



Ireland's Environment 2008 aims at providing a comprehensive integrated assessment of the overall quality of Ireland's environment. Ireland has experienced unprecedented social and economic changes over the past two decades and this has resulted in certain pressures on the environment increasing at a rate that often exceeds that observed in other EU countries.

The overall finding of this assessment is that Ireland's environment is relatively good. However, Ireland will face a number of key environmental challenges in the coming years – the four priority challenges identified are, limiting and adapting to climate change, reversing environmental degradation, mainstreaming environmental considerations and complying with environmental legislation and agreements. The underlying principle of sustainable development is that the natural resources and environmental conditions fundamental to the economic and social well-being of future generations are not exhausted or degraded. In this regard it is vital that environmental issues and considerations be placed at the heart of policy and decision-making across all sectors.

The responsibility for addressing environmental issues is not just the preserve of governmental bodies; it is a shared responsibility with every member of society. Changing the behaviours of individuals and ensuring environmentally responsible businesses is essential to meet the environmental challenges identified.

Developments in science, research and innovation will play a valuable role in meeting the environmental protection challenges. Research provides a foundation for credible decision making, while technology and innovation can provide solutions for environmental problems. The continued strong investment in environmental research is crucial, as today's environmental research will become tomorrow's environmental protection. Improved forecasting of emissions and pressures from economic development across all sectors can also contribute significantly to effective policy making and assessment.

MAIN ENVIRONMENTAL CHALLENGES

16

Introduction

The environment is a key strategic resource and asset for Ireland, and it must be protected and managed to ensure that it remains as the

basis for a healthy society and a strong economy. The EPA state of the environment reports provide evidenced-based assessments of the quality of Ireland's environment and

identify the pressures being brought to bear. This most recent assessment has confirmed that Ireland's environment is of a relatively high standard.

Figure 16.1 Environmental Goals (Source: EPA, 2007)



However, pressures on the environment have markedly increased as Ireland's economy has grown. In some cases these pressures have accelerated at a rate that far exceeds that observed in other EU countries. There have also been notable developments in environmental protection and management in Ireland in recent decades, most of which have arisen as a result of EU environmental policy and the implementation of EU legislation. These have driven environmental improvements and protection measures across a broad range of areas including water and air quality, protection of species and habitats, waste management and environmental licensing of industry.

In 2007 the EPA published its strategy *2020 Vision: Protecting and Improving Ireland's Environment*, which set out a long-term vision for Ireland's environment to 2020. As part of this strategy the EPA identified six environmental goals, as shown in Figure 16.1.

- Limiting and adapting to climate change
- Clean air
- Protected water resources
- Sustainable use of natural resources
- Protected soil and biodiversity
- Integration and enforcement

These goals provide a useful framework in which the main findings and environmental challenges identified through *Ireland's Environment 2008* can be outlined. Accordingly the remainder of this chapter summarises the key environmental issues facing Ireland in the coming years around these six environmental goals, as well as highlighting a number of emerging environmental issues. It also outlines

the importance of research and the potential benefits of environmental technologies in helping to address these key challenges.

Limiting and Adapting to Climate Change

Climate change is recognised as the greatest threat to the planet and the greatest challenge facing humanity. Increased levels of greenhouse gases (GHGs) such as CO₂ act to enhance the natural greenhouse effect and accelerate changes in the climate. Given the strong scientific evidence from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change that warming of the climate system is unequivocal and is very likely to be due to human-induced emissions, the need for major reductions in GHG emissions is now an accepted priority for most countries.

The impacts of climate change present very serious risks at both the global and national levels and threaten the basic components of life, including health, access to water, food production and the use of land. The EU considers that a global temperature increase of more than 2°C would mean an unacceptable risk that a tipping point for dangerous and irreversible impacts of climate change would be exceeded.

Research shows that Ireland's climate is changing in line with the global pattern. This is evident in the temperature records, but there is also a trend towards more intense and frequent rainfall. Future impacts of climate change will be both direct and indirect, resulting from spillover from impacts in other parts of Europe and the rest of the world. Predicted negative impacts in Ireland include:



- more intense storms and rainfall events
- an increased likelihood of flooding in rivers and on the coast, where almost all our cities and large towns are situated
- water shortages in summer in the east and the need for irrigation of crops
- changes in the distribution of species
- the possible extinction of vulnerable species.

These impacts are projected to increase in the coming decades and during the rest of this century.

GHG emissions arise from a range of sources. The agriculture, energy and transport sectors are the primary sources of emissions in Ireland, with contributions of 27.7, 22.3 and 19.7 per cent respectively in 2006. The industrial and commercial sector accounted for 17.2 per cent, while the residential sector produced 10.4 per cent of emissions. This emissions profile has changed considerably since 1990, with the contribution from transport more than doubling and the share from agriculture reducing. In a European context it is notable that Irish per capita emissions of GHGs remain among the highest. In terms of emissions intensity



(emissions of GHGs per GDP), Ireland compares more favourably, although it is above the EU average.

Under the Kyoto Agreement, Ireland has committed to limiting the increase of GHGs to an average of 62.8 Mt/year CO₂ equivalent (CO₂e) (13 per cent above its 1990 levels): a limit that applies during the period 2008–2012. However, in recent years GHG emissions have been between 68.6 and 70.7 Mt/year CO₂e, i.e. around 7 Mt/year CO₂e above our Kyoto limit. Current projections show that even if all anticipated reductions from existing and planned policies and measures are delivered, and forest sinks and Kyoto mechanism purchases are used as envisaged, Ireland will still exceed its Kyoto Protocol limit by 1.4 Mt/year CO₂e. Additional domestic policies and measures and/or additional government purchases will be required to bridge this gap.

The post-2012 targets proposed by the EU Commission are considerably more stringent, requiring reductions in Ireland's emissions of approximately 20 per cent on 2005 levels. The greatest challenge facing Ireland is to meet its targets under the Kyoto Protocol in the period 2008–2012 and to establish

a pathway for achievement of even greater reductions in emissions of GHGs in the period up to 2020 and beyond. The full implementation of the National Climate Change Strategy is vital in this regard. In addition, meeting the future targets will require significant changes to current practices in almost all economic sectors, particularly energy and transport, as well as major investments in low-carbon and other sustainable technologies.

However, the global and long-term nature of climate change means that even if GHG levels were reduced now, some impacts would still be unavoidable. Addressing climate change will therefore require a concerted approach involving both adaptation and mitigation, with effective mainstreaming of climate change issues and targets into future investment decisions at national, regional and local levels.

Air Quality and Emissions to Air

By international standards, air quality in Ireland is very good and Ireland is one of the few countries in Europe in recent years to have had no exceedances of any EU ambient air quality limit values. The relatively low density of towns and cities, the country's geographical position and its island status all contribute positively to this quality. The prevailing westerly winds are a huge advantage to Ireland, constantly renewing the supply of fresh air.

However, emissions of air pollutants – especially particulates and nitrogen oxides from road traffic – remain the main threat to air quality in urban areas, with levels of PM₁₀ close to the EU daily mean limit in many areas across the country. While new standards for car emissions and the

resultant cleaner technology have curbed emissions from individual vehicles, this has been offset by the increasing number and the bigger engines of vehicles on Ireland's roads. A key issue for policy-makers is to ensure that air quality is considered an integral part of traffic management and planning processes.



One of the key issues for Ireland is to reduce its emissions of four transboundary air pollutants, also known as acidifying gases. The national strategies to achieve compliance with the EU National Emissions Ceiling Directive for these pollutants have reduced emissions of sulphur dioxide, volatile organic compounds and ammonia in line with the international commitments. However, emissions of nitrogen oxides, of which transport is a major source, are currently above the 2010 ceiling and are expected to remain high in the short term. This situation is exacerbated by the continued increase in vehicle numbers in Ireland, which offsets any potential benefits gained from technological advances. As a result Ireland faces a significant challenge in meeting EU emission limits for this pollutant, and controls on emissions of nitrogen oxides need be implemented.



Protected Water Resources

The quality of Ireland's water resources is vital, in order to protect the many freshwater and marine habitats, as amenities to be enjoyed. As Ireland depends on both surface water and groundwater sources for drinking water, it is also important that this resource be of the highest standard. The assessment provided in *Ireland's Environment 2008* has identified a number of key issues affecting water quality and quantity in Ireland.

The most significant environmental issues for groundwaters are the elevated nitrate concentrations in the east and south-east of the country and microbiological contamination in the more vulnerable aquifers. Proper management of groundwater resources is needed not alone to maintain the quality and the yield of drinking water sources, but also to ensure that groundwater is not having a detrimental impact on surface water and ecosystems that depend on water.

The most recent assessment showed that over 71.4 per cent of river channel surveyed in Ireland is classed as unpolluted, with 18.1 per cent

considered slightly polluted, 10 per cent moderately polluted and 0.5 per cent seriously polluted. The assessment also showed that the majority of lakes (85.3 per cent) were considered to be of satisfactory water quality. Nutrient enrichment resulting in eutrophication is the most significant pressure on the quality of Ireland's rivers and lakes. The principal sources of these nutrients are municipal sewage discharges and losses from agricultural activities.

While water quality in the majority of estuarine and coastal waters remains generally high, some areas continue to be seriously affected by direct municipal discharges and elevated nutrient inputs from

diffuse sources. A number of major estuaries, predominantly in the south-east and south of the country, have persistently displayed symptoms of nutrient enrichment. The greatest human impact on the ecological quality status of Ireland's marine environment continues to be commercial fishing. The overall quality of bathing waters in Ireland is high, with most designated bathing areas meeting minimum EU standards. However, it is a concern that a small number of bathing areas are consistently failing to meet these mandatory standards. These are set to become more stringent with the implementation of the new Bathing Water Directive in the coming years, and it is likely that there will be a reduction in the number of Irish bathing water sites meeting the EU standards.

Water management in Ireland is now governed by the Water Framework Directive (WFD), which marks a new approach to the protection and improvement of water resources and aquatic ecosystems. The objectives of the Directive are demanding and include the protection of good and high status waterbodies, the prevention of any deterioration in status and the achievement of good status or higher in all waters by





2015. Meeting the objectives of the WFD will be a challenge for Ireland, as it requires that water be managed as a key national resource and used in a sustainable manner by all sectors of the economy. Ireland has been successful in implementing the WFD to date and some progress has been made in the past decade in reducing emissions to water. However, the major challenge ahead is the delivery, in 2009, of River Basin Management Plans, containing measures to ensure we meet the objectives of the WFD within a set timeframe.

It is clear that the provision of upgraded and new wastewater treatment infrastructure has resulted in some improvements in the quality of Irish surface waters, but there are still infrastructural deficits that remain to be addressed. It is anticipated that the recently introduced licensing regime for urban wastewater treatment discharges will also have a long-term positive effect. However, further measures such as the full implementation and enforcement of the Nitrates Action Plan will be required to ensure that the release of nutrients from diffuse agricultural sources is reduced.

Waste and Resource Use

Environmental degradation can be caused in the manufacturing, distribution, usage or disposal of products and services. Both waste generation and resource use are at an unsustainable level in Ireland and throughout the EU, and have increased in tandem with economic growth. Ultimately, virtually all products become waste, necessitating appropriate management for recycling or disposal. To reverse this unsustainable trend, Ireland needs to move beyond controlling emissions and waste, and to address the more fundamental issues of sustainable production and consumption. A key challenge is to break the link between economic growth and the environmental impacts associated with the production and delivery of goods and services, resource use and waste generation.

In the past decade waste management in Ireland has generally moved in a positive direction. Through tight control and regulation, the number of landfills has decreased from over 100 unlined and unregulated dumps to 29 licensed municipal landfills that operate to modern EU standards. Despite

this, odour and litter problems do occur at some sites. Regional waste management plans are in place and have been reviewed in recent years. However, there is a need to coordinate the implementation of these plans at a national level and for progress on their implementation to be reported on an annual basis. Similarly, the National Hazardous Waste Management Plan needs to be fully implemented, to ensure that adequate infrastructure is in place to meet the needs of the State.

Good progress has been made towards meeting national and EU recycling targets on packaging and municipal waste, for example. This, however needs to be set within the context of both of these waste streams showing strong increases in waste generation in recent years, outstripping gains made in recovery. In addition, it is notable that significant quantities of recycled material are exported for recovery, with only approximately 25 per cent of material actually recycled in Ireland in 2006. To the maximum extent possible, Ireland needs to develop its own indigenous facilities, markets and outlets to recycle waste. This would have the environmental benefit of processing material closer to sources as well as creating employment and investment opportunities.

Ireland still has a number of difficult targets to meet in relation to waste management. A target of diverting 50 per cent of household waste from landfill by 2013 remains some distance away, with only about 22 per cent recovered in Ireland in 2006. The EU Landfill Directive has set targets to be met progressively for diverting biodegradable waste away from landfill.



By 2016 Ireland is required to reduce its landfill of biodegradable waste to 35 per cent of the amount produced in 1995. With almost 62 per cent of such waste being sent to landfill in 2006, this target is a considerable challenge for Ireland. While a national strategy to deal with biodegradable waste has been published, there is an urgent need for it to be fully implemented.

Producer responsibility initiatives are increasingly being used to ensure that the cost of collection and recycling of certain products when they become waste is borne by the manufacturer or importer. There has been notable success for

example, in the implementation of producer initiatives in relation to packaging waste and waste from electrical and electronic equipment. Their continued implementation in Ireland will significantly impact the management of priority waste streams.

Prevention, however, is the most desirable method of waste management, since the absence of waste eliminates the need for handling, transportation, treatment and disposal. Prevention also provides the highest level of environmental protection by optimising the use of available resources. However, as the European Environment Agency

has highlighted, preventing waste continues to be one of the toughest environmental challenges as, similar to climate change issues, societal behaviour changes are needed now but without immediately tangible benefits.

Biodiversity and Soil

A range of factors including its glacial history, island status and geographical position at the edge of the European continent have shaped Ireland's biodiversity. As a result Ireland is endowed with a wide diversity of habitats and species, many of which are absent or scarce in the rest of Europe and are consequently of international importance. These include for example limestone pavements (such as the Burren), turloughs, active peatlands and machairs, and maerl beds. Ireland also has unique juxtapositions of Mediterranean flora and fauna with species of colder climates. It is particularly rich in mosses, liverworts, lichens and fungi, while Irish waters are among Europe's richest, supporting 24 whale and dolphin species. Ireland also has a number of bird species that are rare or in decline elsewhere, including storm petrels, choughs and roseate terns, and it is an important destination for many migratory birds, such as the Greenland white-fronted goose. However, many aspects of Ireland's biodiversity are under threat, leading to habitat degradation and loss. The main threats arise from intensification of agriculture, poorly managed commercial forestry, peat extraction, land clearance and development, climate change and invasive alien species.

While there has been some progress in relation to raising awareness about the importance of Ireland's biodiversity, much remains to be





done. A 2007 Eurobarometer report on attitudes of Europeans to biodiversity found that 52 per cent of those surveyed in Ireland had never heard of the term 'biodiversity', while 26 per cent had heard of it but did not know what it meant and only 22 per cent had heard of it and knew what it meant.

In terms of biodiversity, there is a need to protect and manage what is important and special in Ireland. Some progress has been made in the implementation of the National Biodiversity Action Plan and also in designating areas for nature protection and conservation in Ireland

in accordance with its international obligations. However, the European Commission has indicated that this designation process is incomplete and in addition, the European Court of Justice ruled in 2007 that Ireland had failed to fulfil its legal obligations on the designation and protection of areas for wild birds and on the protection of several bird species. Furthermore, a recent assessment has revealed that the current conservation status of many of Ireland's most important habitats and species is poor or bad. This poses a significant challenge for Ireland in striving to meet its obligations under the EU Habitats Directive and the EU

policy objective of halting the loss of biodiversity. It is clear that Ireland must finalise as a matter of urgency the designation of an adequate number of protected sites and prepare, adopt and fully implement site management plans which have clear conservation targets identified for each site. The actions identified in the National Biodiversity Action Plan must also be successfully delivered. In addition, there is a pressing need to implement a national policy for the control of invasive alien species.

Climate change may bring particular challenges for the conservation of Ireland's natural heritage and biodiversity and this emphasises the importance of conserving biodiversity in the wider countryside as well as in protected areas. The development and implementation of Local Biodiversity Action Plans is important in this regard. It is also vital to ensure that climate change adaptation and mitigation measures are not themselves harmful to biodiversity. Biodiversity assessment should therefore be undertaken to ensure that the development of alternative energy sources (for example biofuels) does not impact negatively on nature conservation.

One of the main shortcomings in managing Ireland's biodiversity is the lack of data to provide baseline and up-to-date information on the distribution and abundance of species and on some habitats. The recent establishment of the National Biodiversity Records Centre is an important development in this regard.

Ireland's soils are a vital national resource that provide the foundation for life in terrestrial ecosystems as well as important functions, for example as a medium for growing food, forage crops and energy crops. Nonetheless, policies and



legislation on the protection of soil are very limited at a national level and their development is urgently required. Significantly, the knowledge and understanding of many issues relating to soil are limited in Ireland due to the lack of data. As such there is no systematic soil information or monitoring system in Ireland, and this hampers evidence-based decision-making and policy-making. It is critical therefore that a national soil map and information system be delivered as a matter of priority. The EPA has recently initiated and supported the development of the national soil map through its research programme (STRIVE).

It is possible that many soil threats and pressures, such as erosion, surface sealing, compaction and salinisation, are occurring in Ireland, but no comprehensive assessment has been made to date. These threats, along with the potential impacts of climate change, need to be evaluated, quantified, prioritised and addressed. While Ireland has fewer contaminated land problems than most other heavily industrialised countries, there is a need to develop a national plan for the remediation and management of contaminated sites and to develop guideline values for priority contaminants in soil.

Finally, Ireland has experienced a relatively high rate of land use change over the past two decades in comparison to many other EU countries. However, development on the periphery of urban areas is continuing, with associated increases in commuting distances, travel times and emissions of pollutants to air. Similarly, rural areas have experienced widespread construction of single rural dwellings and the suburbanisation of villages close to towns and cities. While guidelines for rural housing and best practice



guidelines for urban design have been published, there is a need to ensure that national development and spatial strategies give more focus to environmental issues.

Integration and Enforcement

The previous state of the environment report in 2004 identified the need to improve enforcement of environmental legislation, and to better integrate environmental considerations into the policies and plans across all sectors of the

economy, as particular environmental protection challenges in Ireland. Progress has been made in this regard with greater consideration and recognition being given to environmental priorities in, for example, the National Development Plan 2007-2013, the strategy reports of the National Social and Economic Council and through the establishment of a Cabinet committee on climate change. Nonetheless, given the ongoing development of the economic sectors as noted in Chapters 2 and 15 and the range of environmental legislation implemented at EU and national levels, it is clear that these issues will continue to be among the most important environmental challenges facing Ireland over the coming decade.

Economic development is essential to the continued transformation of Ireland and to improve the quality of life for people living in the State. Sustainable economic and social development, however, must be underpinned by the efficient use of resources, balanced regional development and the integration of environmental considerations and priorities across all economic sectors. While the environment is sometimes



perceived as being in conflict with the objectives of economic development, it should be noted that within the context of sustainable development, economic and social well-being is intrinsically linked with protecting the environment. The underlying principle of sustainable development is that the natural resources and environmental conditions fundamental to the economic and social well-being of future generations are not exhausted or degraded, but enhanced and maintained.

The primary strategic frameworks for integrating environmental considerations into other sectoral policy areas are mainstream economic policies. In particular, the National Development Plan provides an opportunity for such integration, as it set out a road map of investment and integration of policies to enhance development in Ireland over the period 2007–2013. While it is welcome that the environment and environmental sustainability are included as a common theme across many of the programmes and measures, it is vital that on an ongoing basis, all sectors take full account of environmental considerations as part of policy and investments planning undertaken through this plan. The National Development Plan should, through its implementation, give equal status to economic prosperity, social equity and environmental protection.

The EU Strategic Environmental Assessment (SEA) Directive, implemented in Ireland since 2004, is considered an important vehicle for integration of environmental considerations at a sectoral level. As noted in Chapter 11, the SEA Directive is aimed at assessing the environmental effects of plans and programmes in sectors such as



forestry, fisheries, transport, energy, tourism, and land-use planning. While many of the economic sectors are now beginning to address the requirements of the SEA Directive, it is notable that a number of significant sectors, in particular the forestry, tourism and transport sectors, have yet to engage fully in the process. It is also regrettable that the National Development Plan 2007–2013, which sets the framework for lower-tier plans and programmes, was not in itself formally subject to an environmental assessment in accordance with the SEA Directive and national SEA Regulations. It should be noted that no enforcement powers are assigned to the statutory environmental authorities within the national legislation implementing the SEA Directive to require plan/programme makers to undertake an SEA.

Currently there are over 200 environmental laws in force in Ireland, the majority of which have stemmed from EU legislation. It is important that these laws are vigorously implemented and enforced, particularly at local level, and that there is greater cohesion among the relevant agencies to tackle serious environmental offences. There has been

considerable success in recent years in tackling offences such as large-scale illegal dumping and illegal cross-border movement of waste. In addition, since the previous state of the environment report, a national Environmental Enforcement Network, coordinated by the EPA, has been developed and has brought together the various agencies that have a role in enforcement. The focus of this network is to achieve a higher and more consistent standard of enforcement across Ireland, ensuring that those who flout environmental laws are made to pay for their actions. Improved enforcement and remediation costs that can run into millions of euro are an increasing deterrent to would-be polluters.

Emerging Issues

The manufacture, use and disposal of chemicals can create risks to humans and the natural environment. Recent developments in EU legislation, notably the REACH Regulation, have attempted to address the shortcomings of previous policy approaches. The REACH Regulation places greater responsibility on industry to manage risks that chemicals may pose to human health and the environment. In



principle it applies to all chemicals – not just those used in industrial processes, but also household products such as paints and cleaning products and those used in articles such as clothes, furniture and electrical appliances. REACH therefore has significant challenges for manufacturers, importers, formulators, distributors and users of chemicals. Legislation to put appropriate national arrangements in place for implementation of REACH and related legislation is currently being finalised.

In recent years concern has been expressed that endocrine-disrupting chemicals (EDCs), through release into the environment, can have adverse effects on health and the environment. Suspected or confirmed EDCs include organochlorine pesticides, PCBs, organotin compounds, phthalates, and natural and synthetic hormones. There has also been growing concern regarding the potential implications of pharmaceutical and personal care products (PPCPs), such as medicines, veterinary drugs, fragrances and cosmetics, discharging indirectly into the general environment. International and national studies have highlighted the presence of PPCPs in low concentrations in the

environment in the influent and effluent of municipal wastewater treatment plants and in sludge. National studies have indicated that antimicrobial agents and antimicrobial-resistant bacteria are present at significant levels in hospital effluent and city sewage. Overall, there is a need for further research to determine the effects of both EDCs and PPCPs on human health and the environment in Ireland.

The rapidly developing field of nanotechnology has found highly successful applications in diverse areas such as computer equipment and the cosmetics industry. This emerging technology may benefit the environment, for example through improvements in monitoring devices, remediation of pollution and conserving energy and resources. However, the very properties of nanoparticles may pose potential risks to human populations or the environment. It is important, therefore, that the potential health and environmental issues be addressed in parallel with the development of nanotechnology, particularly as the testing and assessment methods used to assess traditional chemicals may not be fully applicable to nanotechnology-derived materials. Improved information regarding characterisation of nanomaterials, their hazards, exposure, risk assessment and risk management is required at both national and international levels. This will allow regulators to make fully informed decisions, adapt existing regulatory frameworks to take account of the emerging technology and address any public and environmental concerns. Research addressing some potential effects of nanoparticles on the environment and human health is currently under way in Ireland, through the EPA's environmental research programme.

Role of Research and Environmental Technologies

Developments in science, research and innovation can play a valuable role in environmental protection and in moving towards a sustainable future for Ireland. High-quality research can provide the foundation for credible decision-making, while technology and innovation can provide valuable pioneering solutions for environmental problems. The complexity of existing and emerging environmental issues and the range of causal factors mean that environmental policies must be underpinned by the type, and in-depth level, of knowledge that can only be delivered through a systematic programme of environmental research. Improving knowledge on environment and health-related issues is a particular example where such a structured research programme can play a pivotal role.

Meeting United Nations and EU environmental obligations frequently requires the support of environmental research. Examples of this in Ireland include research to gain improved emission inventories of greenhouse and acidifying gases and to assist in the determination of reference baseline conditions as required under the EU Water Framework Directive.



At a national level, the Strategy for Science, Technology and Innovation (SSTI) published in 2006 sets a target for Ireland to be internationally renowned for the excellence of its research by 2013. The strategy builds on the investments of the National Development Plan to deliver a sustainable, world-class research system in Ireland across a spectrum of disciplines and it also sets out the strategic direction for environmental research, placing particular emphasis on combating the main environmental challenges facing Ireland.

The EPA has the legal remit for the overall coordination of environmental research in Ireland. In 2007 it published a strategy for science, technology research and innovation for the environment (STRIVE). This strategy, which builds on the success of previous EPA-coordinated environmental research programmes, is focused on the provision of world-class scientific knowledge to protect and improve the natural environment by addressing key environmental management issues across seven thematic areas:

- climate change
- waste resource management and chemicals
- water quality and the aquatic environment
- air quality, atmospheric deposition and noise
- impacts on biodiversity
- soils and land use
- socioeconomic aspects.

Key research priorities for STRIVE in the coming years will be strongly based on the issues and knowledge gaps identified through *Ireland's Environment 2008* and other related environmental assessments.

The EPA STRIVE and the SSTI also highlight the importance of environmental technologies as a key area in which research and innovation are essential, both from a sustainable socioeconomic perspective and also to deliver environmental and quality-of-life outcomes. Environmentally sound technologies protect the environment, are less polluting, use resources in a more sustainable manner, recycle more waste and products and handle residual wastes in a more acceptable manner than the technologies for which they are substitutes. The importance of environmental technologies is mirrored at EU level, where the EU Environment Technology Action Plan (ETAP), adopted in 2004, is designed to promote development and deployment of 'green technologies'. ETAP has the aim of stimulating the development and deployment of technologies that reduce pressures on natural resources and improve the quality of life of European citizens, while at the same time stimulating economic growth.

In a growing market for environment technologies, environmental research can identify new opportunities and contribute to the knowledge economy and to sustainable development. The EPA STRIVE strategy has placed a particular emphasis on research into new or improved environmental technologies – for example green chemistry, nanotechnologies and white biotechnology – for the management of natural resources and to reduce the environmental impact of human activities.

However, it is also acknowledged that barriers exist to the introduction of environmental technologies. These include the difficulty of bringing new innovation from the research and

development stage to the market and subsequent successful application of the technologies. A key priority for Ireland is to bridge the gap between research and the marketplace and to support Irish companies in getting a foothold in the national, European and global markets for environmental goods and services.

Conclusions

The environment is a key resource for Ireland, and it must be protected and improved to ensure that it remains a basis for a healthy society and a thriving economy into the future. The overall finding of this report is that the quality of Ireland's environment is relatively good but there are some key environmental challenges facing the country, as a result of economic, social and demographic changes over the past number of years. Furthermore, analysis of likely future developments across all sectors of the economy suggests that pressure on environmental quality will continue to build over the next two decades.

The EPA's strategic framework document, *2020 Vision*, sets out six environmental goals for protecting and improving Ireland's environment. While each of these six goals must be achieved to ensure environmental quality is protected and enhanced in the longer-term, some issues represent a greater challenge than others. As such, *Ireland's Environment 2008* has identified the most pressing and challenging environmental priorities for the State in the coming years as follows (see also Figure 16.2):

- Limiting and adapting to climate change;
- Reversing environmental degradation;

- Mainstreaming environmental considerations; and
- Complying with environmental legislation and agreements.

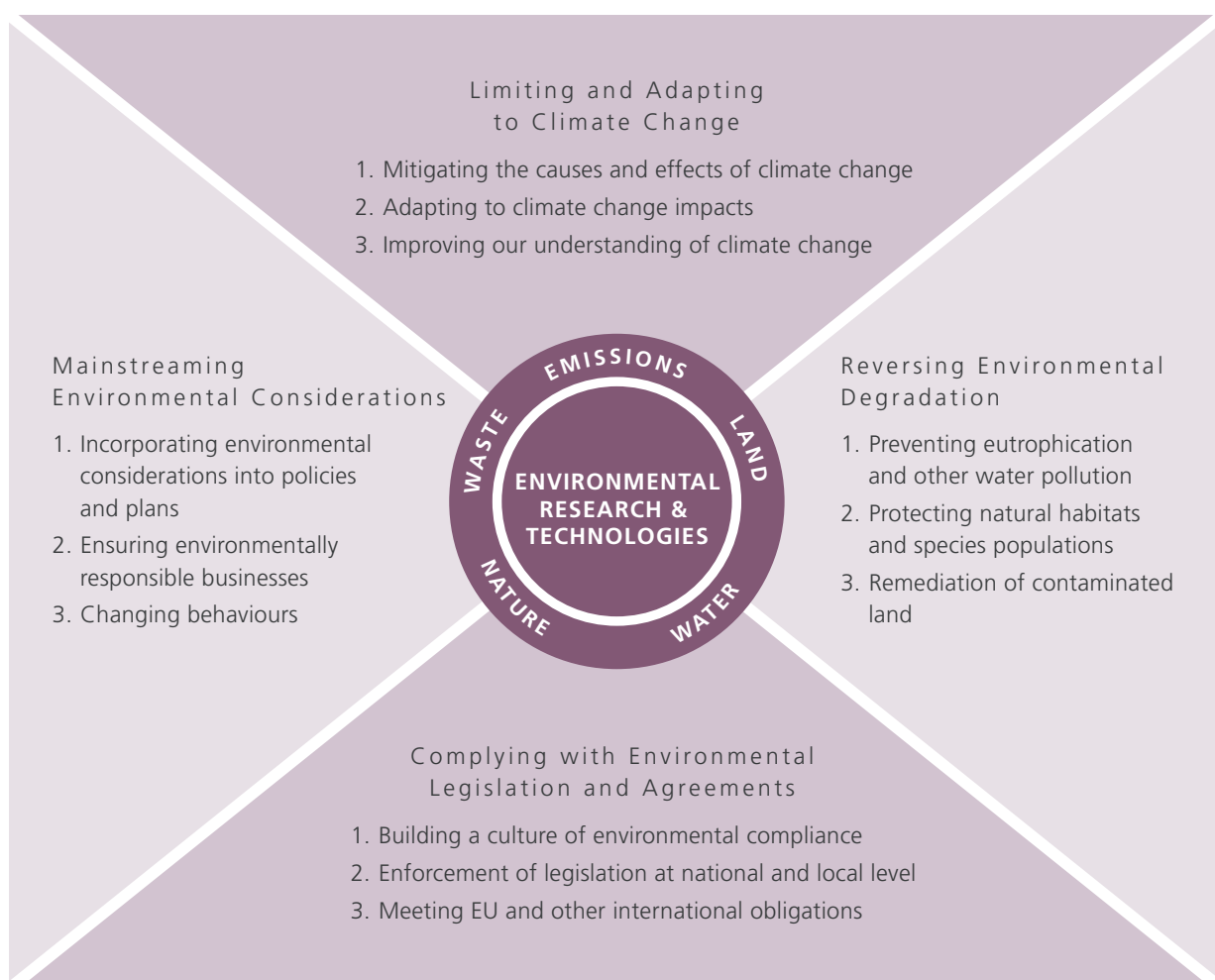
In relation to climate change, Ireland faces a significant challenge to meet its targets both under the Kyoto Protocol in the period 2008–2012 and under the EU burden sharing target for 2020 and beyond. Ireland needs to reduce its dependence on fossil fuels and ensure that significant increases are made in both energy efficiency and in the use of alternative energy sources such as wind, ocean and biomass. Achieving the 2020 target will require radical

changes to current practices in all economic sectors, particularly in energy and transport.

It is notable that even if greenhouse gas levels were reduced now, some climate change impacts in Ireland are unavoidable. Future national and local/regional development plans and investments must be climate-proofed to minimise the unavoidable effects of climate impacts. Continued research is also required to improve our understanding how Ireland's climate will change, the likely impacts resulting and to underpin our capacity and ability to devise and implement effective technologies, policies and measures.

In terms of reversing environmental degradation, the two most significant areas where unsatisfactory environmental quality is extensive are eutrophication and other water pollution and the unsatisfactory conservation status of natural habitats and species. Tackling pollution of water bodies is vital, as both ground and surface waters are sources for drinking water, and because many ecosystems are dependant on good water quality. Although progress has been made in reducing emissions to water, more focused efforts are now required to ensure that the rate of improvement in the status of Ireland's waters is

Figure 16.2 Main Environmental Challenges



increased to meet the objective of the EU Water Framework Directive.

Biodiversity loss is a serious threat to the quality of Ireland's environment because habitat degradation and loss of species are often irreversible. Many of Ireland's most important habitats afforded protection under the EU Habitats Directive have been assessed as having bad conservation status and certain species are considered to be of poor conservation status. Ireland must complete its designation of an adequate number of protected sites as a matter of urgency. Improved coherence is also required at national level between various plans and programmes affecting biodiversity. Decision-making at regional and local levels must also be consistent with high-level commitments for biodiversity.

The issue of contaminated sites, such as disused landfills, abandoned mines and sites of old industrial activities, has become more prominent in Ireland in recent times. It is estimated that there are up to 2,300 sites where there is the potential for soil and/or groundwater contamination, but the actual

number is still unknown. There is a pressing need to develop an overall policy and legislative framework for the identification, management and remediation of contaminated land in the State.

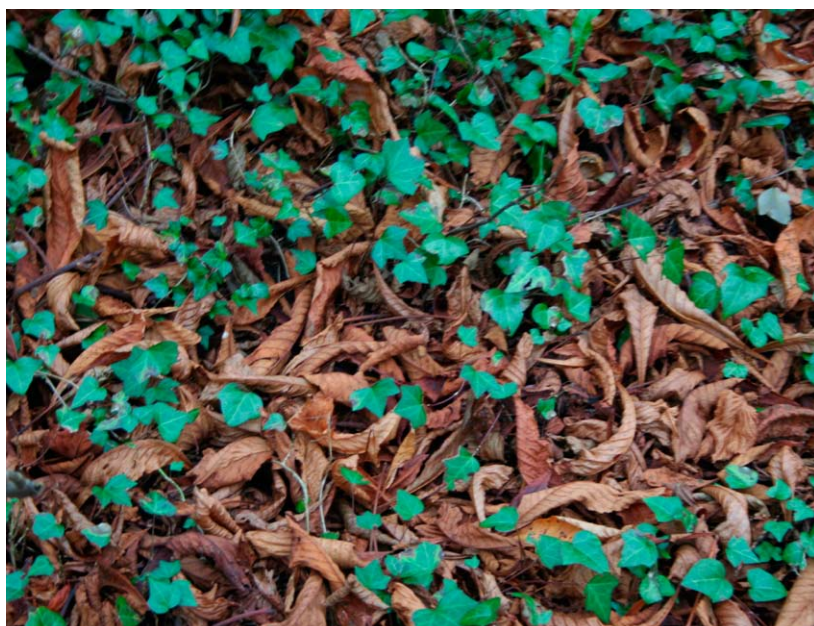
In achieving economic development that is sustainable, it is essential that the natural resources and environmental conditions that are fundamental to the well being of future generations are not exhausted or degraded. The third key challenge for Ireland is to mainstream environment considerations and to ensure that environmental priorities are placed at the heart of policy and decision-making across all economic sectors. Furthermore, responsibility for environmental issues is not just the preserve of governmental bodies. Instead it is a shared responsibility for all members of society. Current levels of resource use, in particular energy and water, are at unsustainable levels, and the volume of waste generated is continuing to escalate. Individual behaviours must change if a more sustainable style of living is to be achieved. While some progress has been achieved, for example in waste recycling, there

remains considerable scope for improvement in relation to energy use, conservation of water, and in waste prevention and management.

Similarly, businesses must also take greater responsibility for their environmental performance and be conscious that the cumulative impact on the environment of small, medium and large enterprises can be substantial. Business representative bodies have an important leadership role to play in increasing awareness of economic benefits of good environmental performance, including encouraging participation in initiatives that support the production of goods and services in a more environmentally friendly manner.

The final major environmental challenge for Ireland is in complying with environmental legislation and agreements. Overall, there is a need for Ireland to build a stronger culture of compliance with environmental legislation. State bodies and local authorities must become proactive guardians and stewards of the environment in their areas, while business representative organisations must encourage a greater compliance with environmental licensing and regulation. Allied to this is a continuing need for a higher and more consistent standard of enforcement of all environmental legislation at national and local level to ensure that the polluter pays principle applies and that those who flout environmental laws are made to pay for their actions.

Ireland faces a difficult challenge in meeting many of its environmental protection obligations under both European legislation and other internationally binding legal agreements. Those that pose the most substantial challenges include:





- To prevent the deterioration of water quality in any water body and to achieve 'good' status or higher for all water bodies by 2015 under the EU Water Framework Directive.
- Under the Kyoto Protocol to the UNFCCC to reduce greenhouse gas emissions to 13 per cent over 1990 levels over the period 2008–2012.
- Under the European Commission's 'Climate Action and Renewable Energy Package' to reduce greenhouse gas emissions by 20 per cent in 2020 relative to 2005 levels. If an international agreement is achieved, further reductions, up to 30 per cent, will be required.
- Under the EU Habitats and Birds Directives, to fulfil Ireland's obligations on the designation, management, classification and protection of sites.
- Under the National Emissions Ceiling Directive to achieve the emissions reductions targets for transboundary gases, particularly with respect to nitrogen oxides (NO_x) emissions.
- Under the EU Landfill Directive progressively to reduce biodegradable municipal waste disposed in landfill to achieve a maximum of 451,000 tonnes landfilled by 2016.

Finally, it is anticipated that environmental research will play an increasingly important role in environmental protection and management in the future, particularly in relation to better understanding and addressing emerging environmental issues and in the development of new or improved environmental technologies. The continued strong investment in environmental research is crucial, as today's environmental research will become tomorrow's environmental protection.

References

Environmental Protection Agency (2007) *2020 Vision: Protecting and Improving Ireland's Environment*. EPA, Wexford.