further seven advertised sites awaiting formal designation. It is expected that a number of additional SPAs will be proposed, including, in particular, for the hen harrier and chough. A review of the SPA network is currently under way.

The total number of actual and proposed NHA sites is 1287. Nearly 500 of these have been subsumed into SACs or SPAs. Recently 148 blanket bog or raised bog sites have been advertised, notified and designated through statutory instrument as NHAs. An additional seven sites of ornithological interest await designation as NHAs.

Comment

The growth in the total area of land protected under national and EU legislation is welcome. However, we still lag behind the rest of Europe in the land area designated as SPAs under the Birds Directive. The total area already designated or awaiting designation as SPAs (292,728 hectares) is approaching 4 per cent of the national territory. This is considered relatively low in European terms, the EU average being 8 per cent. The protection of sufficient land area is required if we are to prevent further loss of biodiversity and ensure the recovery of endangered species.

Protected Areas Designated or Awaiting Designation

Category	Description	No. of sites	Area (ha)
Statutory Nature Reserves	State-owned land, inland waters or foreshore areas forming the habitat of a species or community of flora or fauna of scientific interest or forming part of an ecosystem of scientific interest, which would benefit from protection measures, established under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000.	78	18,889
National Parks	Almost entirely State-owned areas designated nationally with the aims of nature conservation and public recreation and appreciation.	6	61,134
Special Protection Areas (SPAs)	Areas of conservation value for birds of importance in the European Union designated internationally under the Birds Directive.	135	292,728
Special Areas of Conservation (SACs)	Areas of conservation value for habitats and/or species of importance in the European Union designated internationally under the Habitats Directive.	424	1,349,945
Natural Heritage Areas (NHAs)	Areas of conservation value for ecological and/or geological/geomorphological heritage designated nationally under the Wildlife (Amendment) Act, 2000.	1287	923,563
Wildfowl Sanctuaries	Areas over which shooting of wild birds is prohibited, established under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. These areas have been excluded from the 'Open Season Order' so that game birds are left undisturbed to rest and feed.	68	n/a
Refuges for Fauna	Areas where the specific protection of one or more species of animal is required, established under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000.	7	428
Ramsar Sites	Sites designated internationally for the conservation of wetlands, particularly those of importance to waterfowl under *The Convention on Wetlands of International Importance especially as Waterfowl Habitat*, the so-called Ramsar Convention.	45	66,994
UNESCO Biosphere Reserves	Sites of conservation value internationally designated with the aim of integrating the interests of nature conservation, sustainable development, research and education. Biosphere Reserves are recognised by UNESCO (United Nations Educational, Social and Cultural Organisation).	2	11,137
Biogenetic Reserves	Biogenetic Reserve is an international designation for natural habitats that are especially valuable for nature conservation in Europe. Biogenetic Reserves are designated by the Council of Europe.	14	6,587

Note that many of these designated sites are coincident and that the areas given are not, therefore, cumulative.

Source: National Parks and Wildlife Service

6.4 PROTECTED SPECIES

Causes of the decline of many native species include habitat loss, reduction in food supplies, predation and poisonings from pesticides, new farming practices (including increased mechanisation), and recreation and tourism developments. To redress this decline, species have been designated for conservation under Irish and European legislation.

Legislation

The major national legislation on species conservation comprises the Wildlife Act, 1976, the Wildlife (Amendment) Act, 2000, the Flora (Protection) Order, S.I. 194/1999, and various other statutory instruments. At European level the major conservation legislation comprises the Habitats Directive (92/43/EEC) and the Birds Directive (79/409/EEC). The Water Framework Directive (2000/60/EC) also has the aim of protecting and enhancing the state of aquatic ecosystems.

The signatories to the Convention on Biological Diversity (CBD) agreed in 2002 to pursue more effective implementation of the objectives of the CBD in order to achieve a significant reduction in the current rate of loss of biological diversity by 2010. In response to the Convention, Ireland published the National Biodiversity Plan 2000-2006.

Total Numbers of Endangered, Vulnerable and Rare Species in Ireland

	Flowering plants	Algae	Amphibians	Fish	Birds	Mammals
Endangered (E)	6	0	1	3	8	0
Vulnerable (V)	41	5	0	3	3	0
Rare (R)	71	3	0	0	0	1
Indeterminate				3	3	2

Note that the threat level (E, V or R) for plants is currently being reviewed; a revision may result in an increase in the number of vulnerable plants considered to be endangered.

Endangered Species

Plants	Amphibians	Fish	Birds
Marsh saxifrage Serrated wintergreen Meadow saffron Cottonweed Meadow saxifrage Rough poppy	Natterjack toad	Allis shad Killarney shad Pollan	Common scoter Hen harrier Grey partridge Corncrake Red-necked phalarope Nightjar Roseate tern Corn bunting

Source: Respective Red Books

Trend over Time

A national register of plants at local risk of extinction recorded 162 species as potentially under threat in 1988, ten of which were thought to be extinct (at least five have been refound since this listing in 1988). Five reptiles (including the common lizard and marine turtles) and three invertebrates are protected under national wildlife legislation. Under the Habitats Directive two species of bryophytes (mosses and liverworts), all members of the bryophyte family *Sphagnaceae*, and all members of the lichen species *Cladonia* subgenus *Cladina* (reindeer moss), are protected from exploitation.

Comment

Species Action Plans (SAPs) have been published in conjunction with the Environment & Heritage Services (EHS) of Northern Ireland covering the Irish hare, the corncrake, the pollan and Irish lady's tresses. Plans are currently being prepared for the otter, bat species, the Kerry slug, the red squirrel, the freshwater pearl mussel and the Killarney fern. The National Parks and Wildlife Service (NPWS), the National Botanic Gardens and TCD Botanic Gardens are working together on the development of a National Strategy for Plant Conservation. The National Botanic Gardens is working to collate a complete dataset of cultivation protocols for all threatened species in Ireland (ca 120 spp).

6.5 BIRDS OF CONSERVATION CONCERN

Birds of Conservation Concern Ireland (BoCCI) are bird species suffering decline in the Irish/European and global context. Birdwatch Ireland (BWI) and the Royal Society for the Protection of Birds (RSPB) have identified and classified these species by the rate of decline into a red list and an amber list.

Listed species must meet one or more of the following criteria. For red-listed species (listed below): their breeding population or range has declined by more than 50 per cent in the past 25 years, or their breeding population has undergone a significant decline since 1900, or they are of global conservation concern. For amber-listed species: the breeding population has declined by 25-50 per cent in the past 25 years, or they are rare or sporadically breeding species, or their breeding or wintering population is internationally important and/or localised, or they have an unfavourable conservation status in Europe.

Legislation

The primary national legislation covering the protection of ecosystems and species is the Wildlife Act, 1976 as amended by the Wildlife (Amendment) Act, 2000. The major European legislation driving bird species conservation is the Birds Directive.

Bird Species on Red List

Black-necked grebe[2]	Hen harrier[1]	Corncrake[1,2]	Twite[1,2]	Roseate tern[1,2]
Common scoter[1,2]	Red grouse[1]	Lapwing[1]	Yellowhammer[1]	Barn owl[1]
Grey partridge[1,2]	Quail[2]	Curlew[1]	Corn bunting[1,2]	Nightjar[1,2]
Red-necked phalarope[2]	Chough[1]		Ring ouzel[2]	

[1] Declining breeder. [2] Historical decline. *Source: Birdwatch Ireland*

Trend over Time

There has been no change in the birds listed on the red or amber lists since 2002.

Comment

Six of the 91 Actions listed in the National Biodiversity Plan 2002-2006 relate directly or indirectly to birds. Under Action 26, a draft Species Action Plan has been prepared for the corncrake.

BWI and RSBP have agreed a list of species (shown below) on which to focus priority work.

Birdwatch Ireland and RSPB Priority List

Farmland	Upland	Woodland	Coast & Wetlands
Grey partridge Corncrake Barn owl Yellowhammer Lapwing Curlew	Golden plover Hen harrier Ring ouzel	Nightjar	Common scoter Red-necked phalarope Little tern Roseate tern Chough Twite

This focus prioritises work and use of resources in the conservation of species deemed threatened and of importance. Specific conservation measures can have a positive impact on the population of birds of conservation concern. For example the Termoncarragh (7 km west of Belmullet in northwest Mayo) BWI project is producing encouraging results from habitat management. Reversion to pasture, early cut silage, and late mown meadow has attracted the first recorded singing corncrake since 2000, and also singing quail. Restoration of Annagh Marsh (part of Termoncarragh) has attracted 18 pairs of breeding lapwing (up from 12 pairs) and two pairs of redshank (last bred in 1996).

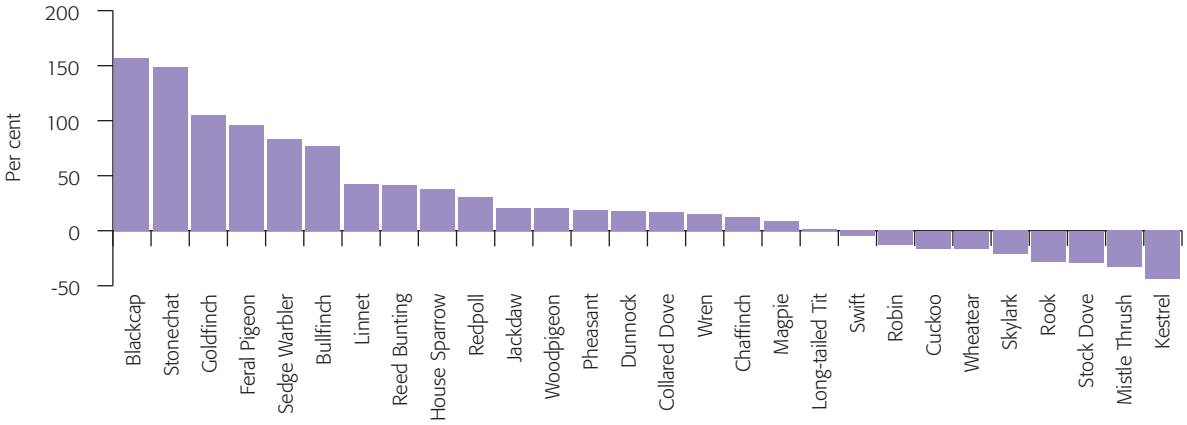
6.6 BIRD SPECIES

The Countryside Bird Survey (CBS) is undertaken between April and June each year and provides scientific data on the abundance and distribution of Ireland's breeding bird populations. It is conducted by BWI, NPWS and the Heritage Council.

Legislation

The major national legislation covering the protection of ecosystems and species is the Wildlife Acts. The major European legislation driving ecosystem and species conservation comprises the Habitats Directive (92/43/EEC), Birds Directive (79/409/EEC) and Water Framework Directive (2000/60/EC).

Countryside Bird Surveys 1998-2004 – Recorded Changes in Population of Bird Species



Source: Birdwatch Ireland

Trend over Time

The bird species showing a population change in the period 1998 to 2004 are shown in the figure.

An analysis of the 2004 CBS data shows that the distribution of most species has remained constant, particularly among the top 20 most widespread species. The wren, robin, chaffinch, blackbird and woodpigeon were the most widespread in 2004. Further down the list, several species have shown some dramatic changes in distribution. The goldfinch, the blackcap and the stonechat have shown range expansion, while the skylark has shown range retraction. The skylark population has been in continuous decline since 2000, and it is now on the BoCCI amber list. Other trends in common farmland birds' distributions include increases for the pheasant, the feral pigeon, the woodpigeon, the collared dove, the magpie and the jackdaw, with declines for the kestrel, the cuckoo and the rook.

Comment

The CBS has shown that some once common countryside species, such as the skylark, are now under threat. Incentives to improve countryside management – such as the Rural Environment Protection Scheme (REPS) – can help the skylark and other endangered species to recover.

6.7 KEY CHALLENGES

Protecting and Maintaining Biodiversity

Biodiversity is important for human well-being and survival: ecosystems provide a stream of essential services including the supply of food, fuel and medicines.

The EU has developed a strategy to halt biodiversity loss by 2010 and to restore habitats and natural systems. In Ireland a National Biodiversity Plan was published in 2000 and an Interim Report on its implementation was published in 2005. Progress in implementing the 91 Actions listed in the Plan (10 of which relate to protected areas) has been encouraging. However, local authorities, government departments and public authorities have been slow to make biodiversity action plans. The implementation of such plans is required if we are to halt biodiversity loss.

The management of biodiversity has been handicapped by a lack of coordination in the collation and dissemination of data on flora and fauna in Ireland. It is expected that the National Biological Records Centre, established in May 2006 at Waterford Institute of Technology, will fill this gap and provide information on the location of species and habitats. This information will greatly aid the implementation of biodiversity plans and ensure that, where biodiversity issues arise, policy decisions are made on the basis of relevant and up-to-date information.

Increasing Environmentally Sustainable Farming Practices

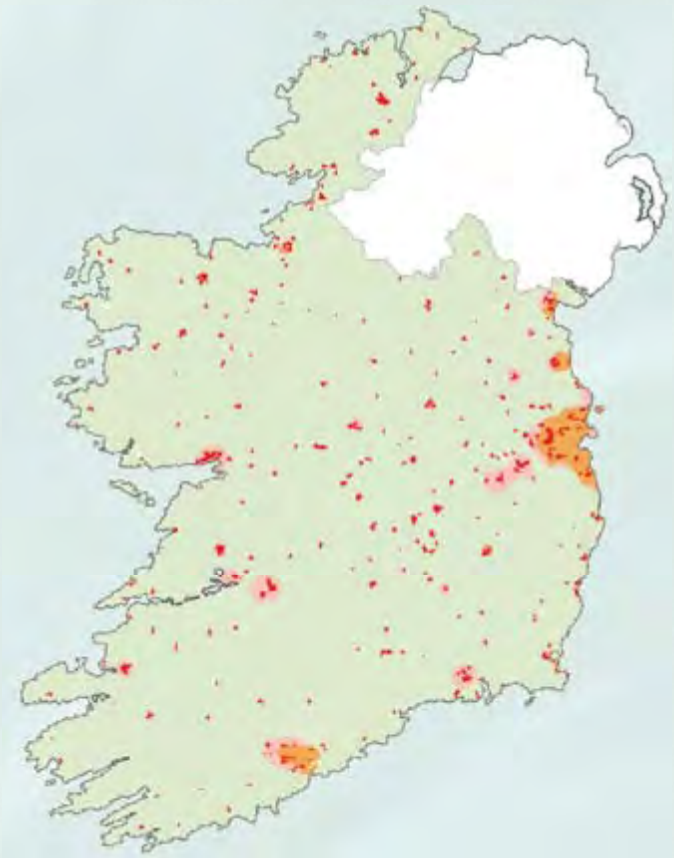
Under Action 58 of the National Biodiversity Plan 2000-2006, future revisions of the REPS agri-environment initiative will ensure that conservation is a priority. Such initiatives play a valuable role in mitigating the impact of agricultural practices on biodiversity. The need for such mitigation is greatest in areas of intensive agricultural practice where participation in the REPS is lowest. Agricultural policies need to be proactive in promoting increased participation in the REPS in such areas.

Improved Information on Land Cover Changes

CORINE Land Cover provides a valuable tool to monitor changes in national land cover during the period 1990-2000. Many of the changes in this period (such as urban sprawl, further urbanisation, infrastructural developments, the increase in the land area devoted to silage production and the afforestation of wetlands) increased the pressures on the environment. The implementation of spatial policies that encourage balanced, sustainable growth and have due regard for the environment is now required.

Widespread urban development took place between 1990 and 2000. This map shows the distribution of this development and the extent of urban land use in 2000.

Urbanisation 1990-2000



Urban Development

Dominant Landscape Type

- Dense Urban Areas
- Dispersed Urban Areas
- Other Land Uses

Source: EPA/EEA

7. TRANSPORT

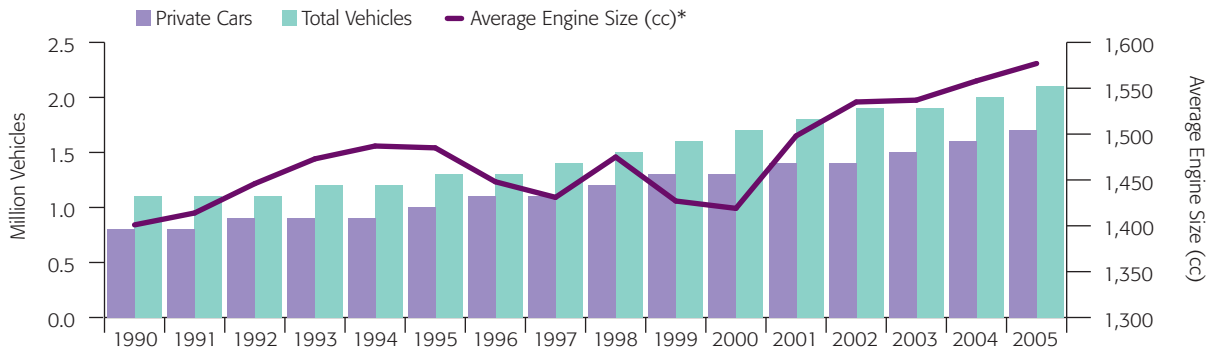
The transport sector is the fastest growing contributor to national greenhouse gas (GHG) emissions and accounts for 18.4 per cent of the national total.

Public transport use, despite an increase in the numbers of users, has failed to keep pace with the increasing use of the car. Its share as a means by which people travel to work decreased steadily from 14 per cent in 1981 to just 9 per cent in 2002. Continued efforts are needed to curb unsustainable transport use, particularly by increasing the share of public transport.

7.1 VEHICLE NUMBERS

Ireland's transport infrastructure, particularly around Dublin, has been overwhelmed by the enormous increase in transport associated with economic growth over the past decade. The rate of private car ownership and the volume of road traffic have already reached the levels predicted for 2010, contributing to traffic congestion in cities and huge increases in energy consumption and GHG emissions.

Vehicle Numbers and Size of Engines



** Average engine size calculated by EPA.* *Source: DEHLG*

Trend over Time

The number of private cars and goods vehicles on our roads more than doubled between 1990 and 2005. This upward trend in the national vehicle fleet, which is linked to economic growth, is expected to continue: Irish car ownership levels, which were at 227 per thousand population in 1990, were estimated at 406 per thousand in 2005 and are expected to converge with the EU-15 average of 491.2 cars per thousand (2002 figures) by the end of the decade. Furthermore, there is a purchasing trend towards vehicles with larger engine size. The average engine size of private cars purchased in Ireland increased from 1401cc in 1990 to 1577cc in 2005. The weighted average fuel consumption for new petrol cars registered in 2004 was 1.4 per cent greater than for those registered in 2000. Fuel consumption in new diesel cars registered in 2004 was 2.7 per cent higher than in 2000.

Comment

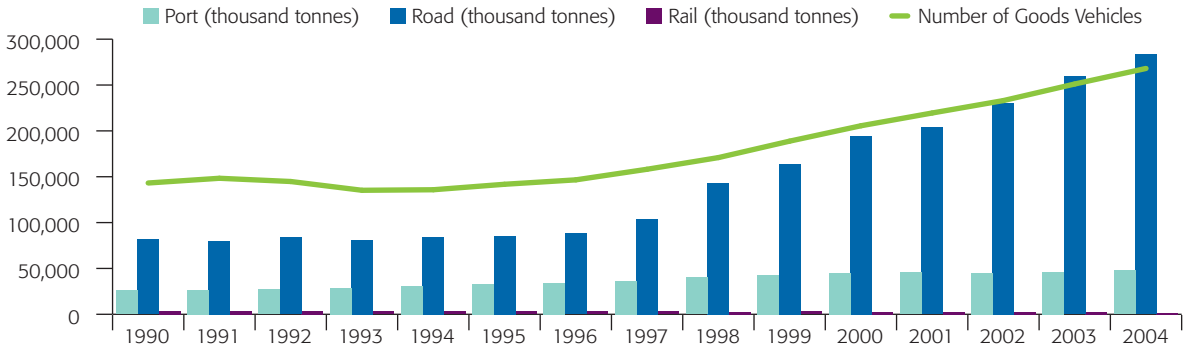
All forms of motorised traffic are well-known emission sources of air pollutants and GHGs, and are one of the main sources of noise in the environment. The most relevant emissions are carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NO_X), volatile organic compounds (VOCs) and fine particulate matter fractions such as PM_{10} and $PM_{2.5}$. While emissions of CO and VOCs have decreased substantially in recent years from new vehicles, primarily as a result of the introduction of catalytic converters, these reductions have largely been offset by increases in engine size of vehicles and in total sales of vehicles. It would appear that recent changes in the Vehicle Registration Tax (VRT) structure have not been effective in curbing the trend towards purchase of vehicles with larger engine sizes.

It is clear from present trends that the number of vehicles on Irish roads is set to increase. Levels are predicted to meet the European average by the end of the decade – the number of private cars in the State will reach approximately 2 million, an increase of 0.5 million over 2004. Even if the target of reducing CO_2 emissions to 140 g/km for new cars by 2008-2009 is achieved, as agreed under the Voluntary Agreement negotiated between the automotive industry and the EU Commission, this is unlikely to row back the ever-increasing contribution of the transport sector to Ireland's GHG emissions.

7.2 FREIGHT TRANSPORT DEMAND

The volumes of freight being moved in Ireland have grown dramatically over the past 15 years in line with the economic growth of the country. Increased economic activity has a direct impact on the volume of imports and exports, and the increase in consumer spending has resulted in a rapid increase in the volumes of freight being transported within the State to satisfy the ever-expanding consumer demand. The resultant overall increase in freight transport demand makes it increasingly difficult to limit its environmental impact.

Freight Transport Demand



Source: CSO & DEHLG

Trend over Time

Freight traffic has increased in line with economic development. The most dramatic change over the period 1990 to 2004 was a 250 per cent increase in the volume of freight transported by road, from 81 million tonnes to 283 million tonnes. Over the same period the volume of freight transported by rail fell by almost 50 per cent, from 3.3 million tonnes in 1990 to 1.7 million tonnes in 2004. Port freight almost doubled over the same period, from 26 million tonnes in 1990 to 48 million tonnes in 2004.

Comment

In Ireland, road transport is the dominant mode of transport for freight. We have no commercial waterway network. The relatively short distances involved in freight transport militate against the use of rail as a cost-effective transport option, particularly given the freight loading/offloading and the associated local freight distribution network requirements at rail termini. The freight management systems adopted by the greater part of Irish industry ('just in time' and point-to-point delivery) are considered the primary reasons for the use of roads as the preferred transport mechanism.

Over recent decades the volume of freight carried by rail has reduced to the extent that it raises real questions about the viability of rail as an alternative to road transport for the vast bulk of overland freight shipments.

The conflicts between the environment and the demand for transport are well recognised and particularly pertinent to Ireland at the present time, as all forms of motorised traffic are well-known emission sources of air pollutants and GHGs. Increasing the fuel efficiency of road haulage and the efficiency of road freight operations (e.g. logistics) is required to stem the growth of emissions from this sector.

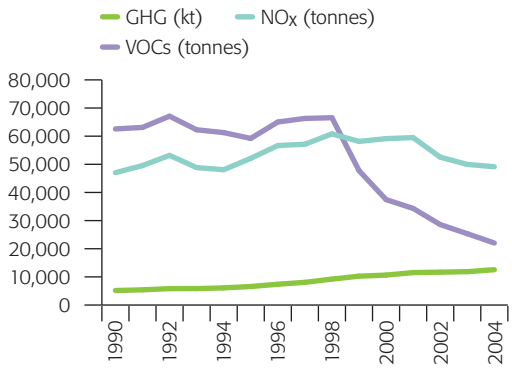
7.3 AIR EMISSIONS FROM TRANSPORT

The transport sector makes a large contribution to the emissions of key pollutants such as CO_2, NO_X and VOCs. The public, particularly in urban areas, are readily exposed to these pollutants.

Legislation

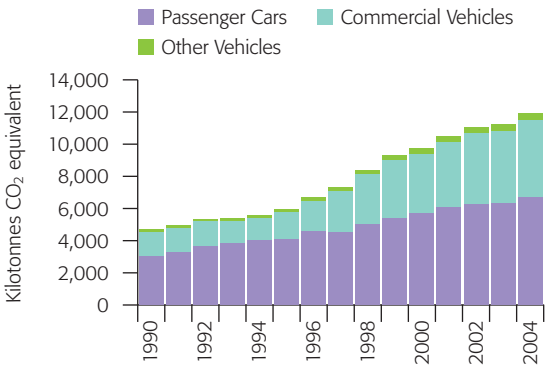
The emissions limit for GHGs was established following the adoption of the Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC). Its aim is to limit the increase in GHG emissions during the five-year period 2008-2012 to 13 per cent above 1990 levels. The EU National Emissions Ceilings (NEC) Directive has set emission targets for a number of gases including NO_X that have to be achieved by 2010.

Key Air Emissions from Transport



Source: EPA

GHG Emissions from Road Transport



Source: EPA

Trend over Time

The most significant and sustained increase in total GHG emissions has been from the transport sector, which accounted for 18 per cent of total emissions in 2004. Emissions from this sector increased by 144 per cent between 1990 and 2004. This increase is due almost entirely to road transport and occurred mainly between 1994 and 2004, when emissions increased from 5.66 Mt to 12.13 Mt of CO_2 equivalent.

The transport sector is the principal source of NO_X emissions, contributing approximately 41 per cent of the total in 2004. Even though improved technologies are reducing the emissions of NO_X from individual vehicles, overall emissions from transport have increased by 5 per cent since 1990.

VOC emissions from transport fell by 65 per cent between 1990 and 2004, but still accounted for 35 per cent of total VOC emissions in 2004. The use of three-way catalytic converters in motor vehicles is largely responsible for the decrease in VOCs.

Comment

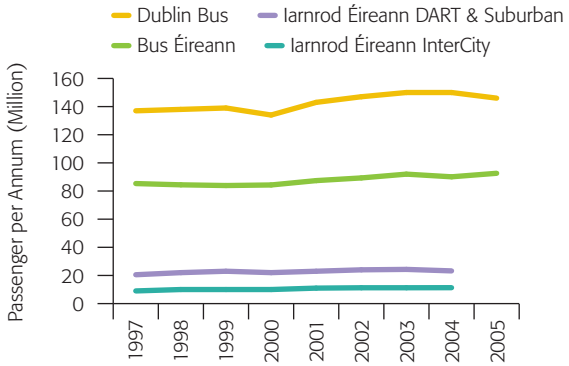
Although the emissions from individual vehicles will continue to fall as a result of technological advances and cleaner fuel, emissions from the transport sector look set to increase due to increased vehicle numbers and engine size.

New Vehicle Registration Tax (VRT) rates for cars favouring the purchase of smaller, more fuel-efficient vehicles were introduced in 1999. The lowest rate of VRT remained unchanged at 22.5 per cent (of purchase cost) for cars under 1,400cc; a new rate of 25 per cent was introduced for cars 1,401cc to 2,000cc and the top rate was increased from 28 per cent (for cars over 2,500cc) to 30 per cent for cars over 2,000cc. Latest figures suggest that this change in taxation policy has not had the desired effect and the average engine size continues to rise. Further revision of the taxation system to encourage the purchase of more fuel-efficient and lower emission cars should be examined.

7.4 PUBLIC TRANSPORT

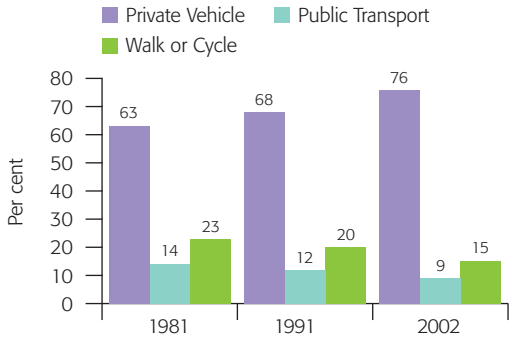
The car dominates passenger transport in Ireland. The 2002 Census showed that 76 per cent of the population in employment travelled to work by car. As little as 9 per cent used public transport such as bus or train. In 2002, 15 per cent of people either cycled or walked to work.

Public Transport Passenger Numbers



Source: DoT

Means of Travel to Work



Note: Data amalgamated into classes by EPA. Source: CSO

Trend over Time

Bus

The total number of passengers carried by Bus Éireann increased by approximately 10 per cent from 84 million passengers in 2000 to 93 million passengers in 2005. Similarly, the number of passengers carried by Dublin Bus increased by almost 9 per cent from 134 million in 2000 to 146 million in 2005.

Rail

The number of passengers carried by Iarnród Éireann increased by 19 per cent between 2000 and 2005.

The number of passengers carried by DART and on suburban routes (Dublin and Cork) increased by 10 per cent from 22 million passengers in 2000 to 24.3 million passengers in 2003. The number decreased slightly in 2004 because of DART upgrade works.

The number of passengers carried on intercity routes increased by 17 per cent, from 9.7 million in 2000 to 11.3 million in 2004.

The two Luas light rail lines began operation in 2004. Luas carried over 22 million passengers in its first full year of operation.

Comment

Despite the increase in numbers of people using public transport, its share as a means by which people travel to work has been steadily decreasing over the past 20 years. Census 2002 shows that the percentage of people using public transport to travel to work decreased from 14 per cent in 1981 to just 9 per cent in 2002. The percentage of the workforce travelling to work by car or van increased from 63 per cent to 76 per cent over the same period.

A policy of urban containment, involving high-density residential development and good public transport, is crucial to curbing the trend of increasing hinterland-to-city travel. Transport 21, launched in November 2005, identifies the investment proposed in the ten years to 2015 in order to develop all elements of national transport infrastructure. It provides for total capital funding of over €34 billion over the next ten years, of which approximately €16 billion has been earmarked for public transport projects. The successful implementation of this strategy is crucial to reducing our reliance on the private car as means of transport, and the associated emissions.

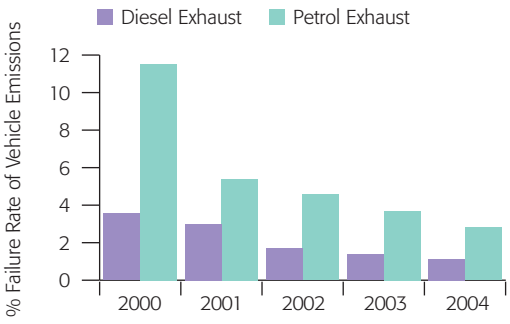
7.5 VEHICLE EMISSIONS

While improved emission control technologies have significantly reduced the emissions from new cars and other vehicles, a significant number of older cars with relatively little pollution control are still in service and emit a disproportionately high level of air pollutants.

Legislation

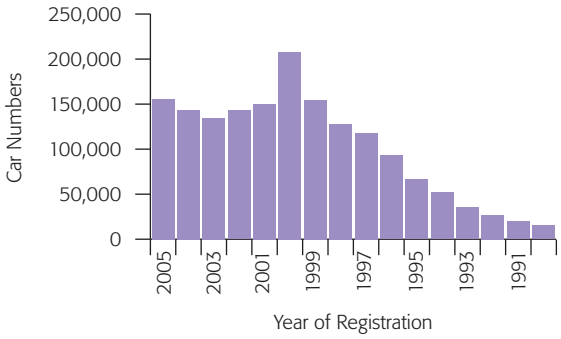
The National Car Test (NCT) was introduced on 4 January 2000 to comply with EU Directive 96/96/EC. This directive makes car-testing mandatory in all EU member states. The directive is intended to improve road safety and ensure compliance with environmental emission standards.

NCT Results



Source: SGS

Age Profile of Private Cars



Source: DEHLG

Trend over Time

Since the introduction of the NCT in 2000 the percentage failure rate due to exhaust emissions has been steadily decreasing. Diesel vehicles had an exhaust emissions failure rate of 3.6 per cent in 2000 compared to 1.1 per cent in 2004. The exhaust emissions failure rate of petrol vehicles fell from 11.5 per cent to 2.8 per cent over the same period.

More than 50 per cent of private cars are aged 6 years or older and approximately 7 per cent are 13 years or older. Standards requiring the use of catalytic converters on petrol cars first came into force in 1993 with the introduction of the EU EURO I car standards. Most cars purchased prior to 1993 do not have catalytic convertors. Cars without three-way catalytic converters (TWCs) are a major contributor to poor air quality.

Comment

Compliance with vehicle emission standards has improved as a result of the introduction of the NCT. The NCT facilitates vehicle optimisation and encourages the operation of more efficient vehicles.

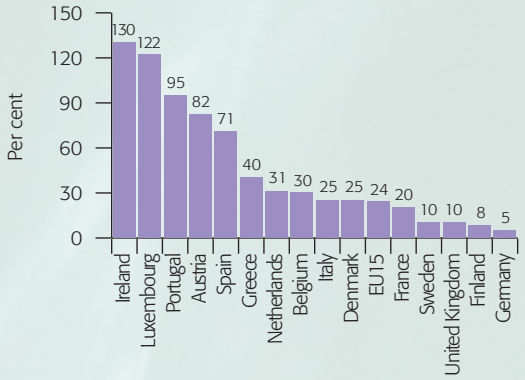
Improving the fuel efficiency of the vehicle fleet is a key part of reducing emissions from the transport sector as a whole, since the private car will remain an important means of personal mobility, particularly in rural and isolated areas. Technological advances within the automotive industry will be critically important in bringing more fuel-efficient, novel and clean technologies to market. The average rated emissions of CO_2 from new passenger cars sold in the EU-15 have decreased by 11.8 per cent between 1995 and 2003. However, major additional efforts are required in the coming years to deliver the target of 140 g of CO_2 emissions per kilometre by 2008-2009 to which the industry has committed itself in the EU Voluntary Agreements negotiated between the EU Commission and the car manufacturers.

7.6 KEY CHALLENGES

Reducing GHG Emissions

Transport contributes over 18 per cent of total GHG emissions; the emissions from this sector increased by 144 per cent between 1990 and 2004. This increase is due almost entirely to road transport and occurred mainly between 1994 and 2004. The EU suggests that reductions of the order of 15-30 per cent are required by 2020 and by as much as 60-80 per cent by 2050 for total GHGs. The major challenge for Ireland is expected to be that of reversing the trend in emissions growth from transport in order to achieve the reductions suggested by the EU.

Growth in Transport GHG Emissions 1990-2003



Source: TERM 2005

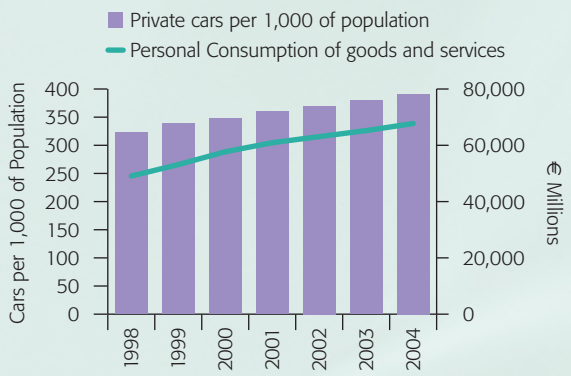
Reinventing Public Transport

Public transport is not keeping pace with population growth and is losing out to the private car. There needs to be a substantial increase in public transport capacity in order to provide a frequent and reliable service which will encourage greater use by the public. In addition, the barriers preventing people from moving from the private car to public transport need to be identified and addressed. This needs to be achieved such that the share of public transport can be increased to prevent worsening traffic congestion and increased emissions from the transport sector.

More Wealth, More Cars, More Pollution

The rapid growth in private car ownership is one consequence of growth in our personal wealth. We are buying more cars with larger engine sizes than ever before. As a result the efficiency benefits of recent technological improvements in vehicle manufacture are being negated. The number of cars in the 1.7 to 1.9 litre range grew by over 400 per cent between 1990 and 2005; cars with engine size less than 900cc and up to 1.2 litre are showing steady or declining numbers. Making transport users fully aware of the external costs of transport (such as emissions of greenhouse gases) will be key to changing travel patterns and consumer purchasing behaviour. Embracing the 'polluter pays' principle – through for example our car taxation system – and raising awareness of the significant external costs associated with transport hold the potential to bring about changes in personal behaviour.

Private Cars and Personal Consumption



Source: DEHLG & CSO

No Alternative to Road Freight?

Our recent increase in wealth has resulted in the expansion of the freight transport sector, required to support our personal consumption of goods and services. The greater part of Irish industry operates a 'just in time' delivery system with products of low volume/high value. Such factors contribute to low freight transport efficiency in an island economy such as Ireland. Given our unique freight transport circumstances we now need to examine all options to improve our freight transport efficiency.

8. INDUSTRY

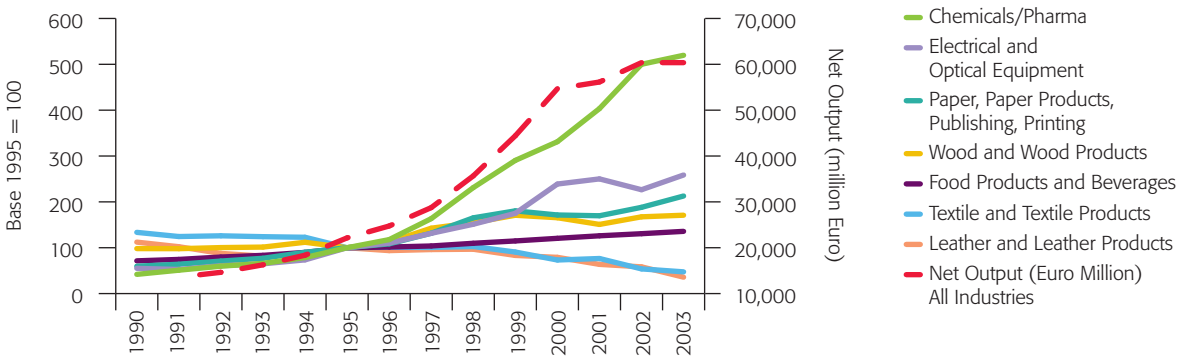
Over the past decade Ireland has seen rapid growth in the chemical and electronic sectors, while more traditional sectors such as leather goods and textiles have gone into decline.

The overall change in manufacturing demographics has resulted in the industry sector as a whole becoming more productive and more energy efficient.

8.1 INDUSTRIAL PRODUCTION

The profile of manufacturing industry in Ireland has changed dramatically over the past decade. Some sectors, such as the high-tech pharmaceuticals and electronics sectors, have performed beyond expectations, while more traditional labour-intensive manufacturing sectors such as textiles and leather goods have declined or moved due to low labour cost competition from eastern European and Asian economies.

Industrial Production Index by Industry Sector and Year



Source: CSO

Trend over Time

Industrial production increased by 25 per cent between 2000 and 2004. For particular sectors the volume increase was much greater: volume increased by 54 per cent in the publishing and printing sectors; production in the chemicals sector increased by 44 per cent. The highest growth rates have been in the high-technology sectors such as electronics, medical devices and the chemical and pharmaceutical sector. The increase in industrial production creates demands and pressures on the environment in terms of energy and raw material consumption, increased waste generation and the enhanced threat of pollution incidents from point source emissions.

Comment

Unprecedented growth in the high-tech industry sectors of electronics, medical devices and pharmaceuticals has revitalised the Irish economy over the past ten years.

Increasing efficiency in the use of energy and materials, using cleaner technologies to minimise emissions to air and water, preventing or reducing waste and increasing re-use or recycling activities will help maintain Ireland as an attractive location, in both economic and environmental terms, for the continued development of indigenous and multinational industry.

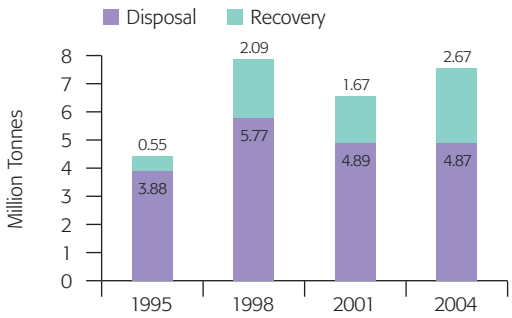
8.2 INDUSTRIAL WASTE GENERATION AND MANAGEMENT

Industrial waste includes waste from manufacturing processes, mining and quarrying, electricity generation and gas and water supply activities. It also comprises non-process industrial waste from canteens, offices and ancillary activities. Industrial waste generation is estimated from information provided by a total of 433 companies: 289 Integrated Pollution, Prevention and Control (IPPC) licensed companies, from their annual environmental reports; and 144 non-IPPC licensed companies, by way of sample survey.

Legislation

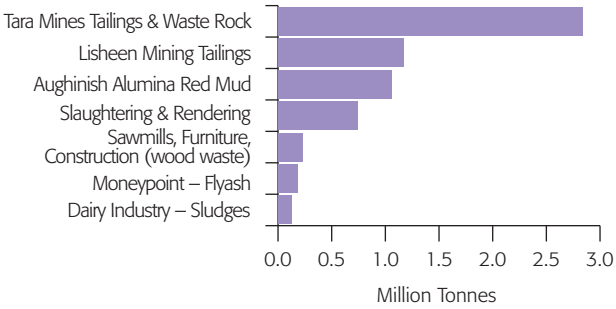
Most large industries are controlled under an IPPC licensing system administered by the EPA under the Protection of the Environment Act 2003. This system is an update of the previous Integrated Pollution Control licensing system in place since 1994 under the Environmental Protection Act 1992. These licences prescribe how a licensed activity will manage, dispose of or recover its waste. These licences also require an activity to examine all options to reduce waste generation as part of its annual environmental management programme.

Disposal & Recovery of Reported Industrial Waste



Source: EPA

Main Sources of Non-Hazardous Industrial Waste



Source: EPA

Trend over Time

In 2004, a total of 7.5 million tonnes of industrial waste was reported, an increase of 23 per cent since 2001. Of this, in excess of 2.6 million tonnes, or 35.4 per cent, was recovered, as compared with 25.5 per cent in 2001. 4.8 million tonnes was sent for disposal, a reduction of 0.4 per cent since 2001.

On-site recovery and disposal practices are well established and regulated in some industrial sectors; for example, solvent recovery or incineration in the chemical and pharmaceutical sector and landfill of tailings in the mining sector. A large proportion of industrial waste is exported for disposal or recovery, principally from the slaughtering/rendering sector (meat and bone meal) and the chemical/pharmaceutical sector (organic solvents).

Comment

The mining sector accounts for over half the quantity of waste generated in Ireland, while red mud from the Aughinish Alumina plant and flyash from the ESB's Moneypoint coal-burning power station remain significant contributors to the overall total. Waste from the food processing and timber industries also features strongly.

Solvents and other process wastes from the chemical and pharmaceutical sector make up the largest fraction of hazardous waste generated.

8.3 HAZARDOUS WASTE

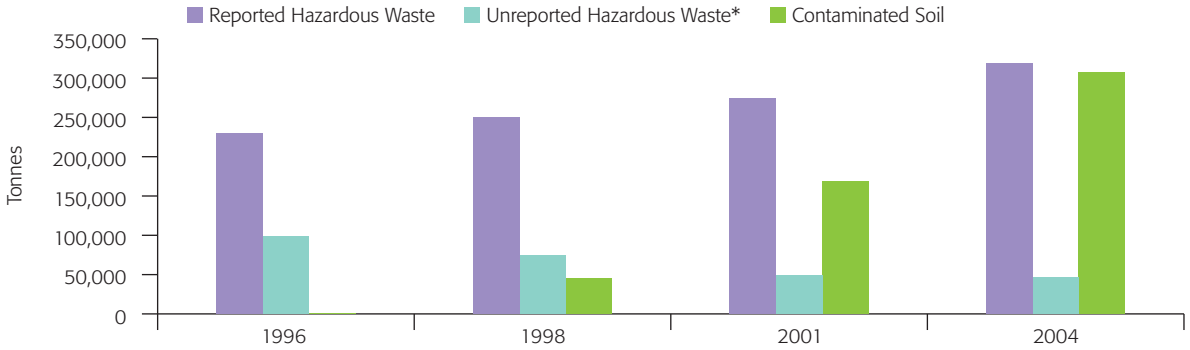
Manufacturing industry is the largest source of hazardous waste generated within the State. However, hazardous wastes are produced by virtually all sectors of society, including households, agriculture, construction, healthcare and others. The nature of hazardous waste varies according to source and it may also change over time as work practices change. For example, contaminated soil is usually generated from once-off projects and can therefore vary greatly from year to year.

Legislation

The Waste Management Act 1996, and its amendments, sets out how hazardous wastes are to be managed in Ireland. This legislation covers the transport and labelling of hazardous wastes in addition to the licensing of activities engaged in the handling of hazardous wastes including its transport, storage, recovery or disposal. Licensing of such activities is undertaken by the EPA and Local Authorities.

These acts also make provision for a National Hazardous Waste Management Plan, the first of which was published by the EPA in 2001. This plan covers collection, recovery and disposal of hazardous waste with a focus on waste prevention. A second National Hazardous Waste Management Plan will be published in 2007.

Hazardous Waste Generation



** Estimated from trade statistics and waste factors.* *Source: EPA*

Trend over Time

In 2004, the total estimated quantity of hazardous waste was 724 thousand tonnes. This compares to a projected estimate of 534 thousand tonnes in 2001 and represents an increase of 36 per cent. The increase is dominated by the reported generation of contaminated soil.

The treatment of hazardous waste at authorised facilities in Ireland increased from 57 thousand tonnes in 2001 to 71 thousand tonnes in 2004. The hazardous waste treatment industry continues to grow in scale and capacity, albeit at a slow rate. Significant new hazardous waste treatment capacity became available, or was licensed, in 2004/5.

The export of hazardous waste, excluding contaminated soil, continues to increase: by 3.7 per cent in 2004 compared to a 55.8 per cent increase in 2003.

Comment

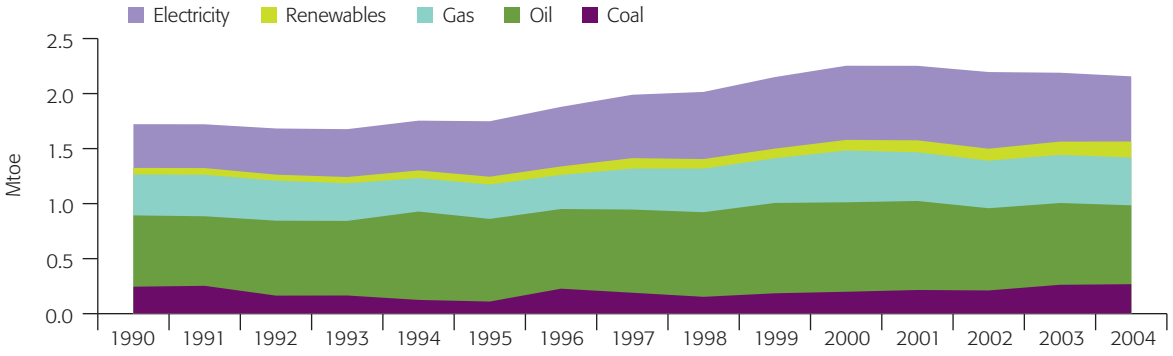
The chemical and pharmaceutical sector is the largest generator of hazardous waste. The sector recently reported a 13 per cent reduction in hazardous waste generation, despite increased production output.

Contaminated soil was the largest single hazardous waste type generated in 2004, accounting for 45.6 per cent of total reported hazardous waste. The continuous increase in the quantity of contaminated soil reflects the scale of redevelopment of brownfield sites.

8.4 INDUSTRIAL ENERGY USE

The industrial sector is a major consumer of energy in Ireland, accounting for 18.3 per cent of total final energy in 2004.

Final Energy Use by Fuel Type in Industry



Source: SEI

Trends over Time

Final energy use in industry grew by 25 per cent (1.6% per annum) to 2.2 million tonnes of oil equivalent (Mtoe) over the period 1990-2004. Within that period only electricity and renewables have increased their share. The share of electricity has risen from 23 per cent in 1990 to 28 per cent in 2004, down from a peak of 32 per cent in 2002 due to the closure of large plants such as Irish Ispat and Irish Fertilizer Industries. Renewables rose from 3.5 per cent in 1990 to 6.8 per cent in 2004 mainly due to the use of biomass in the wood processing industry and the use of tallow in the rendering industry.

Comment

Oil is the most dominant energy source used in industry at 33 per cent, followed by electricity at 28 per cent. The high dependence on imported fuel sources leaves industry vulnerable to increasing fuel prices on world markets and indeed security of supply. There is scope for significant improvement in energy management by industry in Ireland. The approach to increasing the efficiency of energy use should be systematic. When savings have been made by minimising the amount of energy wasted through the use of tools such as energy audits, industry should then consider the use of more efficient energy delivery technologies such as combined heat and power plants, where these are appropriate to the nature and scale of the activity. Such technologies can provide significant savings in terms of both costs and environmental burden by way of the efficient provision of heat and power.

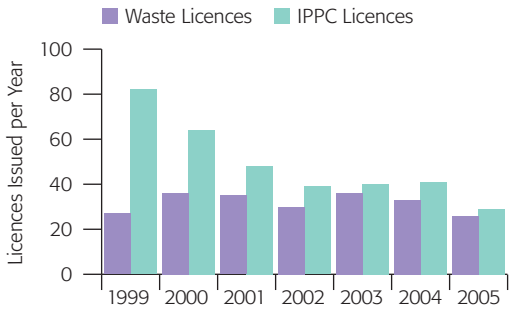
8.5 LICENSING OF LARGE INDUSTRIES

The Office of Licensing and Guidance in the EPA has a wide remit, including licensing large-scale industrial and waste facilities, permitting petrol storage facilities and granting consents for genetically modified organisms (GMOs).

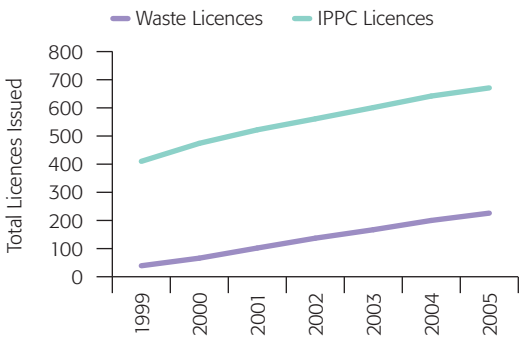
Legislation

The legislative provisions for licensing large industrial sites and waste activities are set out in the Environmental Protection Agency Act 1992, the Waste Management Act 1996 and the Protection of the Environment (PoE) Act 2003.

Annual Licensing of Large Industries



Total Licensing of Large Industries



Source: EPA

Trend over Time

By the end of 2005 the EPA had issued 897 new or revised licences (a single facility may have had its licence revised one or more times). There are currently 175 licensed waste facilities and 635 licensed IPPC facilities in Ireland.

Greenhouse gas permitting commenced on 29 March 2004. Since then 110 installations have been permitted. Two permits have since been revoked as the installations closed down. The Emissions Trading Scheme commenced on 1 January 2005 and all permits have been revised at least once.

Since December 1998, the EPA has permitted 13 installations that required a volatile organic compound (VOC) permit for large-scale petrol storage. These permits are renewed on a three-yearly basis.

There are currently 213 entries on the EPA GMO Register. The majority of these registered GMO/Genetically Modified Micro-organism (GMM) activities take place in third-level research laboratories while the remainder (approximately 11%) take place in private companies.

Comment

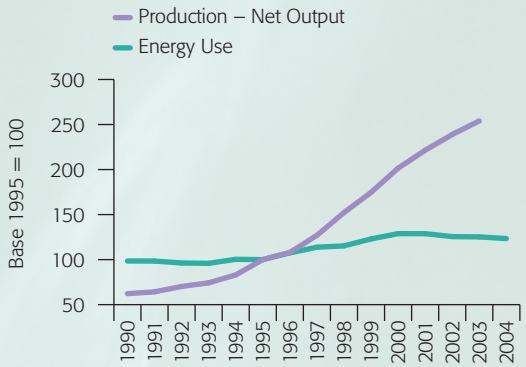
The licensing changes under the Protection of the Environment Act 2003 have had implications for existing licence holders. The EPA has examined all existing IPPC and waste licences to establish whether they satisfy the new requirements of the Act or whether they have to be reviewed. As a result of this review, 29 IPPC licences were identified as satisfying the requirements of the Directive, 100 IPPC licences and 43 waste licences were amended in order to satisfy the new requirements, and a further 156 IPPC licences will require full reviews in 2006/2007. The remaining licences (approximately 350) do not need to be amended at this time as they are licensed by virtue of more stringent thresholds applied in Irish law which are not contained in the EU IPPC directive.

8.6 KEY CHALLENGES

Increasing Energy Efficiency

Relative decoupling of manufacturing output and energy use has been evident since the early 1990s. Energy efficiency in Irish industry has increased more rapidly since 1996, which coincides with the introduction of IPPC licensing and the requirements therein for energy audits and cleaner production initiatives. Absolute decoupling is evident from 2000 and coincides with an accelerated rise in energy price (38 per cent over the period 2000 to 2005). These increased energy costs contributed to the closure of energy-intensive industries in Ireland such as fertiliser and steel manufacture, which enhanced the overall energy efficiency of the industry sector. In a recent European study of energy consumption per GDP, Ireland ranked among the best, in third place. As energy prices are likely to rise, Irish industry will need to maintain its focus on energy efficiency if it is to remain clean and competitive on world markets.

Industrial Production and Energy Use

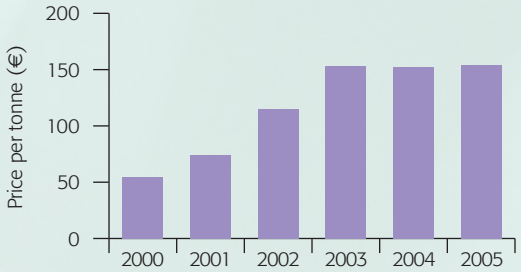


Source: CSO & SEI

Reduced Waste Generation

Average landfill disposal costs in Ireland increased by approximately 300 per cent over the period 2000 to 2005. Approximately 130,000 tonnes of industrial waste was disposed of in commercial landfills in 2004. A further 4.46 million tonnes was disposed of in onsite landfills, predominantly within the mining sector. Studies under the EPA's Cleaner Greener Programme have shown that significant reductions in waste generation can be achieved within industry. The challenge now is the implementation of such waste reduction initiatives across the industry sector at large.

Average Landfill Charges per Tonne

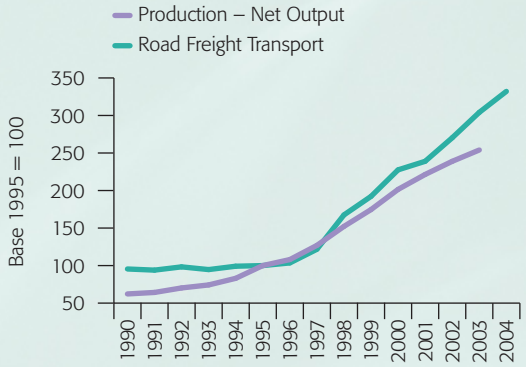


Source: White Young Green, IBEC

Industry and Transport

There is a strong correlation between growth in industrial output and increases in road freight transport. Road freight is the primary means by which raw materials and products are transported to and from manufacturing facilities. Given Ireland's size, the average distance goods are transported within the State is small and militates against the use of rail as a viable freight transport option. In addition, increasing trends in outsourcing manufacturing activities to low cost economies, just in time delivery and changing customer demand patterns have the potential to increase the impact on the environment. The challenge now is to increase the efficiency of freight transport by improving logistics management.

Industrial Production and Freight Transport



Source: CSO

9. ENERGY

Ireland's dependence on imported non-renewable fossil fuels, particularly oil, has continued to increase.

During the period 1990-2004 there has been an increase of 71 per cent in greenhouse gas (GHG) emissions from electricity generation.

The transport sector is the largest energy-consuming sector in Ireland, accounting for 40 per cent of total final energy consumption in 2004.

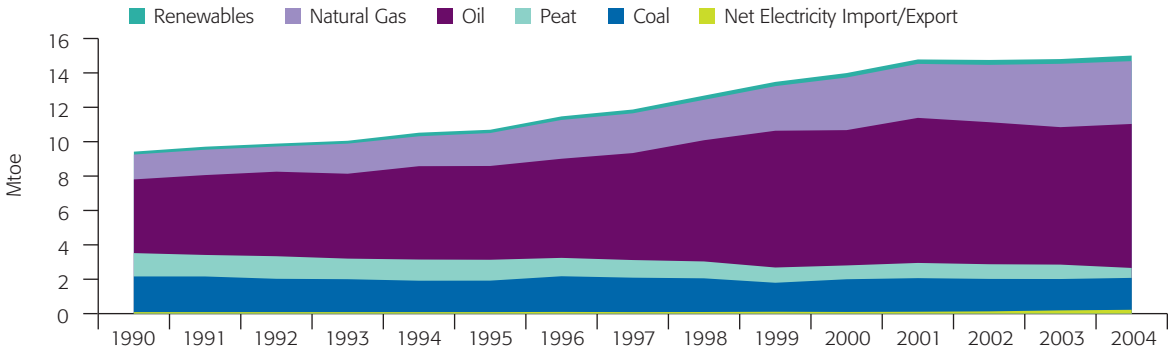
The total contribution from renewable energy to gross electricity consumption in 2004 was 5.2 per cent. A key focus of national policy with regard to renewables has been in the production of electricity from wind energy.

The information contained in this section is taken from a Sustainable Energy Ireland publication, *Energy in Ireland 1990-2004*.

9.1 TOTAL PRIMARY ENERGY REQUIREMENT BY FUEL TYPE

Ireland's energy supply is assessed in terms of changes to the total primary energy requirement (TPER). TPER is the total amount of energy used within Ireland in any given year. This includes the energy requirements for the conversion of primary sources of energy into forms that are useful for the final consumer, for example electricity generation and oil refining. These conversion activities are dependent to a large extent on the efficiency of the transformation process and the technologies involved.

Total Primary Energy Requirement (million tonnes of oil equivalent, Mtoe)



Source: SEI

Trend over Time

Over the period 1990-2004 Ireland's TPER grew in absolute terms by 59 per cent (average annual growth rate of 3%). Growth in 2004 in Ireland was 1.4 per cent.

Oil continues to be the dominant energy source with its share increasing from 46 per cent in 1990 to a peak of 59 per cent in 1999. Compared with other fuels, renewable energy experienced the highest growth in 2004, increasing by 18 per cent. This rate of increase meant renewable growth outpaced that of primary energy consumption and increased its share from 1.8 per cent in 2003 to 2.2 per cent of TPER in 2004, the highest share since 1990. Since 1990 renewable energy has grown by 92 per cent.

Natural gas use increased by 153 per cent, its share in overall energy supply increasing from 15 per cent in 1990 to 25 per cent in 2003 but falling slightly to 24 per cent in 2004. Sixty-two per cent of overall natural gas consumption in 2004 was used for electricity generation.

Energy demand from peat experienced a decline of 58 per cent in absolute terms over the period, with national share of energy supply also falling, from 14 per cent to 3.8 per cent. In 2004, peat consumption decreased significantly by 31 per cent compared with 2003, primarily due to the closure of old peat-fired electricity generation plants.

The relative share of energy demand from coal declined from 23 per cent to 13 per cent. In absolute terms over the period, coal declined by 10 per cent. In 2004 the use of coal increased by 1.6 per cent over the previous year.

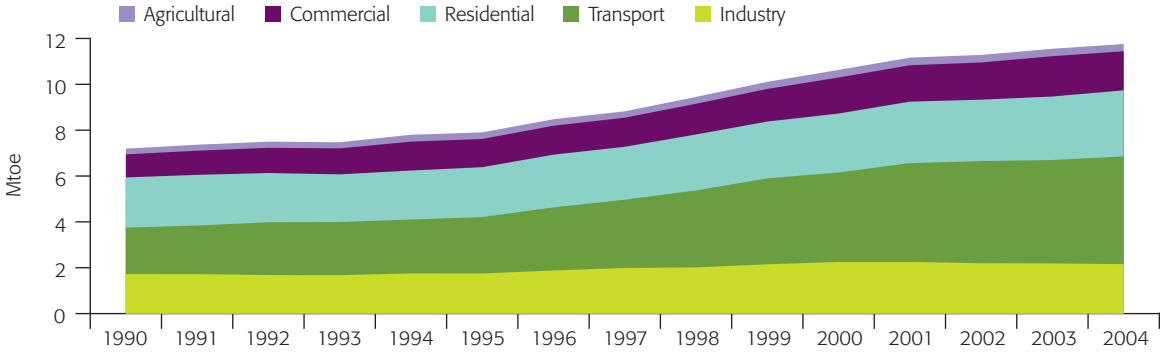
Comment

Ireland is very dependent on imported fossil fuels for energy production. Imported oil and gas accounted for 73 per cent of our energy requirement in 2004 compared with 45 per cent in 1990. This trend reflects the fact that Ireland is not endowed with significant indigenous fossil fuel resources and to date has not harnessed significant quantities of renewable sources.

9.2 TOTAL FINAL ENERGY CONSUMPTION BY SECTOR

Total final consumption (TFC) of energy represents the quantity of energy necessary to satisfy the energy needs of a country. It is calculated as the sum of gross inland consumption of energy from solid fuels, oil, gas and renewable sources. Energy consumption is measured in million tonnes of oil equivalent (Mtoe).

Total Final Energy Consumption by Sector



Source: SEI

Trend over Time

Ireland's TFC in 2004 was 11.8 Mtoe, an increase of 1.8 per cent on 2003 and 64 per cent above 1990 levels. This increase in final consumption on 2003 was achieved with just a 1.4 per cent increase in primary energy. This indicates continued improvement in the efficiency of supply.

Transport was the main sector responsible for the overall increase in energy consumption, as its energy use increased by 132 per cent over the period 1990-2004. Its overall share of TFC increased from 28 per cent in 1990 to 40 per cent in 2004.

Residential energy use grew by 33 per cent over the period 1990-2004. Its share of TFC decreased from 30 per cent in 1990 to 25 per cent in 2004.

The commercial and public services sector's share of final energy use in 2004 remained close to what it was in 1990 at 14.5 per cent. In absolute terms, final energy use grew by 70 per cent to 1.7 Mtoe over the 1990-2004 period.

Comment

Over the period the relative weighting of the sectors has changed. Transport has continued to increase its dominance as the largest energy-consuming sector, while the share of industry and residential have decreased. Over the next five years, growth in demand by the transport sector is forecast to be the biggest factor driving energy demand.

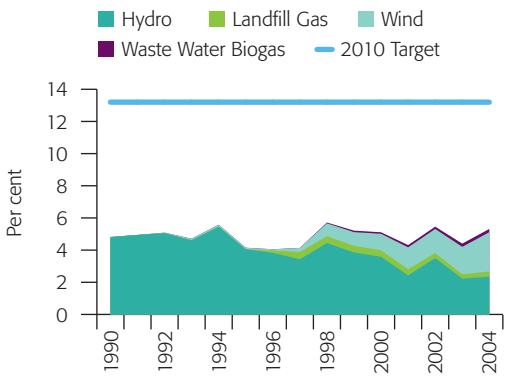
9.3 RENEWABLE ENERGY CONTRIBUTION TO GROSS ELECTRICITY CONSUMPTION

Renewable energy sources are non-fossil energy sources that are not depleted by utilisation: wind, solar, geothermal, wave, hydroplant and biomass. Renewable electricity is generally considered environmentally benign because of very low or zero net emissions of CO_2 per unit of electricity produced.

Legislation

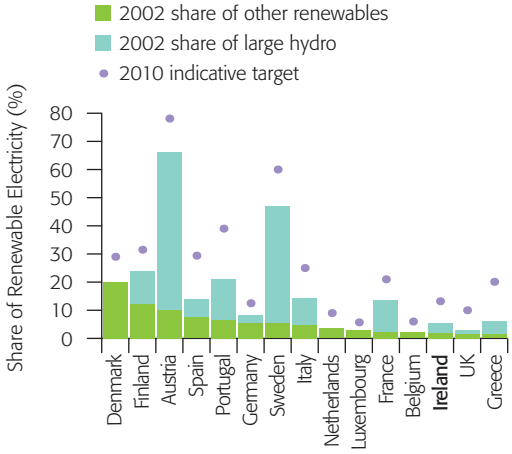
The Renewables Electricity Directive (2001/77/EC) defines renewable electricity as the share of electricity produced from renewable energy sources in gross electricity consumption. In this 'RES-E' Directive indicative targets for each Member State are provided for the contribution of renewable generated electricity to gross electricity consumption by 2010. Under this directive the target for Ireland is a 13.2 per cent share of gross electricity consumption by 2010.

Renewable Energy Contribution to Gross Electricity Consumption



Source: SEI

Share of Renewable Electricity in Gross Electricity Consumption in the EU15 in 2002



Source: Eurostat

Trend over Time

In absolute terms there has been a 122 per cent increase in the growth rate of renewables to the electricity generation fuel mix. The total contribution from renewable energy to gross electrical consumption in 2004 was 5.2 per cent (compared to 4.3% in 2003 and 4.8% in 1990). While the proportion from hydro has declined, electricity production from wind energy and landfill gas has increased. There was also a small contribution from waste-water biogas (0.06%) in 2003 and 2004. Wind and hydro energy in 2004, respectively, accounted for 2.44 per cent and 2.35 per cent of Ireland's gross electrical consumption, while landfill gas was responsible for 0.32 per cent. Provisional 2005 data on renewable contribution to electricity generation suggests an increase from 5.2 to 6.8 per cent. The increase is a result of additional wind energy generation capacity.

Comment

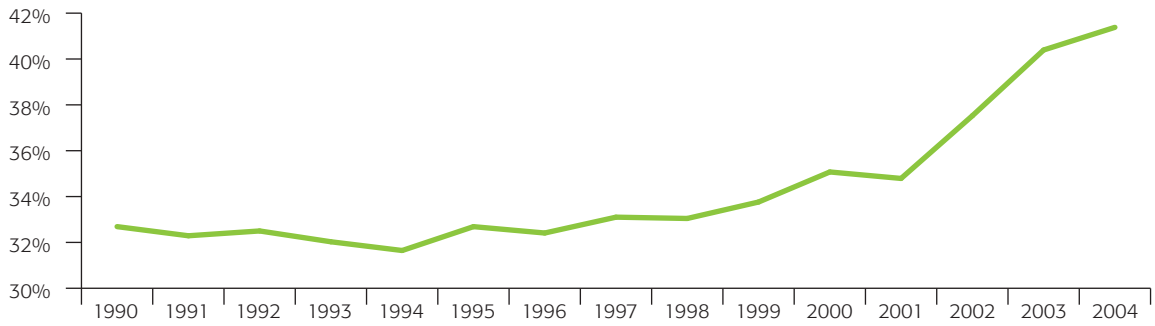
There has been a significant increase in the growth rate of renewable energy to electricity consumption since 1990. The increase has not resulted in a significant share increase as advances made have been offset by an increase in overall electricity demand. The slow progress made to date provides an indication of the scale of the task to achieve the 13.2 per cent target set by the EU directive, and indeed the most recent national target of 15 per cent by 2010.

A key focus of national policy with regard to renewables has been in the production of electricity from wind energy, due to the size of the wind energy resource in Ireland. The contribution from wind energy is set to grow further due to a significant increase in the number of wind turbines.

9.4 ELECTRICITY EFFICIENCY

The efficiency of electricity supply is defined as final consumption of electricity divided by the fuel inputs required to generate this electricity and expressed as a percentage. The inputs include renewable sources and imports and the final consumption excludes the generation plants' 'own use' of electricity and transmission and distribution losses. Hence this is supply efficiency rather than generating efficiency.

Efficiency of Electricity Supply



Source: SEI

Trend over Time

From the mid-1990s onwards the influence of the use of higher efficiency natural gas plants and the increase in production from renewable sources is evident. The sharp rise in 2002 (from 35% to 37%) is accounted for, principally, by the coming on stream of new Combined Cycle Gas Turbine (CCGT) plant (392 MW in August 2002 and 343 MW in November 2002) and the increase in imports of electricity relative to 2001. The trend continued in 2003 with the efficiency of electricity supply increasing to 40 per cent, resulting from a full year with the two new CCGT plants in operation in addition to increased imports of electricity.

In 2004 the efficiency increased by a further 1 percentage point to 41 per cent, by the replacement of the old peat plants in Lanesboro and Shannonbridge with two new higher efficiency plants in Lough Ree and West Offaly. Wind generation and electricity imports also contributed to this efficiency increase.

Comment

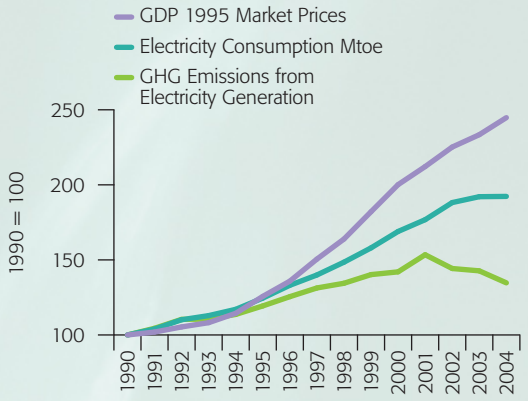
The improvement in the efficiency of electricity supply is encouraging, as it has resulted in a reduction in CO_2 emissions per kWh of electricity supplied. Further efficiency gains can be obtained by increasing the installed capacity of renewable energy based electricity generation and combined heat and power (CHP) plants.

9.5 KEY CHALLENGES

Further Reduction of Greenhouse Gases (GHGs) from the Power Generation Sector

In order to curb the rapid growth in GHGs arising from the energy sector there needs to be a continued focus on the efficiency of electricity use within the State. The growth in renewables in electricity generation needs to be significantly increased and greater use of energy efficient generating technologies such as CHP encouraged within the industrial and commercial sector (hospitals, hotels, etc.). There are still efficiencies to be gained by retrofitting or replacing old inefficient power generation stations.

GDP, Electricity Consumption and Greenhouse Gas Emissions

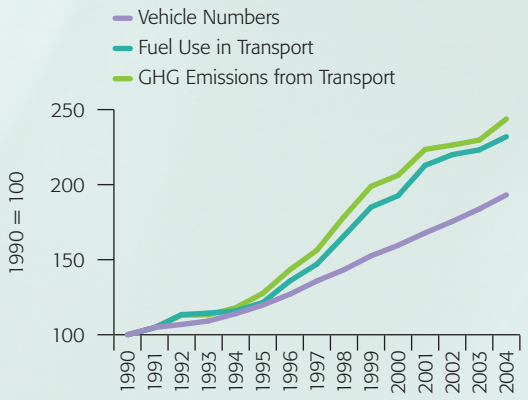


Source: CSO, SEI, EPA

Improving Transport Efficiency

Transport now consumes 40 per cent of energy used within the State. Car ownership levels in Ireland have increased dramatically and the average engine size of cars purchased has also increased, from 1401 cc in 1990 to 1577 cc in 2005. The key challenges therefore are to increase the energy efficiency of vehicles and to reverse the trend in the purchase of vehicles with larger engine size. Increased use of public transport as a means of travel and the use of more efficient methods of freight transport are also required if the upward trend in energy consumption by the transport sector is to be curtailed.

Vehicle Numbers, Fuel Use and GHG Emissions



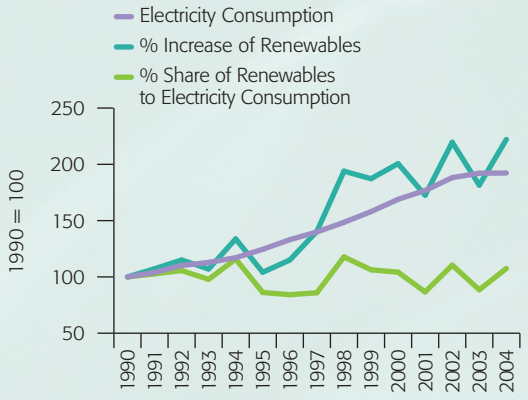
Source: DEHLG, SEI, EPA

Reducing Our Dependence on Imported Fossil Fuels in favour of Renewable Energy Technologies

Ireland is heavily dependent on imported fossil fuels to meet its energy requirements. There has been a 122 per cent increase in electricity generation from renewables from 1990 to 2004. However, this increase has only kept pace with the growth in overall electricity consumption. As such the share of renewables to electricity generation has remained low at between 4 and 5 per cent. Provisional data for 2005 suggests an increase in the contribution from renewables to 6.8 per cent.

The government has recently increased its target for electricity generation from renewables from 13.2 per cent to 15 per cent by 2010. This will require the electricity generation from renewables to be doubled over the next five years.

Electricity Consumption and Renewables



Source: SEI

10. AGRICULTURE

Although the share of Ireland's greenhouse gas emissions attributed to agriculture fell from 35 per cent in 1990 to 29 per cent in 2004, agriculture still contributes a significant proportion of our total greenhouse gas emissions (three times the European average).

While some reductions have been made, nitrogen and phosphorus in fertiliser continue to be a major contributor to pollution of water bodies.

The increase in REPS participation is to be welcomed, but needs to be further extended in more intensive farming areas.

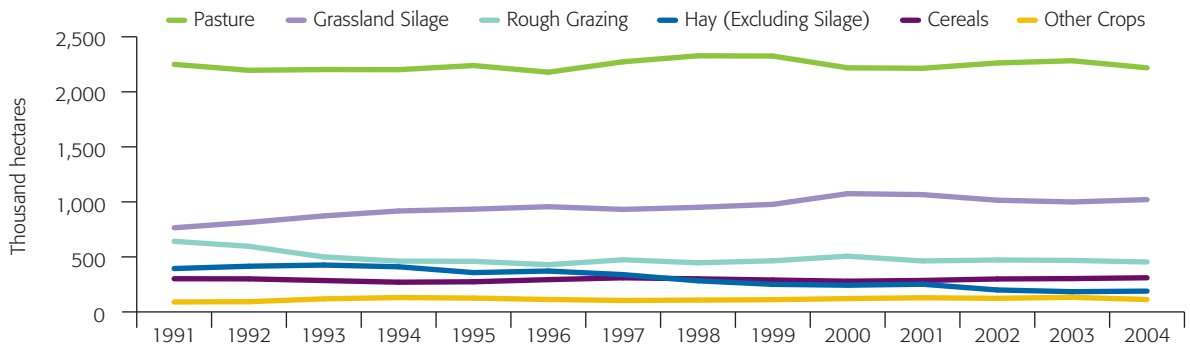
10.1 AGRICULTURAL LAND USE

Agriculture accounts for almost two-thirds of the land area of the State. Analysis of the CORINE Land Cover data for 2000 shows that 55 per cent of the land area is covered by pasture and mixed farmland, 7 per cent by arable land and permanent crops, and 2 per cent by natural grassland and heathland.

Legislation

In 2003 EU farm ministers adopted a fundamental reform of the Common Agricultural Policy (CAP), based on the decoupling of income from agricultural production (the *Luxembourg Agreement*). Ireland has opted for complete decoupling. The new Single Farm Payment (SFP), which replaces previous production-related farm subsidies, is linked to environmental, food safety and animal welfare standards.

Use of Agricultural Land



Source: CSO

Trend over Time

Pasture remains the dominant agricultural land use in Ireland: since 1991 it has accounted for between 50 and 53 per cent of the agricultural land area, and in 2004 it accounted for 51.5 per cent.

The land area devoted to silage production increased from 17.2 per cent of agricultural land in 1991 to 24.2 per cent in 2000 and 2001, dropping slightly since then, while the area used for hay and rough grazing dropped from 17.2 per cent in 1991 to 14.9 per cent in 2004. The area used for cereals has varied only slightly, while the area used for other crops (potatoes, turnips, sugar beet, kale, vegetables, fruit, maize silage and arable silage, and nurseries) varied from 2 per cent to 3 per cent and stood at 2.6 per cent in 2004.

Comment

Full decoupling may change the pattern of land use in Ireland. Some farmers may increase the intensity of agricultural production in order to minimise unit costs, while others may decide that the cost and effort required to work the land is not warranted, given the possibility of low or negative returns in the competitive world market. In some situations this could result in land abandonment or gradual withdrawal from farming.

Intensification of farming practices and land abandonment each has its own potential impact on the environment. Intensification may lead to increased use of fertilisers and chemicals for crop management purposes in the case of arable farming, while viable livestock units are likely to see an overall increase in stocking density. Intensification of agriculture poses risks in terms of water quality degradation and biodiversity loss, particularly where it leads to clustering of intensive agricultural practices within the country.

At the other extreme, land abandonment and the withdrawal of traditional farm management practices may result in the loss of biodiversity on farmland. Sound agricultural management practices can have a substantial positive impact on the conservation of wild flora and fauna, as well as on the socio-economic situation of rural areas. Traditional farming contributes to safeguarding certain existing natural or semi-natural habitats.

10.2 LIVESTOCK NUMBERS

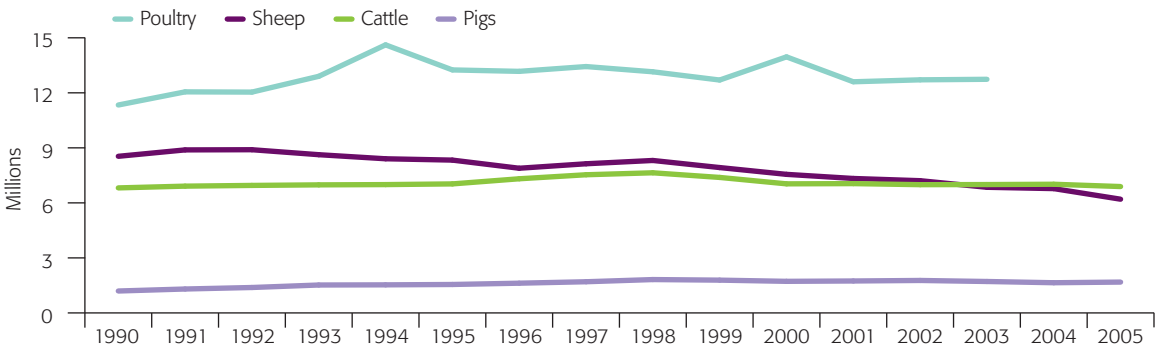
Agriculture generates upwards of 60 million tonnes of managed animal manures per annum. This figure does not include the significant quantities of manure deposited directly on land by farm animals. The organic load generated by agricultural livestock in Ireland is equivalent to that of a human population of about 70 million persons. Agricultural intensification will increase the pressure on the environment in terms of greenhouse gas (GHG) emissions, agricultural waste generation, acidification, eutrophication and overgrazing.

Legislation

Livestock numbers in Ireland have been influenced by the various reforms of the CAP, through such policy decisions as milk quotas and farm subsidies. Measures to be taken under Nitrates Directive (Directive 91/676/EEC) action programmes will limit the livestock manure that may be applied to the land each year to an amount appropriate to protecting water from pollution by nitrates of agricultural origin.

Under the Agenda 2000 reform, two extensification limits were introduced to influence the level and type of EU beef production. The payments introduced under the extensification scheme are conditional on the adherence of the producer to one of two different stocking density limits, either less than 1.4 livestock units[1] per hectare (LU/ha) or between 1.4 and 1.8 LU/ha.

Animal Numbers



Source: CSO

Trend over Time

Cattle numbers have remained steady since 1999 at just under 7 million; however, the proportion of dairy cattle has gradually dropped. Sheep numbers have decreased from just under 9 million in 1992 to 6.2 million in 2005. Pig numbers remain steady at 1.7 million, while poultry numbers in 2003 totalled 12.7 million.

Comment

Cattle numbers are expected to drop in the long term. There is a predicted reduction in the national dairy herd associated with improved animal productivity. It is also expected that the non-dairy herd will contract as a result of the decline in profitability of that sector, as well as the implementation of extensification measures guaranteed under the reform of the CAP implemented by Agenda 2000. Recent world trade talks suggest that export subsidies on beef may also be substantially reduced, in which case profitability of beef production would be further eroded.

While sheep numbers have fallen in response to commonage framework plans and subsequent partial recovery of overgrazed hillsides has been noted in many areas, overgrazing is still apparent in some fragile hillside catchments.

1 1 LU is equivalent to 1 head of cattle.

10.3 ORGANIC AND INORGANIC NITROGEN FERTILISER APPLICATION

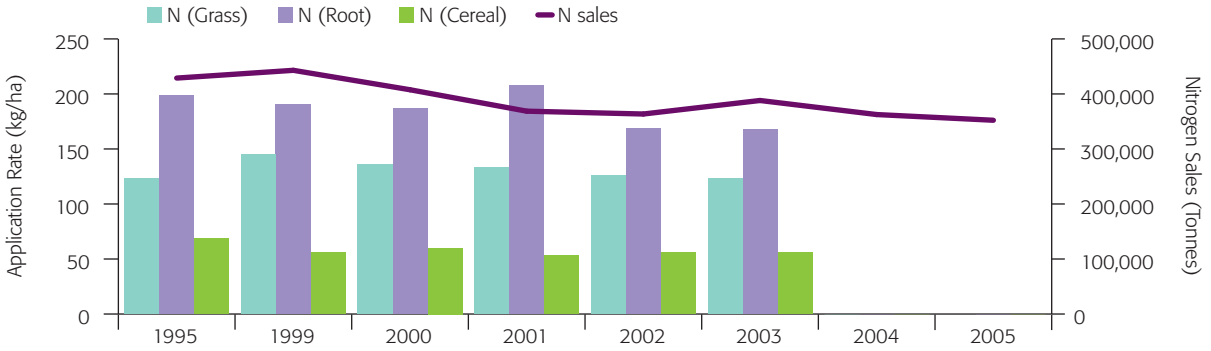
A survey of fertiliser use for grassland and arable crops from 2001 to 2003, published by Teagasc in July 2005, found that the changes in nitrogen usage from 1995 to 2003 appear to be similar to those for national nitrogen fertiliser sales, which have fallen by 18 per cent over the past 10 years. The report found that nitrogen fertiliser usage was much greater in the Southeast and South of the country than in the other regions.

Pollution from nitrates, the most oxidised chemical form of nitrogen (N) found in natural systems, can result from the excessive application (or misapplication) of nitrogenous fertilisers to lands. The inappropriate spreading or discharge of livestock manures and the excessive use of fertilisers are a serious threat to water quality.

Legislation

Measures taken under Nitrates Directive (Directive 91/676/EEC) action programmes contain rules limiting the rate of organic nitrogen fertiliser application. The Directive specifies that the organic nitrogen applied to the land via manure deposition each year, including that deposited directly by animals, should not exceed a specified amount per hectare, and sets this at 2 LU/ha, equivalent to 170 kilograms per hectare (kg/ha) of organic nitrogen.

Nitrogen Fertiliser Usage for Grassland, Root and Cereal Crops



Source: CSO/Teagasc

Trend over Time

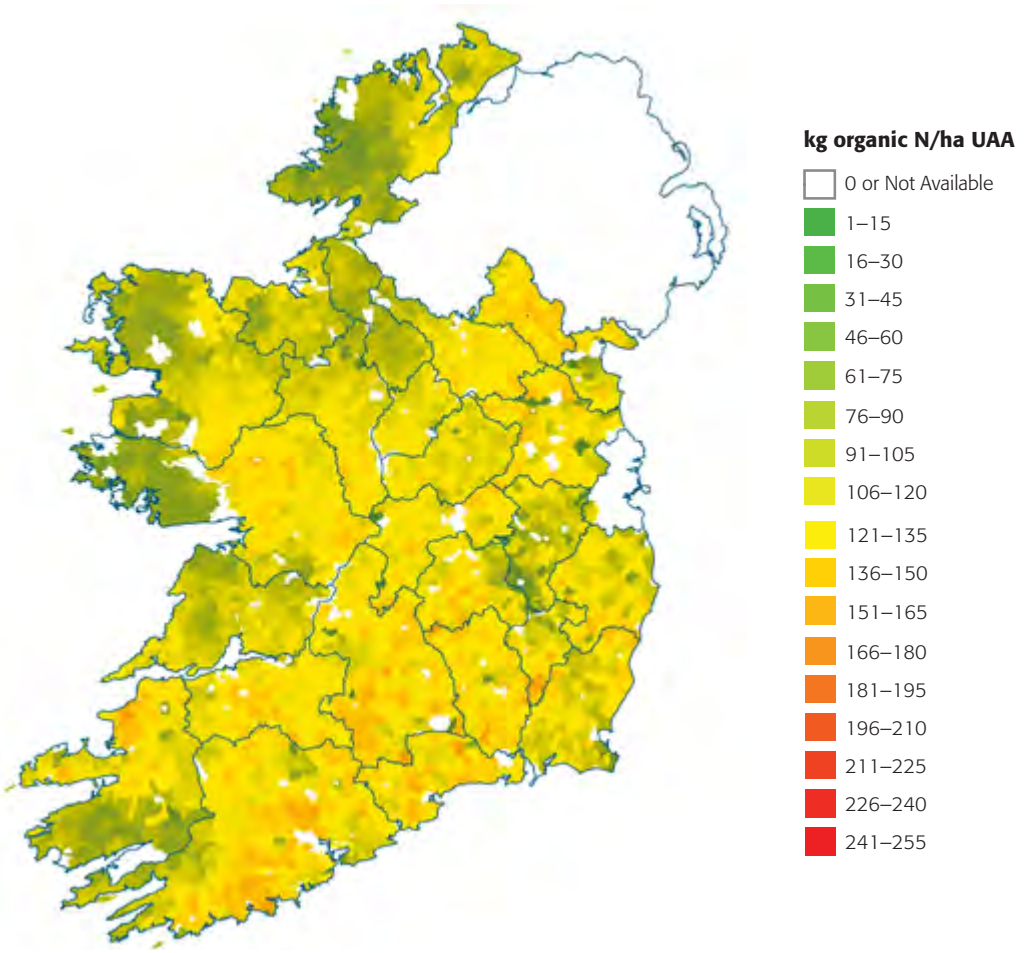
The map shows organic nitrogen loading in kilogram N per hectare of utilisable agricultural area (UAA) aggregated on a DED (District Electoral Division) basis. The values have been computed by Teagasc from animal numbers recorded by the CSO in the Agricultural Census of 2000.

The map highlights the areas where N application rates are highest. It can be seen that, at DED level, most organic N application rates remain below 170 kg/ha N, with just 0.3 per cent (22,344 ha) exceeding this target. A negligible area exceeds 210 kg/ha.

Comment

The implementation of the Nitrates Directive regulations is predicted to lead to a reduction in nitrogen use in Irish agriculture.

Organic N Loading (2000)



Source: CSO/Teagasc

Note: Those DEDs where the respective N value is zero, or where data is unavailable, are coloured white. N values are available for 95.5 per cent of the land area of the State.

10.4 ORGANIC AND INORGANIC PHOSPHATE FERTILISER APPLICATION

Phosphorus (P) is usually the limiting nutrient in algal and higher plant growth in inland surface waters and is primarily responsible for the increase in moderately polluted waters (eutrophication) in recent years. Phosphorus loss from agricultural sources accounts for the highest proportion of phosphate loading to surface waters; the impact of this pollution varies with weather and soil conditions.

Legislation

The Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998, set quality standards for phosphorus in rivers and lakes and requires that the EPA and local authorities take all appropriate steps in discharge of their functions to secure compliance with these.

Trend over Time

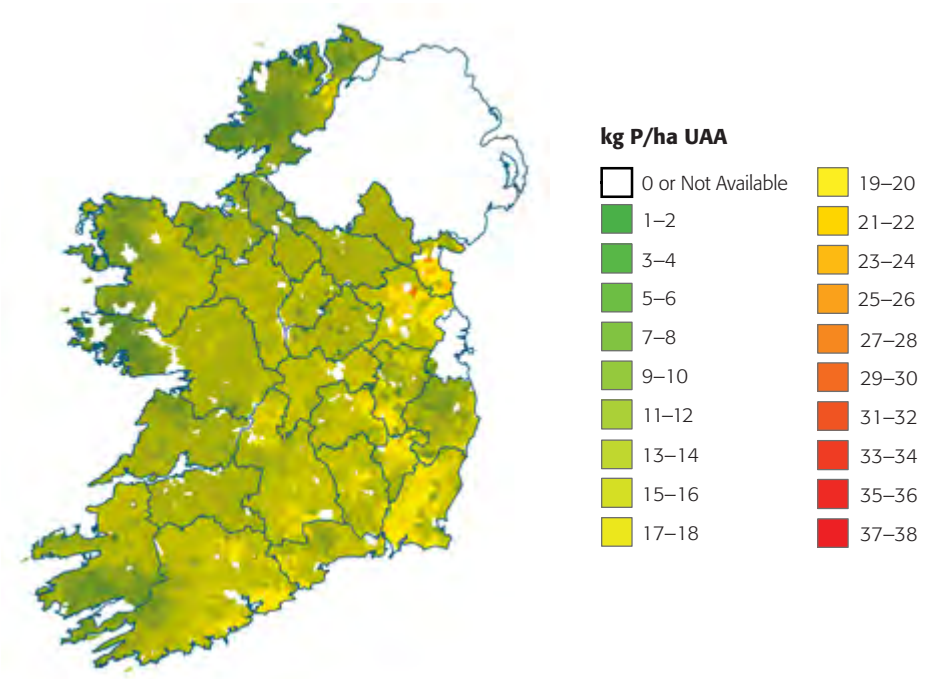
The maps indicate in red the areas where P application rates are highest. They indicate the application rates of P from phosphate fertiliser (inorganic P) and the loading from animal manure (organic P) in kilograms per hectare of UAA aggregated on a DED basis. Teagasc computed the values from animal numbers recorded by the CSO in the Agricultural Census of 2000. It can be seen that chemical P application is most intense in the Northeast, the eastern midlands and the Southeast, whereas organic P application rates are generally moderate in all farming regions. When organic and inorganic P are combined, the highest application rates are found in the South, the Southeast and the Northeast.

Comment

Almost half the slight and moderate eutrophication on Irish rivers is due to agricultural sources. It is estimated that over 70 per cent of phosphorus reaching inland waters emanates from agricultural sources. The loss of phosphorus to water (from diffuse field sources) is affected by such factors as soil phosphorus level, drainage classification (rainfall and connectivity to water) and soil type (pH, organic matter, iron and aluminium content). Farmyard P losses to the environment are also important.

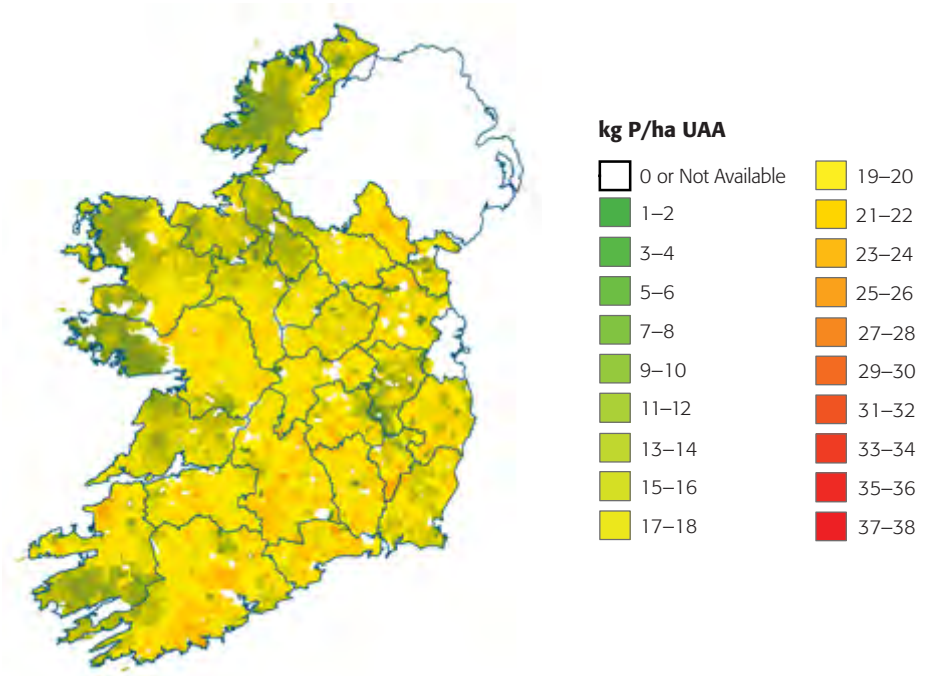
Rates of fertiliser application should be based on replacing the phosphorus off-take once the optimum soil P test level has been reached. Fertiliser application in excess of these rates is uneconomic and increases the risk of losses to the environment.

Inorganic P Application Rates



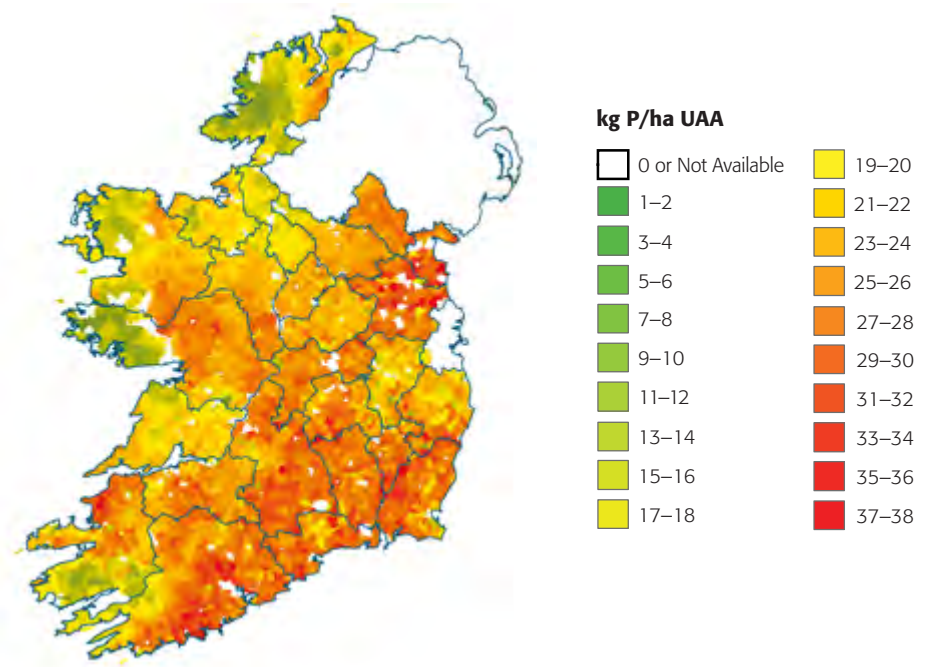
Source: CSO/Teagasc

Organic P Loading



Source: CSO/Teagasc

Combined Organic and Inorganic P



Source: CSO/Teagasc

Note: Those DEDs where the respective P value is zero, or where data is unavailable, are coloured white. P values are available for 95.5 per cent of the land area of the State.

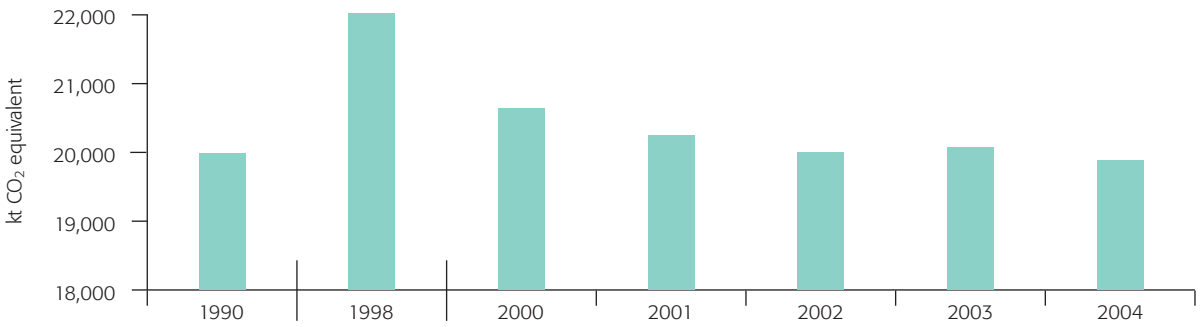
10.5 GREENHOUSE GASES FROM AGRICULTURE

Agriculture's share of the national GHG inventory dropped from 35 per cent in 1990 to 28 per cent in 2003. This figure is three times the EU25 average (9.5%) and the highest in Europe. In France, the next highest, agriculture contributed 17.6 per cent of GHGs in 2003.

Obligations

In 1997, the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Kyoto Protocol. It was agreed that, over the period 2008 to 2012, global emissions of GHGs (carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6)), expressed in CO_2 equivalents, should be at least 5 per cent less than emission levels recorded in 1990. The overall EU target is to reduce emissions by 8 per cent and, within this, an EU burden-sharing agreement (June 1998) recognises Member States' differing circumstances. The target for Ireland is an emissions level of +13 per cent over the 1990 level.

Greenhouse Gases from Agriculture (kt CO_2 equivalent)



Source: EPA

Trend over Time

In Ireland ruminant animals, such as cattle and sheep, are the main source of CH_4, a gas with a relatively high global warming potential. The decomposition of organic material in animal manures may be a significant source of methane emissions if anaerobic conditions prevail in the animal manure management systems being used. Our large livestock populations produce about 0.54 million tonnes of CH_4 annually through enteric fermentation and manure management.

Agricultural soils are the main source of N_2O. Direct emissions arise from the application of fertilisers, both organic and inorganic, as well as from livestock production.

GHGs from agriculture reached a maximum in 1998 and have fallen from 19,979 kilotonnes CO_2 equivalent in 1990 to 19,881 kilotonnes in 2004, reflecting a decline in the cattle population and fertiliser use.

Comment

As a result of a predicted reduction in cattle numbers, further reductions in emissions of methane (which has 21 times the global warming impact of CO_2) from enteric fermentation and manure management are expected. Methane in animal slurries can be converted into CO_2 by anaerobic digestion, a process which thereby reduces the GHG contribution from slurry and also transforms organic nitrogen into inorganic nitrogen, a better fertiliser and, depending on the composition of the digested material, a more balanced fertiliser.

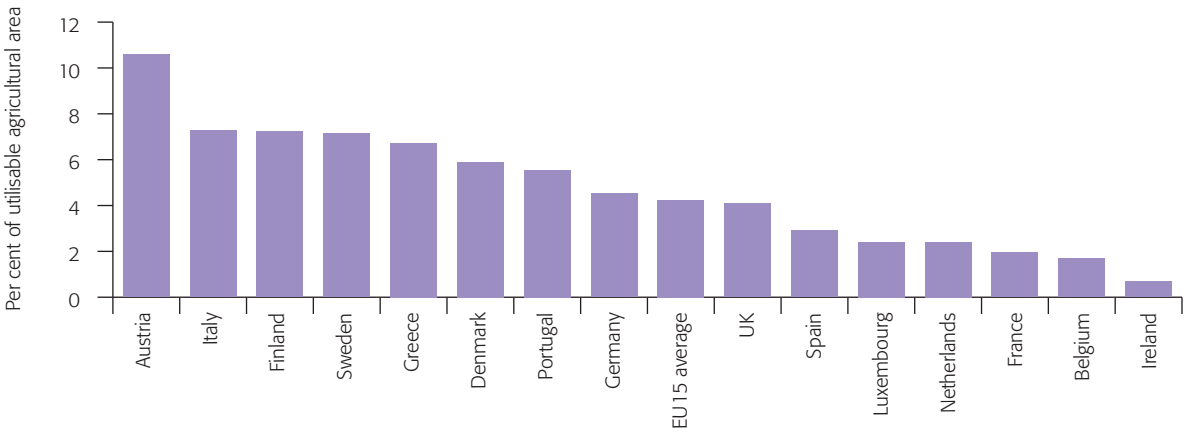
10.6 ORGANIC FARMING

Organic farming is a production system that avoids or largely excludes the use of synthetically compounded fertilisers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming systems rely on crop rotation, crop residues, animal manures and mechanical cultivation to maintain soil productivity, to supply plant nutrients, and to control weeds, insects and other pests.

Legislation

Since the implementation of the first regulation on organic farming (Regulation EEC/2092/91), many farms across the EU have converted to organic production methods. In August 1999 rules on production, labelling and inspection of the most relevant animal species (cattle, sheep, goats, horses and poultry) were also agreed (Regulation EC/1804/1999). This agreement covers such issues as foodstuffs, disease prevention and veterinary treatments, animal welfare, husbandry practices and the management of manure. Genetically modified organisms (GMOs) and products derived from GMOs are explicitly excluded from organic production methods.

Share of Agricultural Area Farmed Organically 2004



Source: Nicholas Lampkin, University of Wales

Trend over Time

The share of agricultural land devoted to organic agriculture in Ireland peaked in 2001 and has been falling since then. There is still a relatively low uptake nationally at approximately 28,500 hectares (approx. 0.69 per cent of total agricultural area in 2004), whereas in the EU25 almost 3.9 per cent of the agricultural area was farmed organically in 2004. The rapid increase in land used for organic farming in Ireland during the late 1990s has not been sustained, and Ireland is falling further behind the EU average. Some 897 food producers were engaged in this form of agricultural practice in Ireland in 2004.

Comment

In Ireland the largest share of organic sales, 43 per cent, is for fruit and vegetables, but about 70 per cent of these are imported. While some imports are necessary for seasonal reasons, the lack of penetration by local producers is notable. There are additional environmental costs associated with the long-distance transportation of organic foods that act to diminish the benefits accruing from organic production. Local production would retain the benefits of organic farming at lower environmental cost.

It is expected that the market for organic foods will continue to grow, supported by consumer demand. Government and retailer initiatives and greater producer co-operation may accelerate this expected growth. Increasing the local production of organic produce by providing incentives and marketing support provides added environmental benefit associated with organic farming.

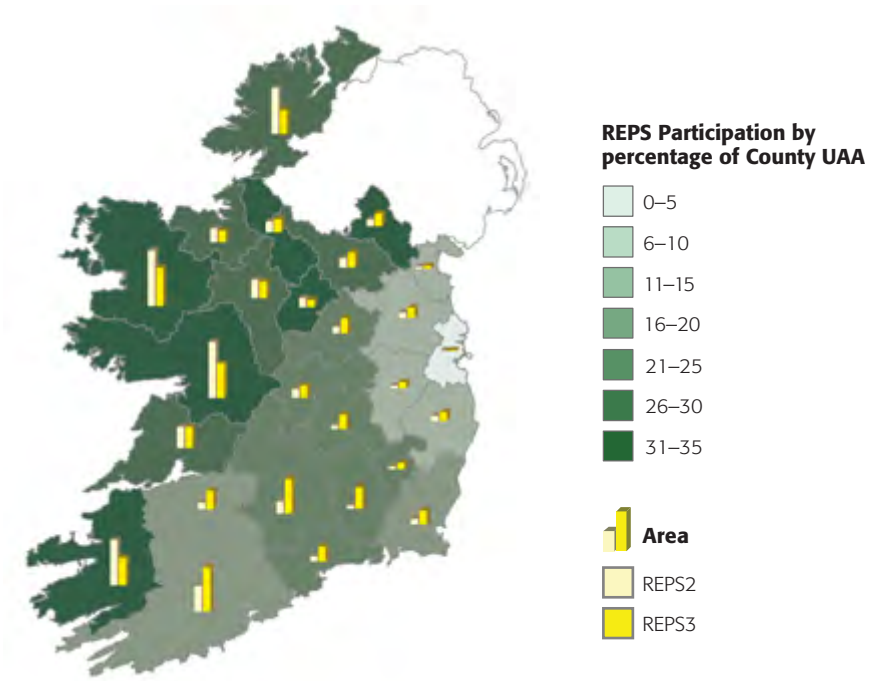
10.7 THE RURAL ENVIRONMENT PROTECTION SCHEME

In Ireland the Rural Environment Protection Scheme (REPS) is the main countrywide agri-environmental scheme instituted as an incentive for farmers to approach their everyday farming practices in an environmentally friendly way.

Legislation

The fifth CAP reform established common conditions for direct payments under the various income support schemes and provided support for the agri-environment. Council Regulation EC/796/2004 of 21 April 2004 laid down detailed rules for the implementation of cross-compliance, modulation and the integrated administration and control system provided for in Council Regulation EC/1782/2003.

REPS Participation Rates



Source: DAF

Trend over Time

Since its launch in 1994, over 45,000 farmers have joined REPS. Based on the latest available data, approximately 39 per cent (or 1.7 million hectares) of the utilisable agricultural area is being farmed under REPS guidelines. REPS uptake has improved since 2002, with a general improvement in the midlands and Southeastern counties. Participation is highest among the smaller extensive farmers in the West and Northwest of Ireland. Large-scale intensive farming activities, which potentially have the greatest impact on the environment, are significantly under-represented in REPS with most participants having less than 40 hectares.

Comment

REPS has environmental benefits and can mitigate the effects of environmentally damaging activities. A recent report found that the N, P and K (potash) fertiliser application rates for grassland and tillage crops on REPS farms were considerably below the rates used on non-REPS farms. In 1999 the Heritage Council recommended that a monitoring and evaluation programme, beginning with the recording of detailed baseline data, be developed and become an integral part of REPS to enable the assessment of the efficacy of the scheme in relation to wildlife protection. However, there is still a dearth of information on the effect of REPS on habitat protection and conservation. A consistent and regular evaluation of the costs and advantages of REPS to the farmer and the environment, under the three major agri-environmental themes encompassing most of the agri-environmental aims of REPS (landscape, biodiversity and agronomy), is required.

10.8 KEY CHALLENGES

Nutrient Management

The misapplication and excessive application of nutrients to lands are significant factors in the pollution of rivers, lakes and groundwaters. Excessive nutrients can be supplied through a combination of chemical fertilisers and animal manure. High animal stocking levels will exacerbate any excessive application of chemical fertiliser. The implementation of the Nitrates Directive and the Water Framework Directive will put agriculture under increasing pressure to modify nutrient application practices. All farmers should prepare Nutrient Management Plans to assist with correct fertiliser usage and to focus attention on the necessary improvements in farm practice. Local authorities have powers under the Waste Management Act, 1996 to require a farmer to prepare a Nutrient Management Plan where this is considered necessary to prevent, eliminate or minimise nutrient losses to waters. Focusing nutrient management by identifying catchment 'hotspots' where the bulk of nutrient losses to water occur is also a key challenge.

Greenhouse Gases

Although there has been a reduction of seven percentage points in GHGs from agriculture since 1990, it still constitutes a significant proportion of Ireland's total GHG emissions and is three times the European average. Mitigation of farm livestock GHG emissions needs to be examined.

Biological Diversity

Farmers are custodians of the landscape and, as such, need to take responsibility for the environmental and ecological effects of their activities. Farming practices insensitive to the underlying ecology (especially intensive farming practices) are leading to a continuous loss in biological diversity: this trend must be reversed. Fuller participation in REPS should be encouraged, particularly by farmers whose income in the new economic climate may be marginal, while the full rigours of cross-compliance will be required to ensure that more intensive agricultural practices are carried out in an environmentally sustainable way. Encouraging biodiversity by participation in, for example, the native woodland riparian scheme may also help to reduce diffuse nutrient losses from fields.

11. FORESTRY

Forests have many environmental benefits, including the removal of carbon dioxide, a greenhouse gas, from the atmosphere and the provision of habitats to support animal and plant life. In order to achieve the full range of benefits, and avoid a negative impact on the environment, forests need to be properly planned and maintained.

Government policy is to rely on the private sector, mainly farmers, for afforestation (the conversion of land from other uses to forestry). Afforestation rates in 2005 were approximately half the national target of 20,000 hectares per annum.

The target of 30 per cent broadleaf afforestation set in the National Biodiversity Plan has been achieved. It is important that this level be maintained so as to support a wider range of bio-diversity than would be supported by coniferous afforestation alone.

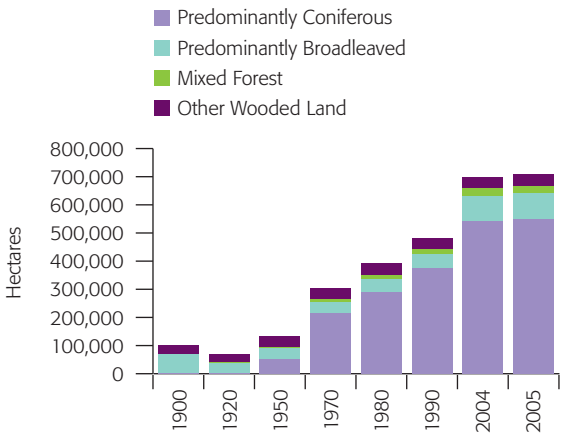
11.1 FOREST COVER

The extension of forestry has brought many important economic benefits, including employment and forest ownership, to the participants. When forestry is sensitive to the environment it can provide additional benefits to the wider community: these include the prevention of soil erosion and landslip, new opportunities for recreation and tourism, and enhanced social, aesthetic and wildlife aspects of the natural environment. Forests can make a significant contribution towards meeting our obligations of limiting greenhouse gases by absorbing carbon dioxide from the atmosphere (carbon sequestration). Conversion of agricultural land to forestry results in a lower chemical fertiliser requirement. On the other hand, poorly planned and managed forests can result in increased soil and water acidity, which impacts negatively on aquatic fauna and flora, and in pollution of waters by fertilisers and pesticides.

Legislation

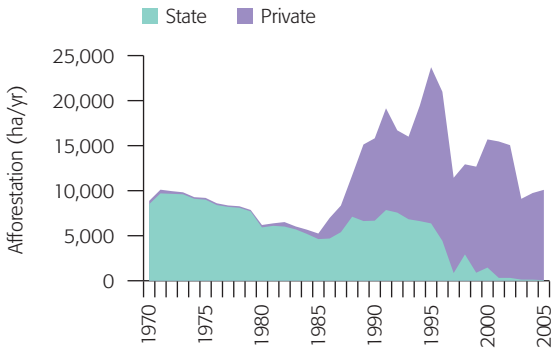
The major legislation governing forests is the Forestry Act of 1946 as amended and the Wildlife (Amendment) Act 2000.

Forest Composition and Land Area



Source: Forest Service

Afforestation in Ireland



Source: Forest Service

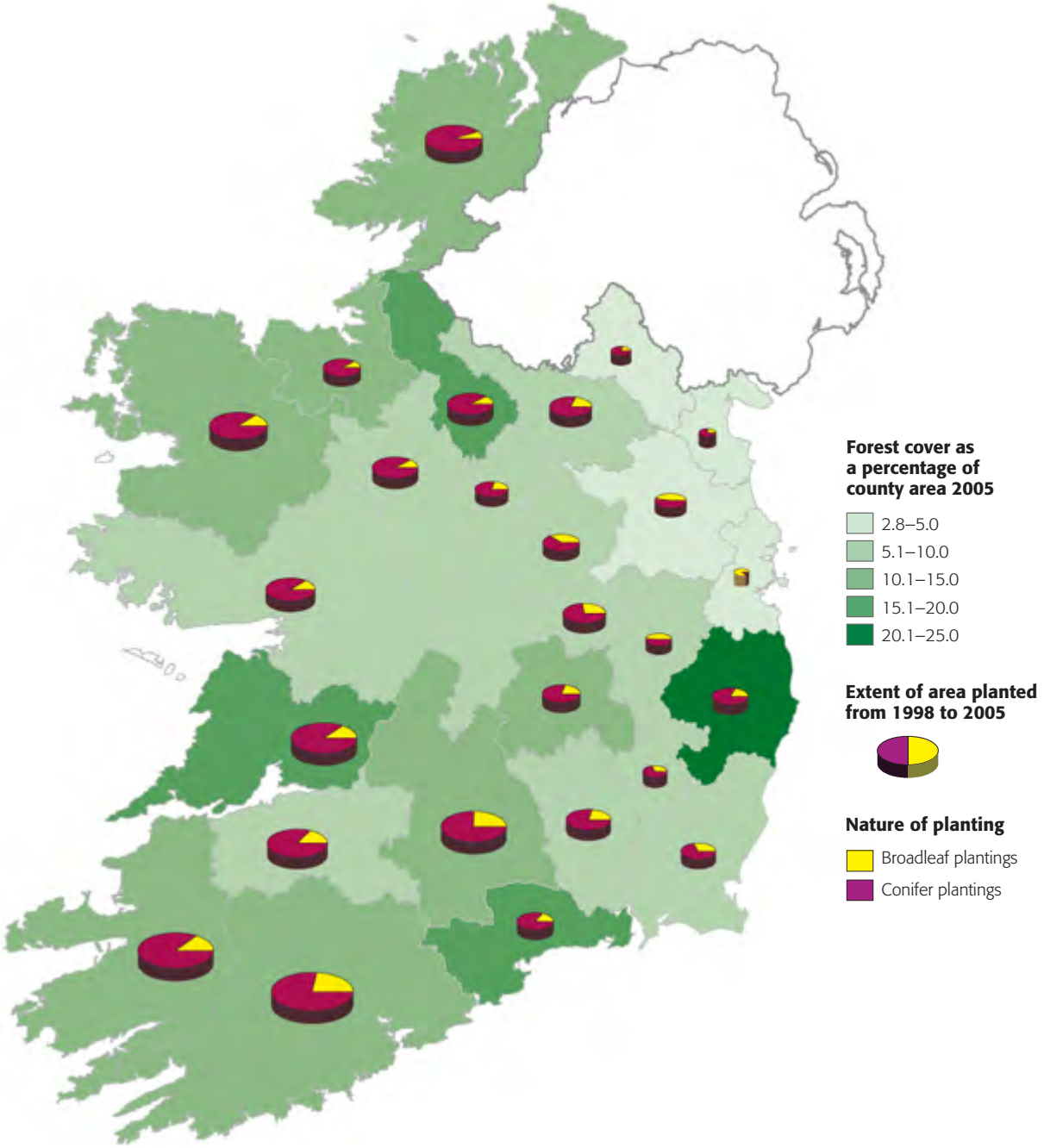
Trend over Time

At the start of the twentieth century woodland accounted for only 1 per cent of Irish land cover. Recent afforestation (planting of new forests) policies have significantly increased this figure to approximately 10.2 per cent of land cover (excluding waters) in 2005. This figure, although much improved since 1950, is still low compared to the EU25 average, which is approaching 40 per cent.

The afforestation target of 20,000 hectares per annum (ha/a) is designed to bring national forest cover up to 17 per cent by 2030. This may be modified in a major review of forestry policy that is under way at present. The current rate of afforestation is approximately 10,000 ha/a. Almost all new forestry planted in 2005 was by private operators, in contrast to 30 years ago when almost all afforestation was undertaken by the State.

Traditionally forestry was restricted to low-productivity acid soils unsuitable to agriculture. However, under the current Afforestation Grant Scheme and Forestry Premium Scheme, better quality land and soils are being planted. Current policy focuses on farm forestry, which is now the largest single component of the forestry programme.

Nature and Extent of Afforestation 1998-2005



Source: Forest Service

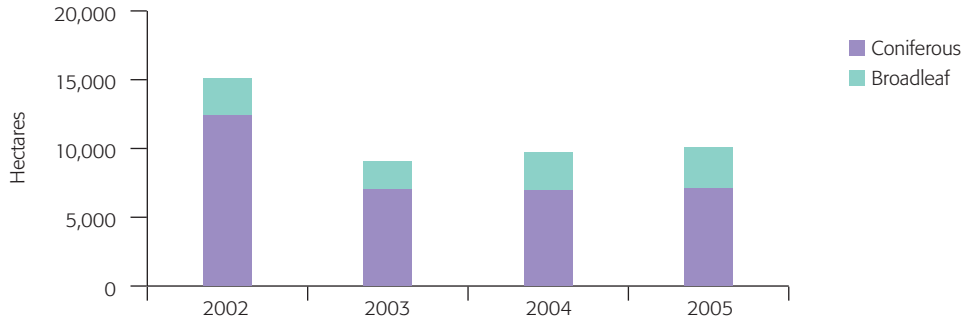
Comment

The current rate of afforestation is only half the Government's target of 20,000 ha/a. The discontinuance of State afforestation, coupled with the current high land prices and the devaluing effect of the irreversible conversion to forestry required by the forestry schemes, has made the achievement of this target difficult. This has been compounded by the reluctance of farmers to change from agriculture (a tradition built up over many generations) to forestry, a change which precludes any other land use and which is profitable only in the longer term.

11.2 SPECIES PLANTED IN IRISH FORESTS

Forests, both broadleaf and coniferous, are important habitats for the survival of native species. Many native birds and mammals characteristically prefer native broadleaf woods, the lack of ground flora in conifer plantations reducing their cover and food sources. The mix of broadleaf and coniferous forestry can and should be managed to best advantage.

Afforestation – Coniferous/Broadleaf Breakdown



Source: Forest Service

Trend over Time

The current rate of afforestation (planting of new forests) in Ireland is 10,000 ha/a, 70 per cent of which is coniferous (mostly diverse), often intermixed with broadleaf afforestation, and with 15 per cent open areas set aside for biodiversity. Non-intimate mixes of conifers and broadleaves (Sitka spruce-ash mixes) are likely to become the dominant configuration in future afforestation. Remaining semi-natural native woodland (less than 20,000 ha) is mainly concentrated in protected areas.

Broadleaf afforestation increased from 2,059 ha/a in 1998 to 3,002 ha/a in 2005, and, as a proportion of all afforestation in the county, was significantly above the national average in counties Dublin, Kildare and Meath. Over the same period total coniferous afforestation dropped from 10,869 ha/a to 7,094 ha/a.

In 2005, 12.8 per cent of forest cover was predominantly broadleaf with the remainder predominantly coniferous. Twenty-six per cent of private forestry is predominantly broadleaf, while the total for public broadleaved forestry remains low at approximately 2 per cent.

Comment

A more diverse forest structure increases the ability of the forest to filter pollutants and to buffer and adapt. Combining a more diverse structure with a richer mix of species also leads to increased biological activity in and on the soil. The financial incentives available for afforestation are higher for beech, oak and other broadleaf species than for conifers.

Mixed forests of broadleaf and conifer species, with preservation of the scrubland, as distinct from pure monoculture forestry, achieve two aims:

- The faster-growing conifer species increase the rate of carbon sequestration;
- The slower-growing broadleaf component in a scrubland setting creates and enhances habitats for a greater diversity of animal and plant species.

11.3 KEY CHALLENGES

Achieving Afforestation Targets

The national target of 20,000 ha/a of new forestry is not being met. It is difficult for forestry to compete with other land uses offering higher and more immediate returns, particularly when the income from forestry is mostly based on government premiums and when the afforestation of relatively good land is considered. Given that afforestation by the private sector has contracted over the past 5 years, the State will need to increase its afforestation levels to those achieved in the early 1970s if it is to meet its current target of 20,000 ha/a. Current policy provides grants to private operators and advantages broadleaf plantation. Without some additional public afforestation it seems that the target of 17 per cent overall forestry cover by 2030 will not be met.

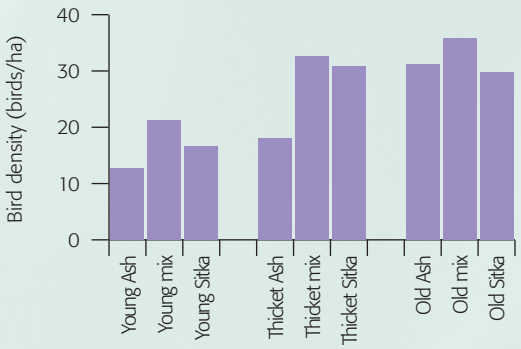
Maintaining Broadleaf Afforestation Rates

The dual aims of increasing carbon sequestration levels and optimally enhancing biodiversity are best satisfied with mixed species afforestation. The target of 30 per cent broadleaf as a proportion of all new afforestation has just been reached; maintaining this level may be difficult where the grower would be more economically secure with a diverse conifer mix. The current policy is to promote broadleaf afforestation over diverse conifers by providing higher grants; however, this additional subsidy may not be sufficient to make broadleaf afforestation an attractive and financially viable alternative and may need to be examined.

Protecting Biodiversity

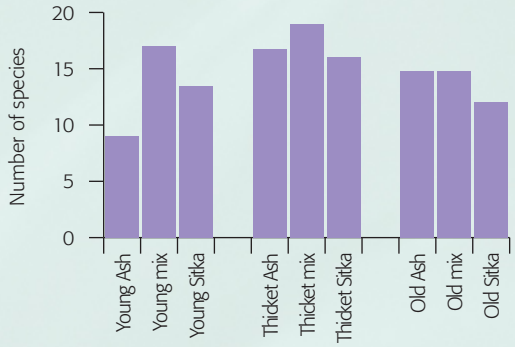
Recent research undertaken as part of the EPA/COFORD-sponsored BIOFOREST research project found that the differences between bird communities in spruce and ash plantations seem to be minimal; forest structure is of more importance in determining bird species composition. In order to improve the forest structure, the BIOFOREST report recommended that a mixture of canopy species be planted and that a mosaic of stands of different age and structure at the landscape level should be the aim. The research also confirmed the importance of marginal habitats, such as hedgerows, scrub, stone walls, earthbanks, ponds and streams; where possible, improved grassland or arable land, instead of semi-natural habitats, should be used for afforestation, particularly in landscapes dominated by intensive farming.

BIOFOREST Project – Average Bird Densities in each Site Type



Source: EPA/COFORD

BIOFOREST Project – Average Bird Species Richness in each Site Type



Source: EPA/COFORD

12. FISHERIES

Many fish species are being harvested at unsustainable levels.

There is concern that 47 out of 62 commercially targeted marine fish stocks in Irish waters are overexploited. Many of these stocks are now outside safe biological limits.

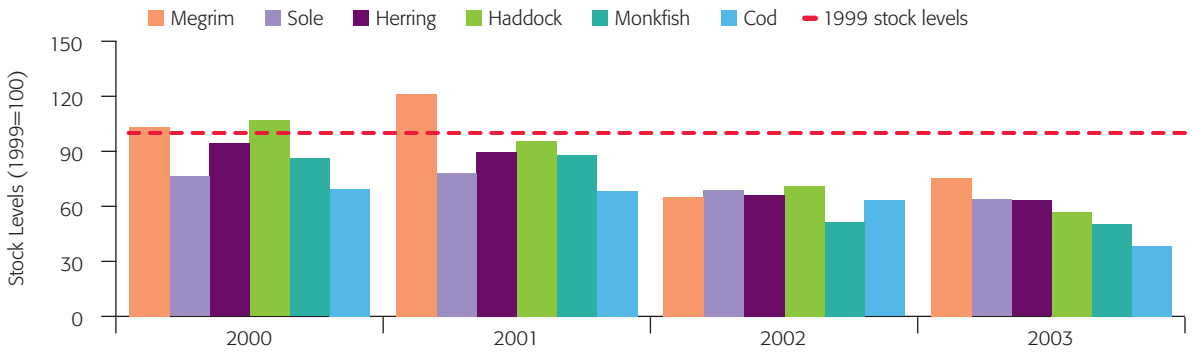
12.1 MARINE FISH STOCKS

The waters around Ireland contain some of the most productive fishing grounds in the EU. In 2004, an estimated 1.5 million tonnes of fish was harvested from these waters. Over 75 per cent of fish stocks in Irish waters are outside safe biological limits (i.e. at low stock size or unsustainable levels of exploitation). One of the most commercially important of these is cod, which was heavily exploited around Ireland during the late 1980s and throughout the 1990s.

Legislation

Fish stocks (excluding the inshore stocks) are managed by the EU under the Common Fisheries Policy (CFP). The latest action plan on fisheries management relating to the conservation and sustainable exploitation of fisheries resources is contained in Council Regulation (EC) 2371/2002.

Percentage Change in Fish Stocks 1999-2003



Source: ICES

Trend over Time

With the exception of mackerel (not shown in chart), which increased substantially in the period 1999-2003, all significantly exploited pelagic and demersal fish stocks in Irish waters showed a decrease in this period. Of particular concern is the substantial fall in cod and sole stocks, which are considered to be outside safe biological limits. The stocks of cod and sole declined by 60 per cent and 36 per cent respectively in 1999-2003. Megrim (which is largely exported to countries such as Spain) and monkfish stocks are still within safe biological limits, but showed a marked overall decline in 1999-2003. Herring and haddock stocks decreased by 46 per cent and 43 per cent respectively in the period 1999-2004.

In more recent years there has been increasing uncertainty about the absolute biomass levels due to discarding and misreporting. Recruitment (i.e. the number of young fish entering the fishery) has been well below average for most of the recent years. Over the past four years recovery plans have been initiated by the EU in response to scientific advice that several stocks including cod and hake around Ireland have been significantly reduced. Recovery measures and rebuilding plans have been put in place for some of these stocks since 2002, but there is little evidence of reduced mortality rates or increases in numbers.

Comment

With the increasing efficiency and industrialisation of fishing there is a worldwide trend towards overexploitation and collapse of many longer-lived and vulnerable fish stocks. In the last decades of the twentieth century fish catches from the seas around Ireland were sustained by increasingly targeting shorter-lived species or juvenile fish (i.e. fishing down the food web) and by developing fisheries for previously unexploited stocks (e.g. deep-water species). Many of these stocks are now also outside safe biological limits.

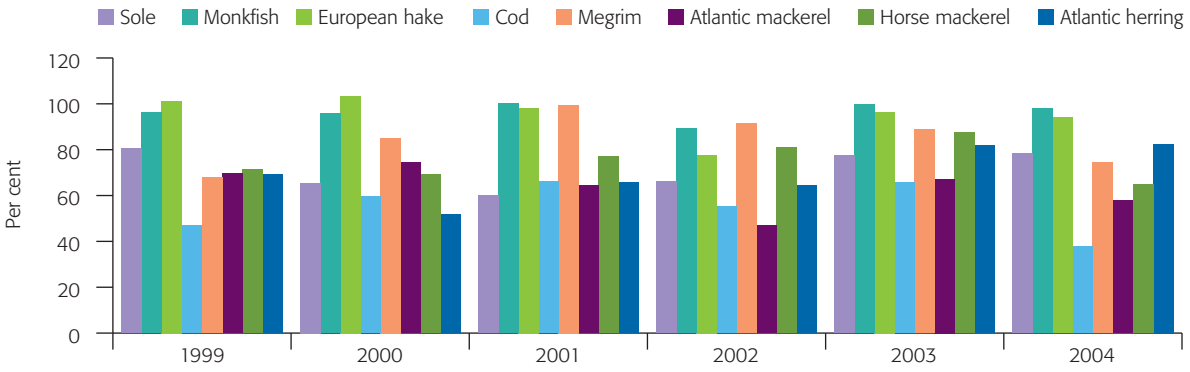
12.2 IRISH SEA-FISH LANDINGS

One of the simplest indicators of stock status is national annual fish landings. European fisheries are regulated by the CFP: this policy is decided upon by the Council of Ministers and then implemented in individual Member States. The CFP was reformed in 2003 in order to address the issue of unsustainability of fish stocks due to over-fishing. An element of the CFP is determination of the annual total allowable catches (TACs) for different fish species, to limit the amount taken from stocks by fishing and so ensure sustainability of the species in the long term. TACs are established each December by regulation, agreed by EU Fisheries Ministers. Member States are then allocated a proportion of the total EU TAC, which becomes the national quota.

Legislation

The Irish Sea-Fisheries and Maritime Jurisdiction Act 2006 (No. 8 of 2006) was signed into law on 4 April 2006. The 2006 Act allows for management of the State's fishing quota by means of Fishery Management Notices under section 12.

Catch as a Percentage of Quota



Source: ICES, DCMNR

Trend over Time

In 2004, 78 per cent of Ireland's total landings, as measured in tonnes, were pelagic species (mackerel, herring and sardines); 10 per cent were demersal species (sole, haddock and cod). However, in financial terms, the value of demersal species per tonne is much greater. In 2004, 226,111 tonnes of pelagic species was landed with an estimated worth of €56.2 million, compared to 30,519 tonnes of demersal species worth €52.5 million.

Since 1999, catch numbers have shown an overall decrease for all the commonly exploited pelagic and demersal species. TAC numbers (quotas) have also decreased overall since 1999, meaning that there are tighter limits on the number of fish that may be removed from Irish seawaters through fishing.

Despite a fall-off in the total fish landings in weight, the fisheries industry in Ireland is still buoyant due to favourable prices for fish, especially in the export market. In addition to quotas, fish landings are affected by market forces on the fisheries industry, such as a rise in the cost of motor fuel.

Comment

Conservation methods such as implementation of TAC limits and technical conservation methods, e.g. increased mesh sizes on nets, have been introduced in order to address the decline in fish stocks over recent years. Dramatic fall-off in TAC numbers since 1999 shows that many fish species are being harvested at unsustainable levels. Conservation needs to be continued, along with the introduction of specific species recovery plans (a hake recovery plan has been implemented for the Celtic Sea), in order for the fisheries industry to remain buoyant in Ireland and for marine biodiversity to be maintained.

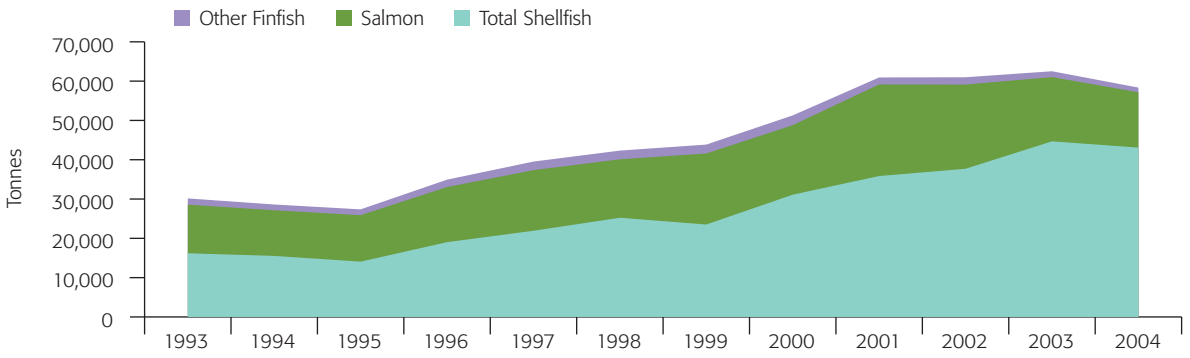
12.3 AQUACULTURE PRODUCTION

Different types of aquaculture generate very different pressures on the environment, the main ones being discharges of nutrients, antibiotics and fungicides to surrounding waters. The main environmental pressures associated with intensive finfish production are the release of organic material in the form of fish waste and uneaten foodstuffs from fish farms in shallow-water environments, which have been shown to have a negative impact on the flora and fauna in the vicinity of cage structures. The pressures associated with the cultivation of shellfish, including the removal of plankton and local concentration and accumulation of organic matter, are generally considered to be less severe.

Legislation

EU Directive 91/67/EEC (as transposed into Irish Law by S.I. 253 of 1996) represents the main fish health legislation under which the Irish aquaculture industry is regulated. The aim of the Directive is to prevent the spread of fish and shellfish diseases while promoting trade in aquaculture animals and products. According to this framework, Ireland has obtained the highest classification possible for finfish and can trade freely with any country within the European Union, and beyond.

Aquaculture Production



Source: BIM

Trend over Time

The aquaculture sector grew from 26,500 tonnes in 1990 to a peak of 62,500 tonnes in 2003. Production in the shellfish sector has continued to grow, albeit with a small decline in 2004. Production in the finfish sector, on the other hand, has declined over the past four years. This reduction, primarily in the salmon sector (which dominates finfish production), has been the result of a number of factors including difficult market conditions (i.e. low prices) and disease problems.

Since 2001, the instances of sea lice infestation reported by the Marine Institute have increased. This is considered to be due to other fish health problems making sea lice treatments less effective. In 2004, benthic monitoring results (measurements of emissions from the aquaculture site to the sea floor) showed all sites that reported to be fully compliant with the standards. Forty four per cent of sites did not report and as such were considered non-compliant. Monitoring of residues in farm fish for 2004 showed no residue levels above the maximum limits, in all samples taken.

Comment

Irish fish farms achieve a high level of compliance with conditions laid down for the status of seafloor and flora and fauna communities in the vicinity of finfish operations. This is largely due to the size (tonnage) and exposure characteristics of Irish marine fish farm sites. Chemicals to control fungal and bacterial diseases that have been used in the past have been reduced significantly in recent years. Improvements in the efficiency of feed and nutrient utilisation as well as implementation of environmental management systems have served to reduce significantly the environmental pressures associated with aquaculture production in Ireland. However, pancreas disease remains a fish health problem and sea lice occurrences are more frequently reaching treatment trigger levels in aquaculture sites.

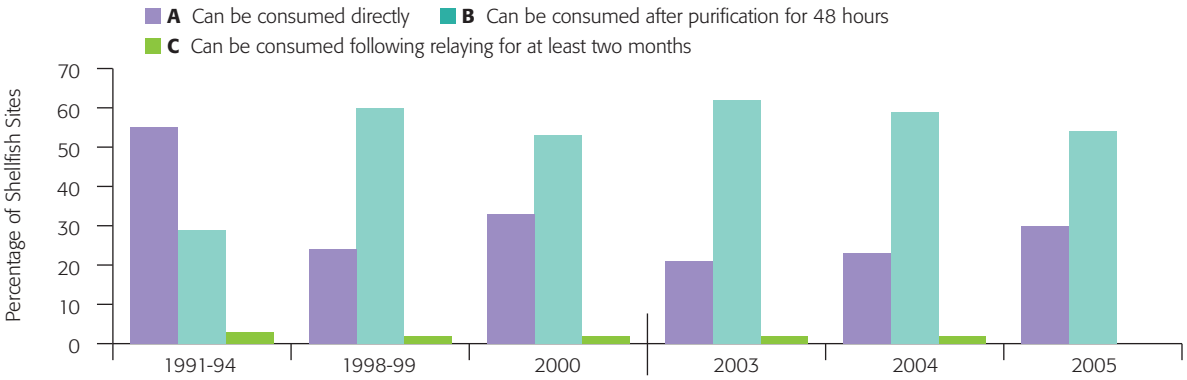
12.4 QUALITY OF SHELLFISH WATERS

The Irish shellfish industry is expanding rapidly and in order to safeguard the consumer, environment and public health monitoring programmes have been put in place.

Legislation

The requirements of the EC Directive (91/492/EEC) laying down the health conditions for the production and placing on the market of live bivalve molluscs came into force in January 1993. However, a shellfish sanitation-monitoring programme for classifying shellfish-growing waters, based on a number of parameters including microbiological criteria, had been in operation in Ireland since 1985. The Department of Communications, Marine & Natural Resources (DCMNR) established a scheme of classification of shellfish production areas. The scheme of classification has three categories, which are given in the chart below.

Quality of Shellfish Areas



Source: DCMNR

Trend over Time

The chart shows the proportion of shellfish sites, as a percentage of total, in the three classes between 1991 and 2005. It should be noted that percentages do not necessarily add up to 100, as sites with more than one class are omitted. In 2005, 30 per cent of sites were Class A waters compared to 23 per cent the previous year, but this is much less than the proportion in the 1991-94 period (55%). However, the downward trend in Class A waters appears to have halted in 2003, with a slight upward swing in 2004 and again in 2005, when no Class C waters were reported.

Shellfish production areas are also monitored, on a weekly or monthly basis, for the presence of phytoplankton and marine biotoxins as part of a national monitoring programme operated by the Marine Institute on behalf of the Food Safety Authority of Ireland (FSAI). Where biotoxins are detected, the production area is closed and harvesting prohibited until the danger of toxicity has passed. Closures of shellfish-growing areas, as a result of biotoxin contamination, are common in the summer and autumn when toxic algae are present. As well as causing illness in humans who consume affected shellfish, some blooms can kill shellfish and other marine life. For example, in 2005 an exceptional bloom of a dinoflagellate, although not of direct human health significance, caused substantial stock losses to producers of shellfish.

Comment

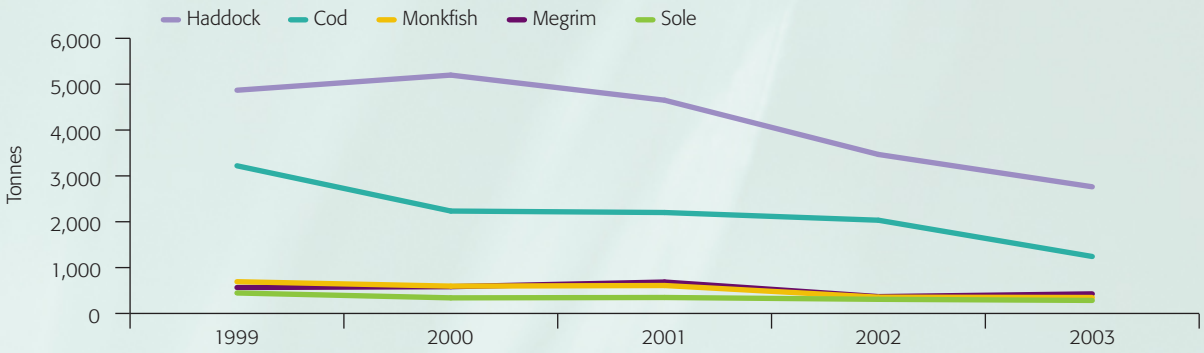
Shellfish farming is widespread in Ireland (all coastal counties except Wicklow and Dublin). Overall, Ireland has a proactive approach to the protection of health through the monitoring of shellfish waters, but the general decline in Class A stocks since 1994 is a cause for concern.

12.5 KEY CHALLENGES

Restoring Fish Stocks at Risk to Within Safe Biological Limits

The Plan of Implementation of the World Summit on Sustainable Development (Johannesburg 2002) specifically urges the need to 'Maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015'. The EU has signed up to this declaration and aims to maintain or restore stocks at levels where they can produce maximum sustainable yields. This will be addressed by the development of multi-annual management plans for individual stock and the marine ecosystem as a whole. Such plans will need to have longer-term sustainable targets, involve all stakeholders, and address both over-capacity and fishing rights within the catching sector.

Fish Stocks in Irish Waters



Source: ICES

Misreporting and Other Unaccounted Removals

There is now increasing uncertainty in the accuracy of stock assessments, forecasts and scientific advice for a number of critical stocks. In a regime where stock size is low and exploitation is high, there is a high risk that management may not be sufficient to prevent stock collapses.

There is now an urgent need to move to regimes of lower fishing mortality in the medium term. In addition the systemic problems of misreporting and discarding need to be addressed as a matter of urgency.

'The Stock Book'
The Marine Institute (November 2005)

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Maps included in this publication have been prepared from data provided by Ordnance Survey Ireland under licence number 8068.

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www.epa.ie	Environmental Protection Agency
www.sei.ie	Sustainable Energy Ireland
www.cso.ie	Central Statistics Office
www.environ.ie	Department of the Environment, Heritage and Local Government
www.ices.dk	International Council for the Exploration of the Sea
www.teagasc.ie	Teagasc – The Irish Agricultural and Food Development Authority
epp.eurostat.ec.europa.eu	Eurostat
www.eea.europa.eu	European Environment Agency
www.ec.europa.eu	European Commission
www.marine.ie	Marine Institute
www.agriculture.gov.ie	The Department of Agriculture and Food

ACRONYMS & ABBREVIATIONS

BIM	Bord Iascaigh Mhara
BoCCI	Birds of Conservation Concern Ireland
BWI	BirdWatch Ireland
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
CBS	Countrywide Bird Survey
CCGT	Combined Cycle Gas Turbine
CEC	Council of the European Communities
CEU	Council of the European Union
CFB	Central Fisheries Board
CFP	Common Fisheries Policy
cfu	Colony Forming Units
CHP	Combined Heat and Power
CH_4	Methane
CLC	CORINE Land Cover
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COFORD	The National Council for Forest Research and Development
cSACs	candidate Special Areas of Conservation
CSO	Central Statistics Office
DAF	Department of Agriculture and Food
DART	Dublin Area Rapid Transit
DCMNR	Department of Communications, Marine and Natural Resources
DED	District Electoral Division
DEHLG	Department of the Environment, Heritage and Local Government
DELG	Department of the Environment and Local Government
DoT	Department of Transport
EA RBD	Eastern River Basin District
EC	European Community
EEA	European Environment Agency
EEC	European Economic Community
EHS	Environment & Heritage Services
EP	European Parliament
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
EU	European Union
FAPRI	Food and Agricultural Policy Research Institute
FEEE	Foundation for Environmental Education in Europe
FGD	Flue-gas Desulphurisation
FSAI	Food Safety Authority of Ireland
GCOS	Global Climate Observing System
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GMM	Genetically Modified Micro-organism
GMO	Genetically Modified Organism
GNP	Gross National Product
GWP	Global Warming Potential
HFC	Hydrofluorocarbons
ICES	International Council for the Exploration of the Seas
IPC	Integrated Pollution Control
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
IRBD	International River Basin District
ISO	International Standards Organisation
IUCC	Information Unit on Climate Change
IUCN	International Union for the Conservation of Nature and Natural Resources
Ktoe	Kilotonnes of Oil Equivalent
kWh	Kilowatt Hour
Mt	Million tonnes
Mtoe	Million tonnes of oil equivalent
MW	Mega Watts
N	Nitrogen
N_2O	Nitrous Oxide
NB IRBD	Neagh Bann International River Basin District
NCT	National Car Test
NH_3	Ammonia
NHA	Natural Heritage Area
NO	Nitric Oxide

NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NPWS	National Parks and Wildlife Service
NW IRBD	North Western International River Basin District
O_3	Ozone
OEE	Office of Environmental Enforcement
OSi	Ordnance Survey Ireland
P	Phosphorus
pcSAC	proposed candidate Special Areas of Conservation
PE	Population Equivalent
PFC	Perfluorocarbons
$PM_{2.5}$, PM_{10}	Particulate Matter Measuring less than 2.5 µm & 10 µm in diameter
pNHA	proposed Natural Heritage Area
ppm	parts per million
RBD	River Basin District
REPS	Rural Environment Protection Scheme
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAP	Species Action Plan
SEI	Sustainable Energy Ireland
SE RBD	South Eastern River Basin District
SF_6	Sulphur Hexafluoride
SFP	Single Farm Payment
SH IRBD	Shannon International River Basin District
SI	Statutory Instrument
SO_2	Sulphur Dioxide
SPA	Special Protection Area
spp	Multiple Species
SW RBD	South Western River Basin District
TAC	Total Allowable Catch
TCD	Trinity College Dublin
TFC	Total Final Consumption
Toe	Tonnes of Oil Equivalent
TPER	Total Primary Energy Requirement
UAA	Utilisable Agricultural Area
UCD	University College Dublin
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Social and Cultural Organisation
UNFCCC	UN Framework Convention on Climate Change
VOC	Volatile Organic Compound
VRT	Vehicle Registration Tax
WEEE	Waste Electrical and Electronic Equipment
WE RBD	Western River Basin District
WFD	Water Framework Directive

GLOSSARY

98-percentile

The value of a ranked distribution above (or below) which 98 per cent of values in the distribution lie, depending on application.

Acidification

Continuing loss of capacity to neutralise acid inputs indicated by declining alkalinity and increasing hydrogen ion concentration (i.e. the decrease in pH of water or soil resulting from increases in acidic anion inputs such as sulphate).

Afforestation

Establishment of a new forest by planting of non-forested land.

Algae

Simple aquatic plants that may be attached or free floating (planktonic) and occur as single cells, colonies, branched and unbranched filaments.

Algal Bloom

Dense growth of planktonic algae or most commonly Cyanobacteria (blue-green bacteria formerly classified as algae) in nutrient enriched lakes causing discoloration of the water.

Ammonia (NH_3)

A simple compound of nitrogen primarily originating in waste discharges. It can be toxic to fish under certain circumstances and is a source of nitrogen for plants and algae.

Amphibians

Vertebrates, including frogs, with an aquatic larval stage followed by a terrestrial adult stage.

Aquaculture

The farming of aquatic species such as fish and shellfish under controlled conditions.

Biodiversity

Word commonly used for biological diversity and defined as assemblage of living organisms from all habitats including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.

Biomass

The biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

Biota

The flora and fauna of an area.

Biotoxins

Substances produced by certain organisms that are toxic or otherwise injurious to other organisms.

Black Smoke

Black smoke consists of fine solid particles suspended in air, which mainly arise from the incomplete burning of fossil fuels such as coal, oil and peat, in the domestic, industrial or transport sectors.

Blanket Bog

An area, often very extensive, of acid peatland, found in constantly wet climates, characteristic of broad flat upland areas, which develops where drainage is impeded and the soil is acid.

Carbon Dioxide (CO_2)

A naturally occurring gas which is also a by-product of burning fossil fuels and biomass, land-use changes and industrial processes. It is the principal anthropogenic greenhouse gas that affects the earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1.

Carbon Sequestration

The uptake of carbon-containing substances, in particular carbon dioxide.

Chlorophyll

The green pigment found in algae and higher plants which is involved in photosynthesis.

Climate Change

The global climate system is subject to natural variation. In the context of the UNFCCC and Kyoto Protocol, what is meant is the change in climate attributable to human activity arising from the release of greenhouse gases into the atmo-sphere and which is additional to natural climate variability.

Cryptosporidium

A coccidian protozoan parasite that infects vertebrates such as sheep and cattle. It can infect humans and is a particularly dangerous parasite when its oocysts enter public water supply systems due to, for example, cattle slurry contamination.

Demersal Fish

Fish such as cod, whiting, plaice, haddock, skates and rays, that spend most of their time swimming near the seabed. It usually refers to the adult stage of the species.

Diffuse Source Pollution

Pollution that arises from diffuse areas in a catchment such as fields adjacent to a river or stream during heavy rainfall when surface runoff occurs.

Ecology

The study of the relationship among organisms and between those organisms and their non-living environment.

Ecosystem

A community of interdependent organisms together with the environment they inhabit and with which they interact, and which is distinct from adjacent communities and environments.

Effluent

Liquid wastes.

Emissions Trading

In the context of the EU Emissions Trading Scheme or the flexible mechanisms of the Kyoto Protocol, this refers to the buying and selling of allowances to emit a defined quantity of greenhouse gases or credits that represent a quantity of greenhouse gas emissions already reduced.

Erosion

Wearing away of earth or rock by the effects of rain, wind, sea or rivers or by the action of toxic substances.

Eutrophic

From the Greek word for 'well-nourished'. Applied to waterbodies with high nutrient concentrations leading to large algal standing crops.

Eutrophication

The enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water.

Faecal Coliforms

Harmless bacteria which serve as indicators of the presence of human and animal faeces in waters.

Fauna

Animals.

Flora

Plants.

Flue-gas Desulphurisation

The removal of sulphur from the flue gases in combustion activities.

Global Warming Potential

Greenhouse gases have different efficiencies in retaining solar energy in the atmosphere and also have different lifetimes in the atmosphere, before natural processes remove them. To compare the different greenhouse gases, emissions are calculated on the basis of their Global Warming Potential (GWP) over a normalized time horizon, giving a measure of their relative heating effect in the atmosphere. CO_2 is the basic unit (GWP of 1). CH_4 has a global warming potential equivalent to 21 units of CO_2, i.e. a GWP of 21. N_2O has a GWP of 310. Compounds in the HFC family have GWPs in the range 140 to 11,700.

Greenhouse Effect

Enhanced warming of the atmosphere due to the reduction in outgoing solar radiation resulting from increased concentrations of gases, in particular, CO_2.

Greenhouse Gases

Gaseous constituents of the atmosphere that absorb/trap infrared (thermal) radiation which is mainly emitted by the Earth's surface and thereby influence the Earth's temperature.

Gross Domestic Product (GDP)

GDP represents total expenditure on the output of final goods and services produced in the country.

Groundwater

Water that occupies pores and crevices in rock and soil, below the surface and above a layer of impermeable material.

Habitat

The dwelling place of a species or community, providing a particular set of environmental conditions (e.g. forest floor, sea shore).

Hazardous Waste

Defined in the Waste Management Act 1996 as any waste which appears on the hazardous waste list or is prescribed as a hazardous waste and which displays one or more of the properties of hazardous waste listed in the Waste Management Act 1996.

Heath

An area of open uncultivated land, typically an acid soil with characteristic vegetation of heather, gorse and coarse grasses.

Hypertrophic

Applied to water bodies which are excessively nourished, extremely productive.

Integrated Pollution Control (IPC)

A system of licensing which covers all emissions to air, water and land, including noise/odour and is intended to minimise the impact on the environment by taking account of pollution that may be transferred from one environmental medium to another. IPC is based on Best Available Technology Not Entailing Excessive Cost (BATNEEC). The implementation of the Integrated Pollution Prevention and Control (IPPC) Directive will replace this system of licensing in an advanced form.

Integrated Pollution Prevention and Control (IPPC)

Council Directive 96/61/EC prescribes IPPC as an EU-wide licensing and enforcement regime for specified activities aimed at preventing/reducing pollution and providing a high level of protection for the environment as a whole.

Invertebrates

Animals which do not possess a backbone.

Kyoto Protocol

The 1997 protocol to the Convention on Climate Change under which industrialised countries will reduce their combined greenhouse gas emissions by at least 5 per cent compared to 1990 levels by the period 2008-2012.

Leachate

The seepage of liquid through a waste disposal site or spoil heap.

Limit Value

A level fixed on the basis of scientific knowledge, with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained within a given period and not to be exceeded once attained.

Mesotrophic

Applied to water bodies which are moderately nourished, moderately productive.

Municipal Waste

Defined in the Waste Management Act 1996 as household waste as well as commercial or other waste which, because of its nature and composition, is similar to household waste.

Nitrate (NO_3)

A salt of nitric acid (HNO_3).

Nitrogen Oxides (NO_X)

A gas which usually includes the two pollutants nitric oxide (NO) and nitrogen dioxide (NO_2) produced by high-temperature combustion and some natural processes.

Nutrient

Element or chemical essential for growth, e.g. phosphorus, nitrogen, oxygen and carbon.

Oligotrophic

Applied to water bodies which are poorly nourished, unproductive.

Ozone (O_3)

Ozone is a secondary pollutant formed from the interaction of various precursor compounds (i.e. NO_X, CO and VOCs) in the presence of sunlight and high temperatures. It is present in air masses across the globe and is transported from Atlantic and European regions.

Ozone Precursor

A substance which contributes to the formation of ground-level (tropospheric) ozone.

Pathogens

Biologically hazardous organisms such as viruses, bacteria or parasites that may give rise to illness in humans or animals.

Pelagic Fish

Fish such as herring, mackerel and blue whiting that spend most of their time swimming in the water column as opposed to resting on the seabed. Usually refers to the adult stage of the species.

Pesticide

A general term for any chemical agent which is used in order to kill unwanted plants ('weeds'), animal pests, or disease-causing fungi.

Phosphate (PO_4)

The commonly occurring form of phosphorus taken up by plants in the aquatic environment and essential for their growth.

Phytoplankton

Microscopic small plants which float or swim weakly in fresh or salt water bodies.

PM_{10}

Particulate matter measuring less than 10 micrometres in diameter.

$PM_{2.5}$

Particulate matter measuring less than 2.5 micrometres in diameter.

Point Source Pollution

Pollution that arises from a well defined point, typically the end of a discharge pipe but may include farmyard sources.

Precipitation

The manner by which water and other matter in the atmosphere reach the earth's surface. Wet precipitation includes rainfall, snow, hail, mist and fog. Dry precipitation describes the deposition of gases, aerosols and particles not dissolved in atmospheric borne water.

Renewable Resource

A resource that can be exploited without depletion because it is constantly replenished, e.g. solar radiation and wind.

Safe Biological Limits

Safe biological limits are limits or reference points for fishing mortality rates and spawning stock biomass, beyond which the fishery is unsustainable.

Sewage

Liquid wastes from communities, conveyed in sewers. Sewage may be a mixture of domestic sewage effluents from residential areas and industrial liquid waste.

Sewerage

A network of pipes and associated equipment for the collection and transportation of sewage.

Slurry

The animal waste generated in animal housing units that have slatted floors and in which no use is made of bedding material.

Sulphur Dioxide (SO_2)

A colourless gas produced mainly by oxidising the sulphur in fossil fuels through combustion.

Total Allowable Catch (TAC)

The TAC is the total catch allowed to be taken from a resource in a specified period (usually a year), as defined in the management plan. The TAC may be allocated to the stakeholders in the form of quotas as specific quantities or proportions.

Trophic Status

The extent of enrichment of a waterbody as assessed by the nutrient concentrations, amount of planktonic algae and macrophytes, water transparency and oxygen levels. The trophic categories oligotrophic, mesotrophic, eutrophic and hypertrophic are used to describe waters varying from un-enriched to highly enriched.

Volatile Organic Compounds (VOCs)

Organic compounds which evaporate readily and contribute to air pollution mainly through the production of secondary pollutants such as ozone.

Waste Arisings

A measure of the amount of waste generated by a specified sector or activity.

Wetland

An area covered permanently, occasionally, or periodically by fresh or salt water (e.g. flooded pasture land, marshland, inland lakes, rivers and their estuaries); also includes bogs.

AN GHNÍOMHAIREACHT UM CHAOMHNÚ COMHSHAOIL

Stádas na Gníomhaireachta

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil, 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil agus Rialtais Áitiúil a dhéanann urraíocht uirthi.

Déanann Bord Feidhmeach lánaimseartha comhdhéanta d'Ard-Stiúrthóir agus ceathrar Stiúrthóirí bainistíocht ar an EPA. Cinntítear neamhspleáchas trí nósanna imeachta roghnaithe i gcás an Ard-Stiúrthóra agus na Stiúrthóirí agus an tsaoirse, de réir mar a sholáthraítear sa reachtaíocht, gníomhú as a stuaim féin. Tá an sannadh, faoin reachtaíocht, maidir le freagracht dhíreach as réimse leathan feidhmeanna mar bhonn taca ag an neamhspleáchas sin. Faoin reachtaíocht, is cion sainiúil é iarracht a dhéanamh tionchar a imirt ar an Ghníomhaireacht, nó ar aon duine a bhíonn ag gníomhú thar ceann na Gníomhaireachta, ar bhealach míchuí.

Cuidíonn Coiste Comhairleach ar a bhfuil dhá chomhalta déag arna gceapadh ag an Aire Comhshaoil, Oidhreachta agus Rialtais Áitiúil leis an nGníomhaireacht.

Freagrachtaí

Tá réimse leathan dualgas agus cumhachtaí reachtúla ag an EPA faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil. Chomh maith leis sin, tá curtha le hacmhainn an EPA maidir le forfheidhmiú le cumhachtaí san Acht um Chaomhnú an Chomhshaoil 2003. Áirítear orthu seo a leanas príomhfhreagrachtaí an EPA:

- ceadúnú a dhéanamh ar phróisis thionsclaíocha mhóra/ choimpléascacha a bhféadfadh cumas truaillithe suntasach a bheith ag baint leo;
- monatóireacht ar chaighdeán comhshaoil, lena n-áirítear bunachair shonraí a bhunú ar a mbeidh rochtain ag an bpobal;
- tuarascálacha tréimhsiúla maidir le staid an chomhshaoil a fhoilsiú;
- sárchleachtais comhshaoil a chur chun cinn;
- taighde comhshaoil a chur chun cinn agus a chomhordú;
- gníomhaíochtaí diúscartha dramhaíola agus aisghabhála suntasacha, lena n-áirítear láithreacha líonta talún a cheadúnú agus plean bainistíochta guaisdramhaíola náisiúnta a ullmhú;
- córas a chur i bhfeidhm a cheadaíonn rialú astaithe VOC a bhíonn mar thoradh ar scaoileadh GMOanna isteach sa chomhshaol in aon turas;
- rialacháin GMO a chur i bhfeidhm agus a fhorfheidhmiú ó thaobh GMOanna a choinneáil agus a scaoileadh amach sa chomhshaol in aon turas;
- clár hidriméadrach náisiúnta a ullmhú agus a chur i bhfeidhm;
- ag cur i bhfeidhm eochair-thuarascálacha na gCreat-Treoracha Aeir agus Uisce
- dréacht a chur le chéile de Phlean Leithroinnte Náisiúnta do thrádáil liúntas astaithe gáis ceaptha teasa; Údarás Inniúla Náisiúnta a bhunú le ceadanna trádála agus liúntais a eisiúint orthu siúd atá clúdaithe ag an scéim; monatóireacht, léargas, agus fíorú maidir le hastuithe ó chuideachtaí rannpháirteacha; agus Clár Trádála Astuithe Náisiúnta a bhunú;
- Réiteach agus cur i bhfeidhm an Chláir Náisiúnta um Chosc ar Dhramhaíl le fócas ar leith ar ghníomhaíochtaí fiontair agus údarás áitiúla
- Forfheidhmiú oibleagáidí freagrachta an táirgeora maidir le trealamh leictreach agus leictreonach dramhaíola (WEEE) a bhainistiú agus maidir leis an srian ar shubstaintí guaiseacha (RoHS) i dtrealamh leictreach agus leictreonach
- Cur i bhfeidhm rialachán an AE in Éirinn maidir le hózón a laghdú

agus, faoin Oifig Forfheidhmiúcháin Comhshaoil, a bunaíodh i 2003 agus atá tiomanta as reachtaíocht comhshaoil a chur i bhfeidhm agus a fhorfheidhmiú in Éirinn;

- feabhas a chur ar chomhlíonadh reachtaíocht cosanta comhshaoil in Éirinn;
- feasacht a ardú maidir leis an tábhacht a bhaineann le forfheidhmiú i gcás reachtaíochta cosanta comhshaoil in Éirinn;
- ceadúnais IPPC agus ceadúnais Dramhaíola a eisíonn an EPA a fhorfheidhmiú;
- iniúchadh agus tuairisciú ar fheidhmíocht údarás áitiúil maidir lena bhfeidhmeanna cosanta comhshaoil a chur ar bun, lena n-áirítear:
  - forfheidhmiú maidir le ceadúnais dramhaíola a sháraítear;
  - gníomh maidir le dumpáil mhídhleathach;
  - ceadanna bailithe dramhaíola a chur i bhfeidhm, agus
  - tionscnaimh a bheidh mar fhreagracht ar an táirgeoir a fhorfheidhmiú (mar shampla, sa réimse a bhaineann le dramhaíl pacáiste);
- gníomh in aghaidh údarás áitiúil nach bhfuil ag comhlíonadh a gcuid feidhmeanna cosanta comhshaoil ar bhealach cuí;
- an dlí a chur nó cuidiú le húdaráis áitiúla an dlí a chur ó thaobh sháraithe suntasacha reachtaíochta cosanta comhshaoil ar bhealach caoithiúil; agus
- cuidiú le húdaráis áitiúla a gcuid feidhmíocht cosanta comhshaoil a fheabhsú ar bhonn cás ar chás, trí ghréasán forfheidhmithe a bhunú le malartú eolais a chur chun cinn chomh maith le sárchleachtas, agus trí threoir chuí a sholáthar.

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