

Water Quality in Ireland 2010 - 2012



ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency (EPA) is responsible for protecting and improving the environment as a valuable asset for the people of Ireland. We are committed to protecting people and the environment from the harmful effects of radiation and pollution.

The work of the EPA can be divided into three main areas:

Regulation: *We implement effective regulation and environmental compliance systems to deliver good environmental outcomes and target those who don't comply.*

Knowledge: *We provide high quality, targeted and timely environmental data, information and assessment to inform decision making at all levels.*

Advocacy: *We work with others to advocate for a clean, productive and well protected environment and for sustainable environmental behaviour.*

Our Responsibilities

Licensing

We regulate the following activities so that they do not endanger human health or harm the environment:

- waste facilities (*e.g. landfills, incinerators, waste transfer stations*);
- large scale industrial activities (*e.g. pharmaceutical, cement manufacturing, power plants*);
- intensive agriculture (*e.g. pigs, poultry*);
- the contained use and controlled release of Genetically Modified Organisms (*GMOs*);
- sources of ionising radiation (*e.g. x-ray and radiotherapy equipment, industrial sources*);
- large petrol storage facilities;
- waste water discharges;
- dumping at sea activities.

National Environmental Enforcement

- Conducting an annual programme of audits and inspections of EPA licensed facilities.
- Overseeing local authorities' environmental protection responsibilities.
- Supervising the supply of drinking water by public water suppliers.
- Working with local authorities and other agencies to tackle environmental crime by co-ordinating a national enforcement network, targeting offenders and overseeing remediation.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE), Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Prosecuting those who flout environmental law and damage the environment.

Water Management

- Monitoring and reporting on the quality of rivers, lakes, transitional and coastal waters of Ireland and groundwaters; measuring water levels and river flows.
- National coordination and oversight of the Water Framework Directive.
- Monitoring and reporting on Bathing Water Quality.

Monitoring, Analysing and Reporting on the Environment

- Monitoring air quality and implementing the EU Clean Air for Europe (CAFÉ) Directive.
- Independent reporting to inform decision making by national and local government (*e.g. periodic reporting on the State of Ireland's Environment and Indicator Reports*).

Regulating Ireland's Greenhouse Gas Emissions

- Preparing Ireland's greenhouse gas inventories and projections.
- Implementing the Emissions Trading Directive, for over 100 of the largest producers of carbon dioxide in Ireland.

Environmental Research and Development

- Funding environmental research to identify pressures, inform policy and provide solutions in the areas of climate, water and sustainability.

Strategic Environmental Assessment

- Assessing the impact of proposed plans and programmes on the Irish environment (*e.g. major development plans*).

Radiological Protection

- Monitoring radiation levels, assessing exposure of people in Ireland to ionising radiation.
- Assisting in developing national plans for emergencies arising from nuclear accidents.
- Monitoring developments abroad relating to nuclear installations and radiological safety.
- Providing, or overseeing the provision of, specialist radiation protection services.

Guidance, Accessible Information and Education

- Providing advice and guidance to industry and the public on environmental and radiological protection topics.
- Providing timely and easily accessible environmental information to encourage public participation in environmental decision-making (*e.g. My Local Environment, Radon Maps*).
- Advising Government on matters relating to radiological safety and emergency response.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

Awareness Raising and Behavioural Change

- Generating greater environmental awareness and influencing positive behavioural change by supporting businesses, communities and householders to become more resource efficient.
- Promoting radon testing in homes and workplaces and encouraging remediation where necessary.

Management and structure of the EPA

The EPA is managed by a full time Board, consisting of a Director General and five Directors. The work is carried out across five Offices:

- Office of Climate, Licensing and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Radiological Protection
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet regularly to discuss issues of concern and provide advice to the Board.

WATER QUALITY IN IRELAND 2010-2012

Prepared for the Environmental Protection Agency

by

Aquatic Environment

Office of Environmental Assessment

Edited by:

Colin Byrne and Andy Fanning

Authors: Bradley, C., Byrne, C., Craig, M., Free, G., Gallagher, T.¹, Kennedy, B., Little, R., Lucey, J., Mannix, A., McCreesh, P., McDermott, G., McGarrigle, M., Ní Longphuirt, S., O'Boyle, S., Plant, C., Tierney, D., Trodd, W., Webster, P., Wilkes, R. and Wynne, C.

ENVIRONMENTAL PROTECTION AGENCY

An Ghníomhaireacht um Chaomhnú Comhshaoil

PO Box 3000, Johnstown Castle, Co.Wexford, Ireland

Telephone: +353 53 916 0600 Fax: +353 53 916 0699

Email: info@epa.ie Website: www.epa.ie

© Environmental Protection Agency 2015

DISCLAIMER

Although every effort has been made to ensure the accuracy of the material contained in this publication, complete accuracy cannot be guaranteed. Neither the Environmental Protection Agency nor the author(s) accept any responsibility whatsoever for loss or damage occasioned or claimed to have been occasioned, in part or in full, as a consequence of any person acting or refraining from acting, as a result of a matter contained in this publication. All or part of this publication may be reproduced without further permission, provided the source is acknowledged.

WATER QUALITY IN IRELAND 2010-2012

Published by the
ENVIRONMENTAL PROTECTION AGENCY, IRELAND

Design by Yellowstone

Printed by Essentra

Published by the Environmental Protection Agency, Ireland

PRINTED ON RECYCLED PAPER

ISBN: 978-1-84095-602-3

PRICE €20

Acknowledgements

The editors and authors wish to express their gratitude to the following organisations that provided data and information for this report: Inland Fisheries Ireland, Irish Coast Guard, Local Authorities, Marine Institute, National Parks and Wildlife Service, Northern Ireland Environment Agency, Sea Fisheries Protection Authority and Waterways Ireland.

The help of the EPA regional chemists, EPA Laboratory and Hydrometric technicians, skippers and other field assistants in undertaking the monitoring programme and analytical work is greatly appreciated. The advice and assistance of colleagues in the Informatics Unit and Water Framework Directive Integration & Coordination Unit are also gratefully acknowledged.

Maps in the report include Ordnance Survey Ireland (OSI) data reproduced under licence.

Photographs courtesy of Colin Byrne (EPA), Deirdre Tierney (EPA) and Aine O'Connor (NPWS).

Image of Rossbeigh beach © Cian O'Mahony (EPA), used with permission.

Table of Contents

Key findings	4
Executive Summary	8
Key findings and trends	9
Groundwater	9
Rivers and canals	11
Lakes	11
Transitional and coastal waters	12
Key pressures	13
Distance to target	13
Strengthening science	13
1. Introduction and Background	16
The purpose of monitoring waters in the river basin management process	16
Monitoring networks	17
Future reporting on water quality	21
2. Groundwater	24
Introduction	24
Assessment of groundwater status (2007-2012)	25
Assessment of groundwater quality parameters	30
Groundwater quality trends	43
Conclusions	48
Recommendations and follow-up actions	49
3. Rivers and Canals	52
Introduction	53
Water Framework Directive ecological status	53
Trends at River Basin District level	56
Quality elements determining ecological status	58
River water quality: Biological pollution assessment	59
Water quality trends	60
River water quality trends in the River Basin Districts (RBDs)	61
Other ecological quality elements: Fish	65
Fish kills	66
Chemical and physico-chemical elements supporting the ecological status of rivers	67
Chemical status of rivers (priority and priority hazardous substances)	78
Causes of water pollution	81
Water quality and ecological potential of canals and their feeder streams	83
Conclusions	86

4. Lakes	90
Introduction	90
WFD ecological status methodology	91
2010-2012 ecological status	93
Update of 2007-2009 ecological status of lakes	95
Comparison of reporting periods	96
Determinants of ecological status in 2010-2012	98
High status lakes	101
Invasive alien species in Irish lakes	103
Protected areas	104
Identified pressures on Irish lakes	104
Heavily-modified water bodies (HMWB)	104
Chemical status	106
Conclusions	107
5. Transitional and coastal waters	110
Introduction	110
Surface water status	111
Protected area status	124
Trends in pressures impacting on TraC waters	132
Other issues relevant to the marine environment	136
Conclusions	139
6. Conclusions and Recommendations	142
Nutrient enrichment	142
Trends	143
Hazardous substances	144
Other water quality indicators	144
Distance to target	145
Strengthening science	145
General recommendations	146
References	151
Acronyms	155
Appendix 1	157
Appendix 2	161
Appendix 3	162
Appendix 4	166
Appendix 5	167
Appendix 6	168
Appendix 7	171

Any queries relating to this report or its content should be directed to:

Dr. Colin Byrne,
Manager (Ecological Monitoring & Assessment Unit),
Aquatic Environment,
Office of Environmental Assessment,
Environmental Protection Agency,
McCumiskey House, Richview,
Clonskeagh, Dublin 14.
Tel: 00 353 (0) 1-2680220
E-mail: co.byrne@epa.ie

Key findings

<p>Water Quality</p>	<ul style="list-style-type: none"> ▲ 53% of rivers, 43% of lakes, 45% of transitional waters, 93% of coastal waters and 99% of groundwater were satisfactory at good or high status. ▲ Rivers monitored, using the biological Q value scheme, were in high or good condition along 73% of the monitored river channels. This was up 4% from the last monitoring period, and includes an overall increase in high status sites. ▲ There was a 5% reduction in satisfactory quality lakes (10 lakes). This requires further investigation to fully understand the reasons for the reduction. ▲ Serious pollution of rivers reduced to 17 km from 53 km since last reporting period. ▲ Reported fish kills declined to an all-time low of 70 recorded between 2010 and 2012. ▲ Water quality in canals remains very high at over 90% satisfactory. ▲ Quantitative issues resulting from over-abstraction of groundwater are minimal (99% of groundwater bodies at good status) ▲ The south and south-east of the country continue to have the greatest proportion of groundwater and rivers with nitrogen concentrations over 10 mg/l NO₃. ▲ While there was a decrease in detections of faecal coliforms in groundwater from 61% in 2008 to 51% in 2012, these levels highlight a risk for drinking water in areas where there is inadequate treatment. ▲ Approximately 35% of the designated shellfish areas were non-compliant with the guide value for <i>Escherichia coli</i>. ▲ The level of compliance with Environmental Quality Standards for hazardous substances was very high across all waters.
<p>Key Pressures and Eutrophication</p>	<ul style="list-style-type: none"> ▲ Eutrophication, which is caused by nutrient enrichment, remains the most significant issue for surface waters. ▲ Levels of nitrogen and phosphorus in groundwater and rivers have been mostly decreasing (52-74% of sites for N and 69% for P) or stable (21-41% of sites for N and 24% for P) since 2007, which is a welcome development. Riverine inputs to transitional waters and coastal waters have also shown declines. ▲ The two most important suspected causes of pollution in rivers are agriculture and municipal sources, accounting for 53% and 34% of cases respectively. ▲ Nutrient inputs to rivers, particularly from the agriculture sector, have seen 18.7% and 37.7% reductions in nitrogen and phosphorus sources, respectively. ▲ Anticipated increases in pressures due to human population growth and agricultural output will need to be carefully managed to build on these positive trends.

Distance to target	<ul style="list-style-type: none"> ▲ 47% of rivers, 57% of lakes, 55% of transitional waters and 7% of coastal waters require improvement to satisfactory condition. ▲ The target of 13.6% improvement in ecological status for surface waters from the 2009 baseline by 2015 included in the first cycle river basin management plans is unlikely to be achieved. ▲ The contamination of groundwater with faecal coliforms in 51% of samples highlights the significant challenge to protect both public and private drinking sources. ▲ 35% of designated shellfish waters with elevated faecal contamination may require additional measures to achieve the quality objectives.
Strengthened science and reporting	<ul style="list-style-type: none"> ▲ Many new ecological monitoring tools have been developed and others are under development. These tools will be essential to managing the aquatic environment. However, further work is needed to understand the link between the new tools and environmental pressures affecting them, including hydromorphological and water abstraction pressures. ▲ Fish assessments downgraded the ecological status in 18% and 27% of surveillance rivers and lakes, respectively. Further investigation is needed to understand the reasons for this. ▲ Targeted assessment of environmental pressures, including physical habitat modifications and barriers to fish migration, needs to be undertaken to determine their ecological impacts. ▲ The EPA is reviewing its reporting outputs on the aquatic environment. The EPA is committed to improving the frequency of reporting, as well as developing key indicators so as to support catchment management activities, and will publish results for the period 2013-2015 in 2016.





EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report presents a review of water quality in the State for the years 2010 to 2012. It is the most recent in the series of comprehensive three-year reviews of water quality in Ireland that have been undertaken by the Environmental Protection Agency (EPA) and its predecessor organisations. The purpose of the report is to give a detailed review of all the main issues related to the quality of the aquatic environment in Ireland, in order to provide guidance towards the protection and enhancement of this valuable resource, and the preparation of second cycle river basin management plans under the Water Framework Directive (2000/60/EC).

The report is based on monitoring carried out at:

- ▲ 336 groundwater monitoring sites (covering approximately 69,000 km²)
- ▲ 3,051 river monitoring sites (covering approximately 13,300 km of river channel length)
- ▲ 42 canal monitoring sites (covering approximately 332 km of channel)
- ▲ 213 lakes (covering approximately 955 km² of lake surface area)
- ▲ 9 heavily modified water bodies (covering approximately 37 km²)
- ▲ 193 transitional water bodies (covering approximately 844 km²), and
- ▲ 101 coastal water bodies (covering over 13,000 km²).

These water quality datasets have been generated by the EPA, local authorities, Inland Fisheries Ireland, Waterways Ireland, the Marine Institute, as well as from other State agencies, such as the Sea Fisheries Protection Authority and the Irish Coast Guard.

The initial focus of the report is on the status of waters as defined under the Water Framework Directive². However, the report also contains more in-depth analysis of the underlying environmental indicators that determine status, including their trends. These environmental indicators are particularly important for identifying the causes of environmental impacts and for guiding the appropriate management measures for the restoration and protection of waters. The environmental indicators of the quality of Ireland's aquatic environment reported include; ecological assessments, nutrient levels and trends, reported fish kills, the quality of shellfish waters, faecal contamination of groundwater, levels of radioactivity in marine waters, oil pollution incidents in marine waters, and the presence and levels of toxic substances in the aquatic environment.

² All water status results are available via the EPA Geoportal at: <http://gis.epa.ie>

Key findings and trends

While the quality of Irish groundwater and surface waters are among the best in Europe³, there are many impacts that need to be addressed to bring all waters up to a satisfactory level and to protect waters already in good condition. The water status assessment for 2010-2012 shows that 48% of rivers, 57% of lakes, 55% of estuaries and 4% coastal waters (by area) assessed were impacted (see **Table 1** and **Figure 1**). Only 1% of groundwater bodies are at poor chemical status due to elevated phosphorus levels or due to historical contamination from mining activities and industrial development. Elevated nutrient concentrations continue to be the most widespread water quality problem in Ireland arising primarily from human activities, such as agriculture and wastewater discharges to water from human settlements, including towns, villages and rural houses. The level of pollution from hazardous substances is low.

Status of Irish waters (2010-2012)	High	Good	Moderate	Poor	Bad
Groundwater (% area) (interim status)	n/a	99	n/a	1	n/a
Rivers (% water bodies)	11.8	41	28.6	17.9	0.7
Lakes (% water bodies)	11	32	33	15	9
Transitional (% area) *	3.6	41.1	43.4	11.4	0.5
Coastal (% area) *	63.4	30	4.4	<0.01	0.0

* - unassigned waterbodies not included.

Table 1. Summary of WFD water status for groundwater (chemical status) and surface waters (ecological status) during 2010-2012.

Groundwater

1% of groundwater bodies (11) in Ireland were classified as at poor chemical status. This was an improvement from 13.6% of the groundwater bodies in Ireland classified as being at poor chemical status in the last assessment, and was due to declines in phosphate levels since the first cycle of WFD river basin management planning. Of the 11 groundwater bodies at poor chemical status, three were at poor chemical status due to phosphate contribution to rivers. The remaining eight groundwater bodies were at poor chemical status because of historical contamination from mining activities and industrial development. Two out of 336 groundwater bodies were at poor quantitative status due to impacts of water abstractions on a groundwater-dependent terrestrial ecosystem, both of which are located in the South-Eastern River Basin District.

The average nitrate concentration in groundwater was below the threshold value of 37.5 mg/l NO₃ at 96% of the monitoring locations for the period 2007-2012. The south and south-east regions of the country continue to have the greatest proportion of monitoring locations with elevated nitrate concentrations. The average phosphate concentration in groundwater was below the threshold value 0.035 mg/l P at 93% of the monitoring locations during the period 2007-2012. Downward trends in nitrate concentrations were evident at 74% of groundwater monitoring locations, with a further 21% having stable levels. There has been a gradual decrease in phosphate concentrations across the WFD groundwater monitoring network, with 70% of sites having average phosphate concentrations less than 0.015 mg/l P in 2012 compared

to 40% in 1995-1997. Certain locations have been identified as having upward trends in nitrate and phosphorus that could, if they continue, lead to failure to meet WFD objectives. Further assessment of these areas is required to understand what is causing the trend.

There was a decrease in samples with positive detections of faecal coliforms during the reporting period (from a maximum of 61% in 2008 to 51% in 2012). Groundwater sources for both public and private drinking water need to be protected, in order to reduce the risk of illness from the consumption of contaminated water, particularly from spring sources.

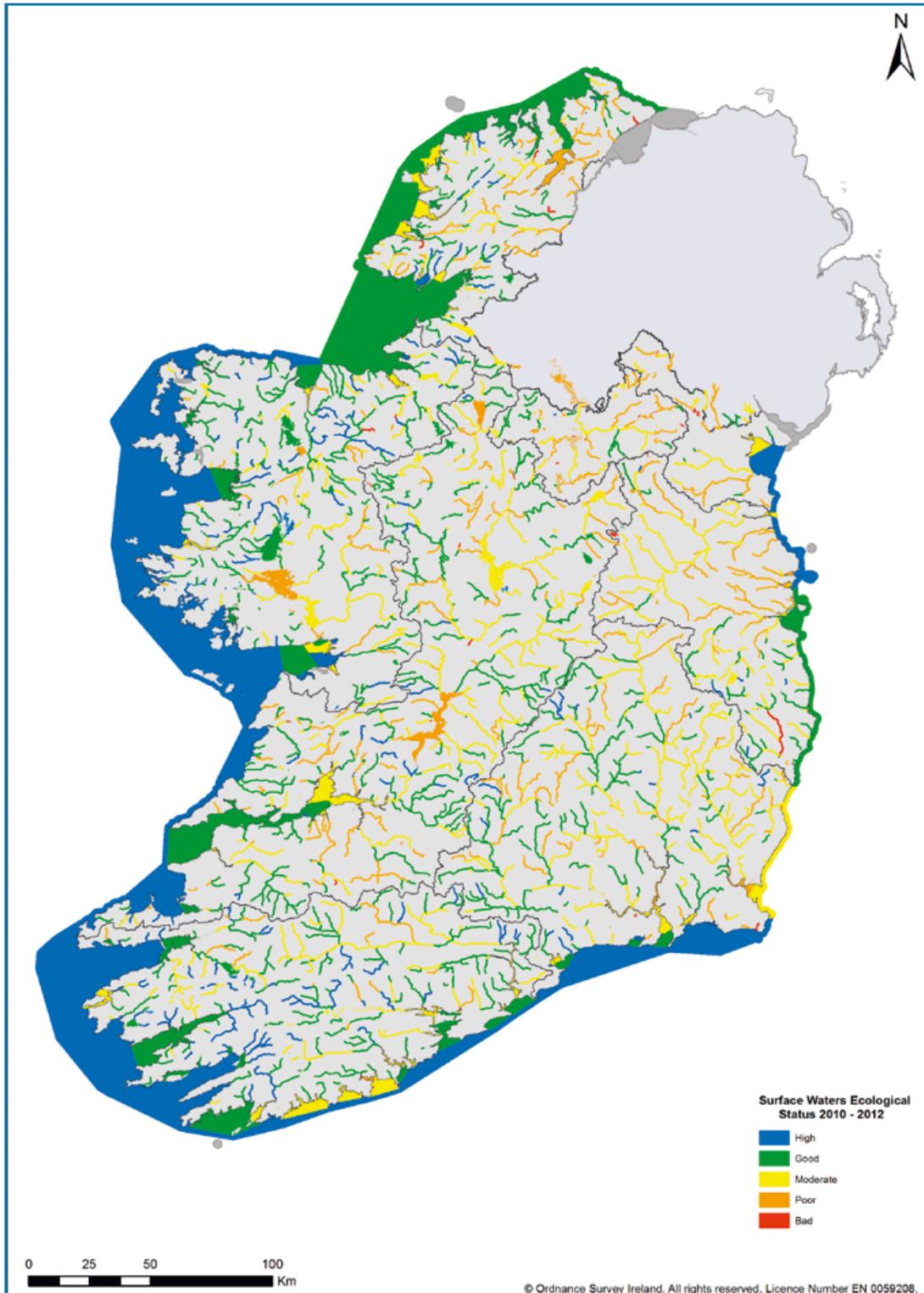


Figure 1. Surface water ecological status for rivers, lakes, transitional and coastal waters (2010-2012).

Rivers and canals

Fifty three percent of monitored river water bodies (858) were at satisfactory ecological status, up 1% since the previous period.

Of 13,300 kilometres of river channel length monitored using the biological Q value scheme, water quality was in high or good condition along 73% of the monitored river channels. This was up 4% from the last monitoring period and includes an overall increase in high status sites. Serious pollution resulting from urban wastewater and industrial pollution was reduced to 17 km of river channel length. This was down from 53 km in 2007-2009.

The two most important suspected causes of river pollution are agriculture and municipal sources, accounting for 53% and 34% of cases, respectively.

Trends in nitrogen indicate that concentrations in rivers were generally reducing (52% of sites assessed) or stable (41% of sites assessed). The greatest reductions were in the intensive agriculture areas in the South-East and Midlands. Trends in phosphorus concentrations in rivers were stable in most parts of the country (69% of sites assessed), including areas where they were historically low. 24% of sites assessed showed decreasing concentrations.

There has been a further decline in the number of fish kills to 70 reported in freshwaters (rivers and lakes) compared to 72 in the previous period (2007-2009). This is the lowest recorded to date, from a high of 235 in the 1980s.

In relation to hazardous substances, the level of compliance with Environmental Quality Standards for specific pollutants⁴ was high, with the main issue being naturally-occurring metals in known, mineral-rich mining areas. In general, the level of compliance with the Environmental Quality Standards (EQSs) for priority and priority hazardous substances was very high. Polyaromatic hydrocarbons (PAHs) and mercury did show widespread exceedances of the EQS. However, these have been identified at EU level as ubiquitous persistent, bio-accumulative and toxic substances (uPBTs) which occur widely in the environment on a global scale, due principally to atmospheric deposition. uPBTs can be found for decades in the aquatic environment at levels posing a significant risk, even if extensive measures to reduce or eliminate emissions of such substances have already been taken. Some are also capable of long-range transport and are largely ubiquitous in the environment. Therefore, non-compliant results do not infer specific issues local to a water body or indeed river basin district.

The Grand and Royal Canals achieved good ecological potential. The canalised section of the Shannon-erne Waterway was compliant with all water quality standards. However, the ecology of the canal was compromised by the hydromorphology of the canal (box-shaped profile), which makes it unsuitable for macrophyte and macroinvertebrate communities to develop.

Lakes

Two hundred and thirteen lakes, representing 955 km² of lake surface area, were monitored for the WFD in the period 2010-2012. Overall, 91 lakes (43% of lakes monitored) were assigned high or good status, comprising 295 km² by area. One hundred and twenty two lakes (57%) were moderate or worse in status (660 km² of lake area monitored).

One hundred and twelve lakes (53% of lakes monitored), accounting for 505 km² of lake surface area, did not change status. Fifty three lakes (221 km² of lake area) declined in status, while 33 lakes (134 km² of lake area) improved in status. Overall, the changes in status translate into a 5% reduction (10 lakes) in the high or good status categories, and a corresponding increase in the moderate or worse status category compared to 2007-2009. The changes in status are generally as a result of changes in phosphorus concentrations. Other factors, such as abstraction

⁴ Specific Pollutants are defined as substances that can have a harmful effect on biological quality, and which may be identified by Member States as being discharged to water in "significant quantities"

pressure, habitat limitations and the presence of alien species, may be impacting on status in some lakes. Fish status was the factor determining overall ecological status in 10 of 13 lakes that were classified as at poor or bad status, where biology was the sole status determinant. The issues require further investigation.

The Invasive Alien Species (IAS) zebra mussel was recorded in 70 of the monitored lakes and one heavily-modified lake water body compared to 50 known lake populations in the 2007-2009 period, suggesting that the zebra mussel continues to spread despite public awareness and biosecurity campaigns. Roach, an invasive fish species, was recorded in 36 of the 75 lakes monitored for fish in 2010-2012.

Six of the nine monitored lake heavily-modified water bodies (HMWBs) were at maximum or good ecological potential.

The levels of hazardous substances (specific pollutants, priority substances and priority hazardous substances) monitored in over 70 lakes remains low with few exceedances. Biota samples of trout and perch were analysed for mercury in 22 lakes. All samples exceeded the EQS. However, it should be noted that the concentrations were well below standards for fishery products⁵, and therefore do not pose a risk to human health. Like PAHs, mercury has been identified as a ubiquitous persistent, bioaccumulative and toxic substance (uPBT) under Directive 2013/39/EU (see Section on Rivers and canals above).

Transitional and coastal waters

36.3% of transitional waters were at high or good ecological status, accounting for 44.7% of the total area assessed (377 km²). A number of water bodies, mainly in the south-east and south of the country, continue to display symptoms of nutrient enrichment and have been classed as eutrophic.

67.4% of coastal waters were at high or good ecological status, accounting for 93% of the total area assessed (approximately 12,471 km²).

Downward trends in nutrient loads to the marine environment were evident, with significant reductions in nutrient inputs from rivers. This downward trend is apparent in the reduction in nutrient sources, particularly from the agriculture sector, which has seen an 18.7% and 37.7% reduction in nitrogen and phosphorus sources, respectively.

Nearly two-thirds (65.1%) of the designated shellfish areas monitored over the four-year period were compliant with the guide value for *Escherichia coli*. Of the non-compliant areas, the worst performing were Bannow Bay, Bantry, Dunmanus Inner, Kinsale, Tralee Bay, and Wexford Harbour Inner, where more than 50% of the samples exceeded the guide value. It is likely that additional measures may be required to achieve the quality objectives for shellfish waters in these areas.

The majority of transitional and coastal waters were at good chemical status. There were a few exceedances of biota standards for mercury in mussel samples. However, mercury has been identified as a ubiquitous persistent, bioaccumulative and toxic substance (uPBT) under Directive 2013/39/EU (see Section on Rivers and canals above).

In general, the levels of radioactive contamination present in the Irish marine environment are low. Radioactive substances from the nuclear reprocessing plant at Sellafield in England continue to be discharged to the Irish Sea, though exposure to these substances is not considered to pose a significant health risk to the Irish public.

⁵ European Commission Regulation (EC) No.1881/2006 as amended by Regulation 629/2008 sets maximum levels for certain contaminants, such as mercury, cadmium and lead, in fishery products

Key pressures

While there has been some modest improvement in the quality of Ireland's waters over the period between 2010 and 2012, there is a significant challenge to meet the requirements of the Water Framework Directive. For example, the figures for 2010-2012 indicate that the target of 13.6% improvement in surface water ecological status by 2015, set in the first cycle of river basin management planning, is unlikely to be achieved.

Eutrophication from nutrient enrichment continues to be the main issue facing Irish waters. The trends in both nitrogen and phosphorus are currently positive, with levels of nitrogen and phosphorus in groundwater and rivers mostly decreasing (52-74% of sites for N and 69% for P) or stable (21-41% of sites for N and 24% for P) since 2007. Nutrient inputs from rivers to marine waters, particularly from the agriculture sector, have seen 18.7% and 37.7% reductions in nitrogen and phosphorus sources respectively.

The two most important suspected causes of pollution of rivers are agriculture and municipal sources, accounting for 53% and 34% of cases respectively. Future pressures include the planned expansion in the agricultural sector and increased nutrient loadings to waters from municipal wastewater discharges due to population growth and other factors. These pressures may threaten the modest improvements seen to date, and if not managed correctly, are likely to impact negatively on the progress made in recent years. Continued investment and resources will be needed to improve the operation and standards of municipal wastewater infrastructure, as well as tackling diffuse pollution arising from agriculture.

The results from some ecological status assessments (e.g. macrophytes and fish) indicate that ecosystems may be responding to environmental pressures other than nutrient enrichment. For example, fish assessments downgraded the ecological status in 18% and 27% of surveillance rivers and lakes respectively. The factors concerned require further investigation to confirm the cause of the unsatisfactory ratings before management measures are considered and implemented.

Distance to target

47% of rivers (waterbodies), 57% of lakes (waterbodies), 55% of transitional waters (area) and 7% of coastal waters (area) require improvement to achieve satisfactory condition. This will require significant additional targeted action to achieve the objectives set out in the Water Framework Directive. In addition to achieving ecological health of aquatic ecosystems, focus will be required on ensuring that the public health requirements are also met. The contamination of groundwater with faecal coliforms in 51% of samples highlights the significant challenge still facing the country to protect both public and private drinking sources. When taken together with the 35% of designated shellfish waters with elevated faecal contamination, it is clear that additional measures may be required to ensure that Ireland's waters are both healthy and safe.

Strengthening science

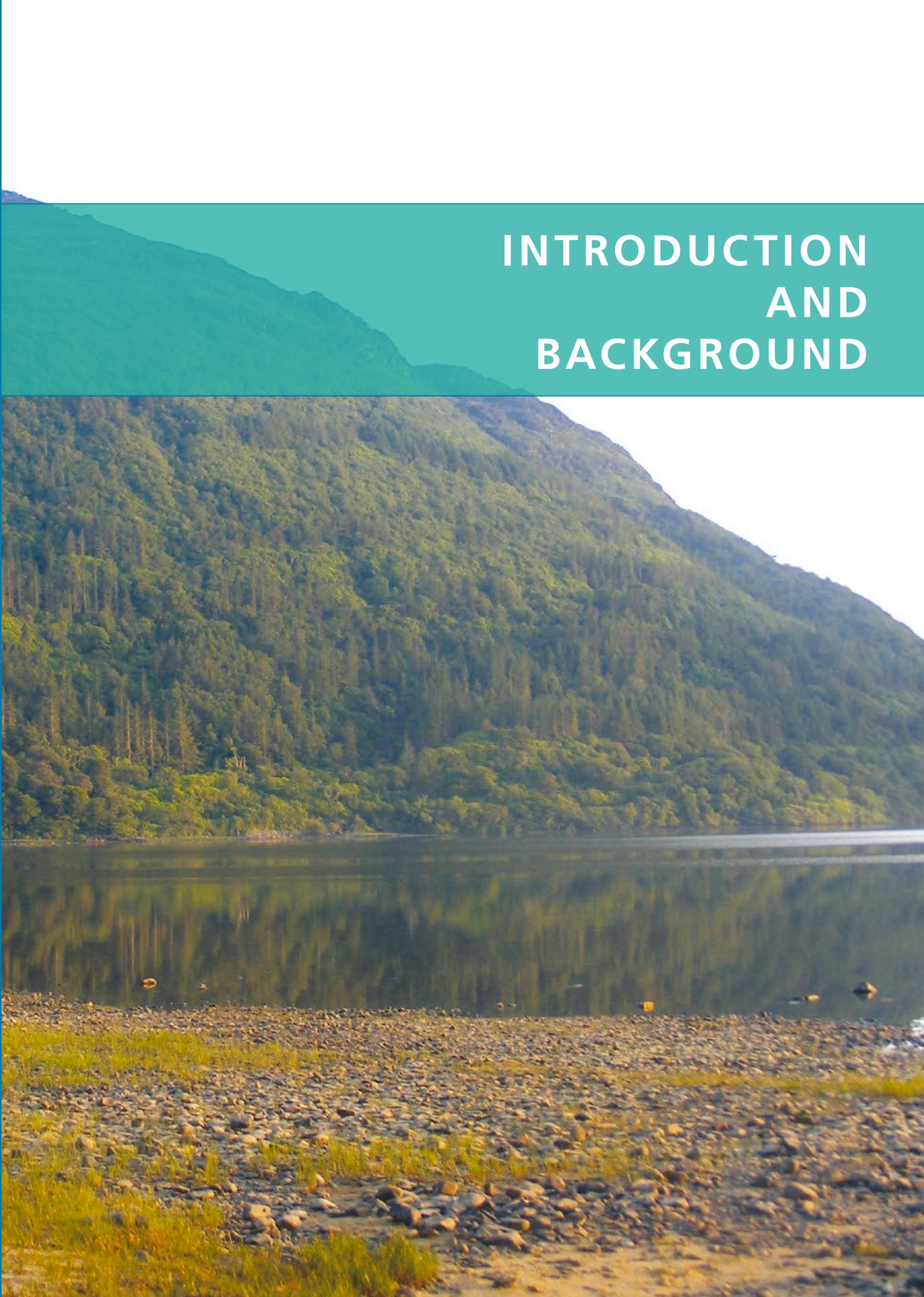
Over 10 new ecological monitoring tools have been developed in recent years for the purpose of assessing impacts from a variety of environmental pressures, and others are under development. These tools will be essential to managing the aquatic environment but further work is needed to understand the link between the new tools and environmental pressures. One of the key findings from the assessments undertaken in this reporting period was the impact of fish status on ecological status. Fish assessments downgraded the ecological status in 18% and 27% of surveillance rivers and lakes, respectively. The reasons why are not always clear and need to be investigated further. Targeted monitoring and assessment of environmental pressures, including physical habitat modifications, barriers to fish migration, and water abstraction/impoundments, needs to be undertaken to determine their ecological impacts. An assessment of available

environmental information and a review of available scientific evidence, both nationally and internationally, will help to improve the Agency's understanding of these pressures and their ecological impacts.

This report notes the loss of status in relation to a number of lakes. Given the modest positive improvement in nutrient trends, and overall water status in all other water categories, further work is required to determine the cause of this trend before management measures are implemented.

The improvement in the trophic status of estuarine waters in recent years is due to the reduction in nutrient inputs. However, a number of estuaries, mainly in the south-east and south of the country, continue to display symptoms of nutrient enrichment and have been classed as eutrophic. The relative sensitivity of these waters to elevated nutrients will need to be assessed to ensure that the right measures are put in place to improve their status.

As the review of priority substances and priority hazardous substances happens at EU level, the presence and level of these substances in Irish waters needs to be investigated. Pharmaceuticals in waters are an emerging environmental issue in Europe, and national consideration of their presence and magnitude in the Irish environment will be needed in the near future. Monitoring to date has detected a number of pesticides, including methylchlorophenoxypropionic acid (Mecoprop), 2-methyl-4-chlorophenoxyacetic acid (MCPA) and 2,4-dichlorophenoxyacetic acid (2,4-D), at low levels in a significant number of rivers (26%-56%). A comprehensive review of the data and other evidence relating to these substances is required, to determine if it will be necessary to consider regulating some of them during the next river basin planning cycle.



INTRODUCTION AND BACKGROUND

1. INTRODUCTION AND BACKGROUND

This report provides an account of the quality of the State's groundwater and surface waters based on survey data for the period 2010-2012. It compares results against earlier assessments. The report continues a series of national reviews of water quality which commenced in 1972 ([Flanagan and Toner, 1972](#); [Flanagan, 1974](#); [Flanagan and Toner, 1975](#); [Lennox and Toner, 1980](#); [WPAC, 1983](#); [Toner et al., 1986](#); [Clabby et al., 1992](#); [Bowman et al., 1996](#); [Lucey et al., 1999](#); [McGarrigle et al., 2002](#); [Toner et al., 2005](#); [Clabby et al., 2008](#) and [McGarrigle, et al., 2010](#)). With the introduction of the Water Framework Directive (WFD) and the development of river basin management plans (RBMPs), the focus of these reports has changed since 2010 (Water Quality in Ireland 2007-2009) to address the status of waters in Ireland in the context of the WFD.

Under Section 65 of the Environmental Protection Agency Act, 1992, the EPA is required to implement national monitoring programmes for water quality to satisfy the requirements of EU and national obligations. Monitoring programmes for rivers, lakes, estuarine and coastal waters, as well as groundwater, were established in 1999, which strengthened the pre-existing ones. However, the national environmental water quality monitoring programme is now largely driven by the EU Water Framework Directive (2000/60/EC).

The initial focus of the report is on the status of waters as defined under the Water Framework Directive. However, the report also contains more in-depth analysis of the underlying environmental indicators that determine status, including their trends. These environmental indicators are particularly important for identifying the causes of environmental impacts and for guiding the appropriate management measures for the restoration and protection of waters. The environmental indicators of the quality of Ireland's aquatic environment reported include; nutrient levels and trends, reported fish kills, the quality of shellfish waters, faecal contamination of groundwater, levels of radioactivity in marine waters, oil pollution incidents in marine waters, and the presence and levels of toxic substances in the aquatic environment.

The aims of the Water Framework Directive are to maintain high and good status waters where they exist, prevent any deterioration in the existing status of waters, and achieve at least good status, in accordance with the environmental objectives set out in RBMPs.

The purpose of monitoring waters in the river basin management process

The Water Framework Directive requires an integrated and holistic approach to the management and protection of both groundwater and surface waters, through the river basin management planning process. The catchment is the most appropriate management unit for applying this approach and requires consideration of the connectivity between groundwater and surface waters. In most rivers in Ireland, more than 30% of the annual average flow is derived from groundwater. In low flow periods, this figure can rise to more than 90%. Therefore, reductions in groundwater input, particularly in dry weather periods, or deterioration in groundwater quality may directly affect related surface water and terrestrial ecosystems. For instance, since surface waters receive contributions from groundwater, its quality will ultimately be reflected in the quality of surface waters.

Environmental monitoring plays a critical role in the cyclical river basin planning process. It initially helps to inform the assessment of environmental risk within the characterisation process ([Figure 1-1](#)). The risk assessment is then used to refine the monitoring programme so as to confirm whether or not environmental impacts are occurring, or are likely to occur, as a result of the risks identified. Monitoring is also used to detect negative environmental trends, monitor the effectiveness of management measures put in place as part of the programmes of measures, and identify emerging environmental issues.

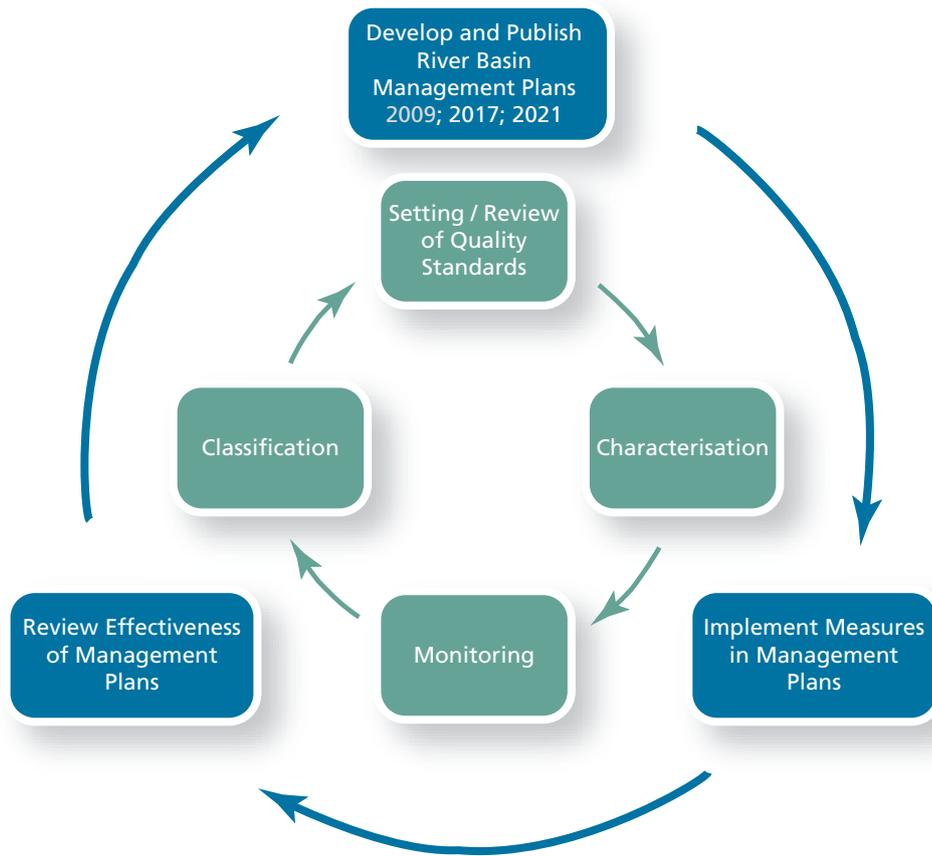


Figure 1-1. The Water Framework Directive Planning Cycles.

Monitoring networks

A comprehensive and representative environmental water quality monitoring programme has been designed and implemented in Ireland (EPA, 2006) to support the implementation of the first river basin planning cycle (**Figure 1-2**). The groundwater network consists of 336 monitoring sites. The river network consists of 3,051 monitoring sites. The lakes network consists of 213 lakes. The transitional waters network consists of 193 monitored water bodies and the coastal waters network consists of 101 monitored water bodies. While the Agency has overall responsibility for the design and management of the monitoring programme, responsibility for certain elements has been assigned by the Agency to a number of public bodies, including local authorities, Inland Fisheries Ireland, the National Parks and Wildlife Service, Waterways Ireland and the Marine Institute. The programme is currently undergoing a review for the purpose of optimising it for use in the second river basin planning cycle.

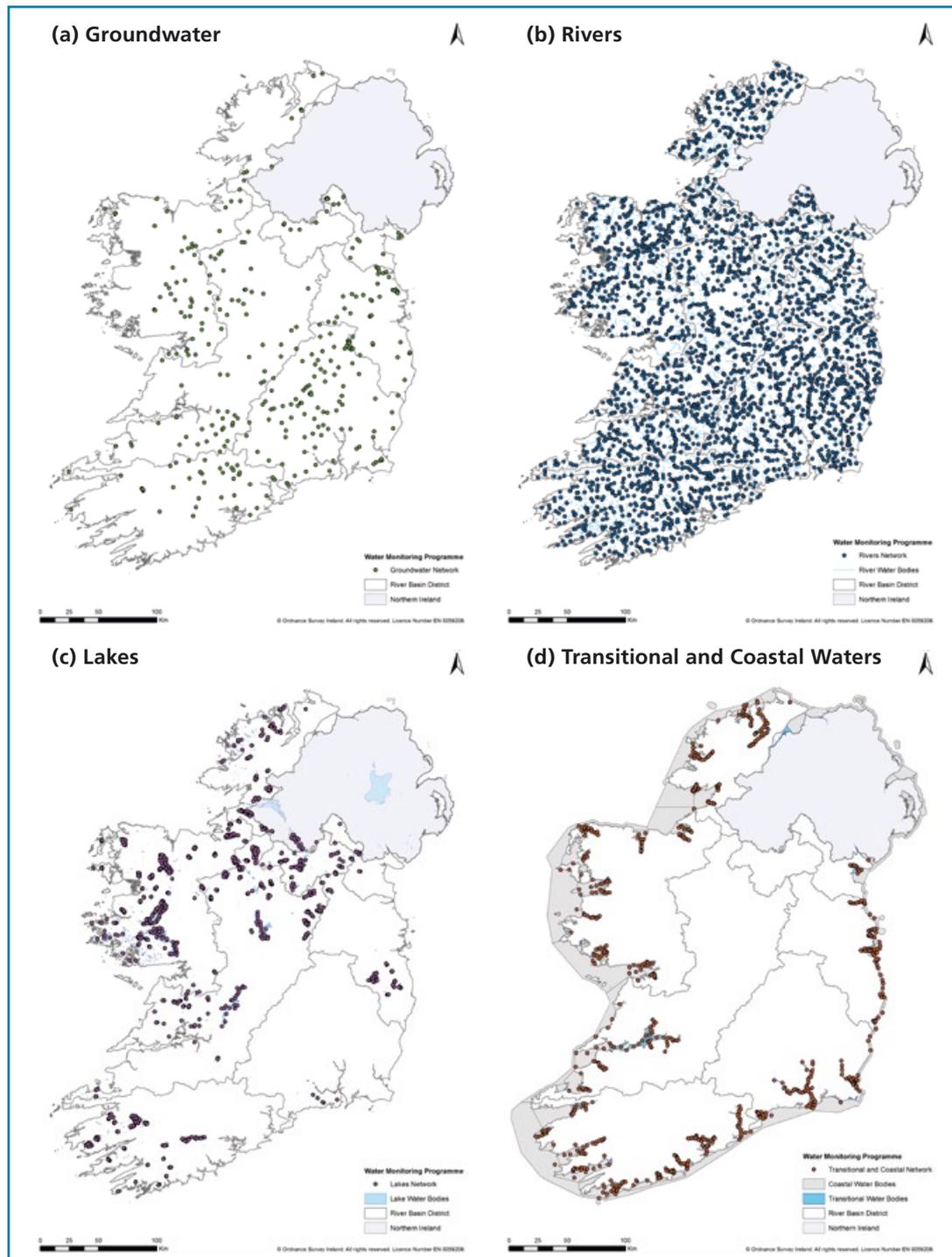


Figure 1-2. The extent of the national environmental water quality monitoring programme for (a) groundwater, (b) rivers, (c) lakes and (d) transitional and coastal waters (2007-2015).

Classification of water status

The WFD classification schemes provide the basis for describing the state of the aquatic environment, and for assessing the effectiveness of the programmes of measures in achieving the environmental objectives established through the river basin management planning process. Many of the monitoring tools used to classify status are new, and some may be revised as a result of improved understanding from their practical application and through further research.

WFD classification for groundwater consists of quantitative status and groundwater chemical status. Each is assigned as either good or poor status. Five chemical and four quantitative tests (Figure 1-3) have been developed to assess whether the WFD objectives are met. The worst-case classification from the relevant chemical status tests is reported as the overall chemical status for the groundwater body, and the worst-case classification of the quantitative tests is reported as the overall quantitative status for the groundwater body.

Tests for assessing chemical status of groundwater include; looking for evidence of saline or other intrusions, exceedances of a range of quality standards and thresholds that would result in failure to achieve the environmental objectives of associated surface waters, groundwater-dependent terrestrial ecosystems, or drinking water protected areas. It also involves looking for evidence of deteriorating trends in quality. Tests for assessing quantitative status of groundwater focus on the over-abstraction of groundwater and include; looking for evidence of saline or other intrusions due to change in groundwater levels, impacts on the environmental objectives of associated surface waters and groundwater-dependent terrestrial ecosystems due to alterations in groundwater levels, and assessing water balances to determine whether the available groundwater resource is exceeded by the long-term annual average rate of abstraction. Full details of status tests are available on the Agency’s website⁶.

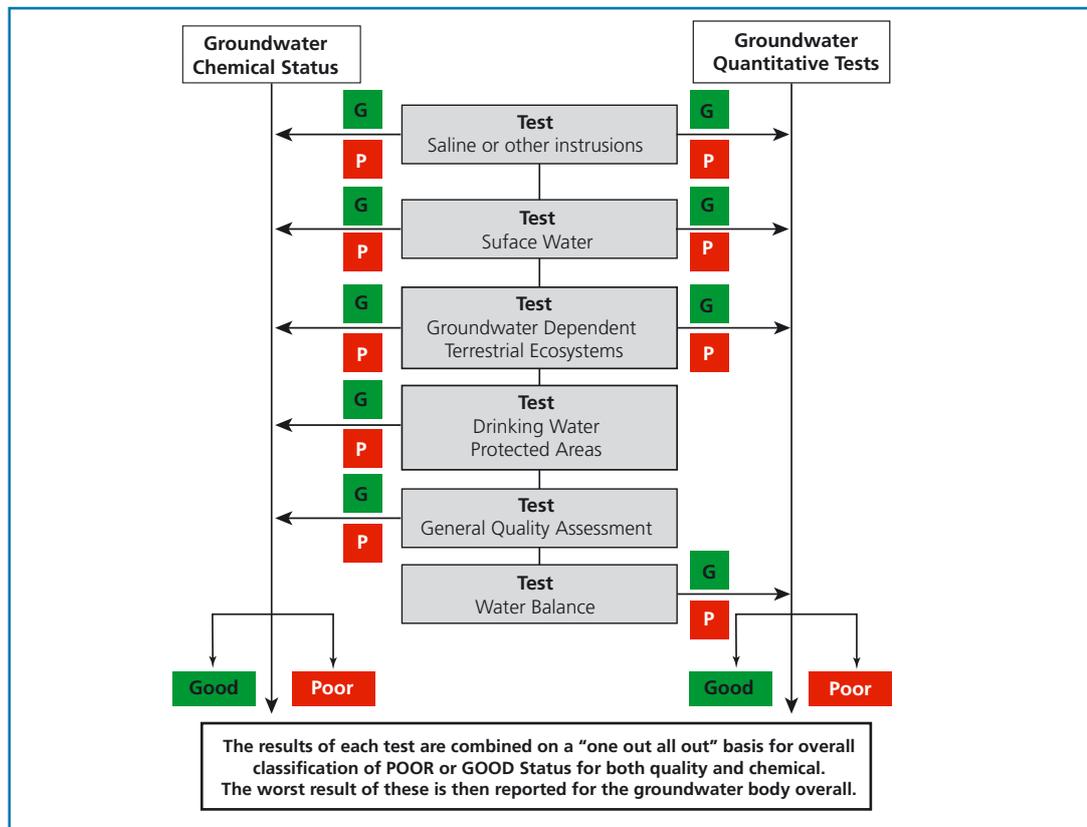


Figure 1-3. Overview of the status assessment (Classification) process (Craig & Daly, 2010 after UKTAG, 2008a).

6 <http://www.epa.ie/pubs/reports/water/ground/groundwaterthresholdvaluesandassessmentofchemicalandquantitativestatus.html>

WFD classification for surface water consists of ecological status and chemical status classification. These classification systems vary across rivers, lakes, transitional waters, and coastal waters. Heavily-modified and artificial surface water bodies are assessed in relation to their ecological potential, as their ecological communities do not correspond to natural ecosystems and, therefore, need to be considered separately.

The quality elements relevant in assessing ecological status and ecological potential for surface waters are:

- ▲ Biological quality elements (covering algae, plants, fish and invertebrates);
- ▲ General physico-chemical quality elements;
- ▲ Environmental Quality Standards (EQSs) for specific pollutants (i.e. synthetic and non-synthetic pollutants); and
- ▲ Hydromorphological quality elements.

Surface water bodies are assigned to one of five ecological status classes (high, good, moderate, poor or bad) or one of five ecological potential classes (maximum, good, moderate, poor or bad). The status assigned is determined by the poorest classed quality element. (This is also termed the 'one-out-all-out' principle, as applies under the WFD).

Figure 1-4 illustrates the manner in which the various quality elements for surface waters are used to define final ecological status.

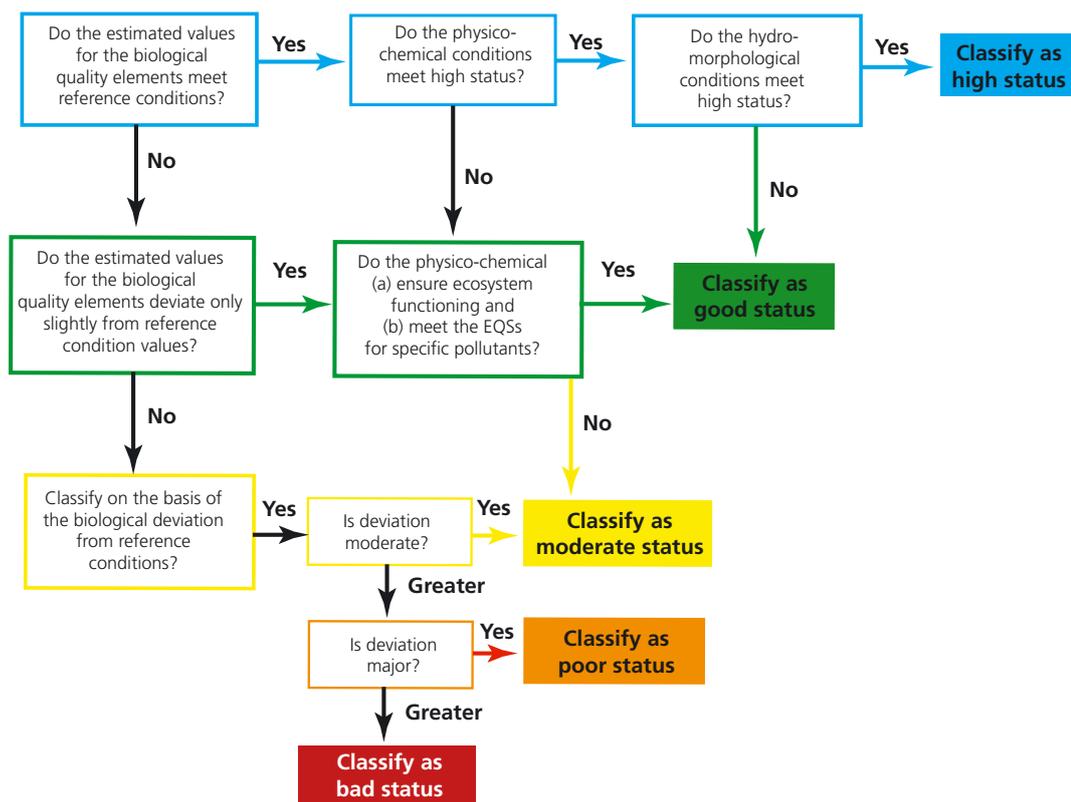


Figure 1-4. The role of different quality elements in the assessment of ecological status.

The quality elements relevant in assessing surface water chemical status are those priority and priority hazardous substances identified in Directive 2008/105/EC (subsequently amended by Directive 2013/39/EU). Water bodies are classified as either at good chemical status or poor chemical status, depending on whether or not they achieve the prescribed environmental water quality standards.

Full details of the methods used to classify groundwater status and surface water status are available to download from the Agency's website⁷.

The sources of data on which the report is based were from the national monitoring programmes undertaken by the EPA, local authorities, Marine Institute, Inland Fisheries Ireland, Waterways Ireland, the Sea Fisheries Protection Authority and the Irish Coast Guard. The WFD monitoring programme has been developing, with the majority of the programme in place since 2007, with some additional aspects added in 2011, specifically in relation to the coastal waters monitoring programme.

Future reporting on water quality

There have been a number of important developments that will potentially change the context for future reporting on water quality in Ireland. These include:

1. The governance arrangements for implementing the river basin planning process have been recently changed through legislation (SI 350 of 2014). Under the legislation, the Agency has a significantly enhanced role in supporting the preparation of river basin management plans and their associated programmes of measures.
2. The existing seven River Basin Districts are to be reconfigured into three RBDs. The existing four national RBDs and the Shannon International RBD are to be merged into one national RBD for administrative and reporting reasons. The North Western and Neagh Bann International RBDs will remain.
3. River water bodies have been significantly revised so that the monitoring network is now more representative for the purpose of assessing the status of rivers. The original 4,565 water bodies have been reconfigured into approximately 3,200 water bodies (see Box 1).
4. Additional biological monitoring tools are being developed. Once finalised, they will be applied to the monitoring programme.
5. Future reporting on water quality will also need to take a more integrated assessment approach at catchment level, taking account of connectivity between groundwater, rivers, canals, lakes, transitional, and coastal waters, so as to better understand the cause of water pollution and to make informed decisions on the most appropriate management measures to implement.

⁷ http://www.epa.ie/pubs/reports/water/waterqua/Final_Status_Report_20110621.pdf
<http://www.epa.ie/pubs/reports/water/ground/groundwaterthresholdvaluesandassessmentofchemicaland-quantitativestatus.html>

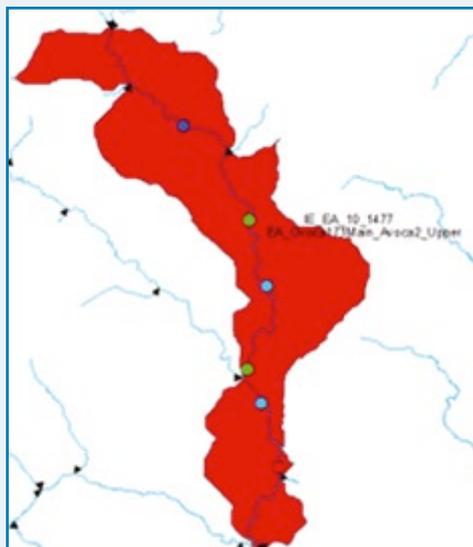
Box 1. Revisions to river water body delineation

During the first River Basin Management Plan cycle, as the WFD status was being generated, it became apparent that the link between water bodies and WFD status was not optimum: long stretches of river channels were being identified as poor status when the actual affected part was quite short. An example of this was the Avoca river water body (see map below). The catchment for the water body is the red area in the map below. It can be seen that there were a number of 'High' status (Blue) and 'Good' status (Green) sites along the length of the river with the only 'Bad' status (Red) site being the furthest station downstream. As the One-Out-All-Out (OOAO) rule applied, the whole river water body was classified as having 'Bad' status, which was inaccurate.

Despite a substantial national monitoring programme (MP) being in place, not all river water bodies had an associated monitoring station. As a consequence of this, only 1,618 river water bodies out of a potential 4,565 had a WFD Status from the reporting period of 2007-2009 assigned to them.

As mentioned above, the method of creating the current river water bodies was based on stream order. The 1st order streams and some 2nd order streams were removed from the river water bodies dataset due to their catchment size being <10km². The river network consists of 74,000 km of channel, of which circa 38,000 km are 1st order streams. This is a substantial length of channel that is not being reported on.

As a result of these issues, the method of delineating water bodies was changed. As the WFD monitoring programme (MP) is designed to track known pressures, it was decided that new river water bodies would be defined by the location of a MP station, i.e. a new river water body would be the length of river, including tributaries between one MP station and the next MP station or the source, whichever was applicable. This method resulted in the majority of water bodies having a one-to-one relationship with a monitoring station. This optimisation should assist in applying environmental objectives and setting practical management measures more effectively for river water bodies.



Note: The Avoca River Water Body Length is 26.5 km (69 km² catchment area).

AN GHNÍOMHAIREACTH UM CHAOMHNÚ COMHSHAOIL

Tá an Gníomhaireacht um Chaomhnú Comhshaoil (GCC) freagrach as an gcomhshaoil a chaomhnú agus a fheabhsú mar shócmhainn luachmhar do mhuintir na hÉireann. Táimid tiomanta do dhaoine agus don chomhshaoil a chosaint ó éifeachtaí díobhálacha na radaíochta agus an truaillithe.

Is féidir obair na Gníomhaireachta a roinnt ina trí phríomhréimse:

Rialú: Déanaimid córais éifeachtacha rialaithe agus comhlíonta comhshaoil a chur i bhfeidhm chun torthaí maithe comhshaoil a sholáthar agus chun díriú orthu siúd nach gcloíonn leis na córais sin.

Eolas: Soláthraimid sonraí, faisnéis agus measúnú comhshaoil atá ar ardchaighdeán, spriocdhírthe agus tráthúil chun bonn eolais a chur faoin gcinnteoireacht ar gach leibhéal.

Tacaíocht: Bímid ag saothrú i gcomhar le grúpaí eile chun tacú le comhshaoil atá glan, táirgiúil agus cosanta go maith, agus le hiompar a chuirfidh le comhshaoil inbhuanaithe.

Ár bhFreagrachtaí

Ceadúnú

- Déanaimid na gníomhaíochtaí seo a leanas a rialú ionas nach ndéanann siad dochar do shláinte an phobail ná don chomhshaoil:
- saoráidí dramhaíola (m.sh. láithreáin líonta talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh. déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- an diantalmhaíocht (m.sh. muca, éanlaith);
- úsáid shrianta agus scaoileadh rialaithe Orgánach Géinmhodhnaíthe (OGM);
- foinsí radaíochta ianúcháin (m.sh. trealamh x-gha agus radaiteiripe, foinsí tionsclaíocha);
- áiseanna móra stórála peitрил;
- scardadh dramhuisce;
- gníomhaíochtaí dumpála ar farraige.

Forfheidhmiú Náisiúnta i leith Cúrsaí Comhshaoil

- Clár náisiúnta iniúchtaí agus cigireachtaí a dhéanamh gach bliain ar shaoráidí a bhfuil ceadúnas ón nGníomhaireacht acu.
- Maoirseacht a dhéanamh ar fhreagrachtaí cosanta comhshaoil na n-údarás áitiúil.
- Caighdeán an uisce óil, arna sholáthar ag soláthraithe uisce phoiblí, a mhaoirsiú.
- Obair le húdaráis áitiúla agus le gníomhaireachtaí eile chun dul i ngleic le coireanna comhshaoil trí chomhordú a dhéanamh ar líonra forfheidhmiúcháin náisiúnta, trí dhírú ar chiontóirí, agus trí mhaoirsiú a dhéanamh ar leasúchán.
- Cur i bhfeidhm rialachán ar nós na Rialachán um Dhramhthrealamh Leictreach agus Leictreonach (DTLL), um Shrian ar Shubstaintí Guaiseacha agus na Rialachán um rialú ar shubstaintí a ídionn an ciseal ózóin.
- An dlí a chur orthu siúd a bhriseann dlí an chomhshaoil agus a dhéanann dochar don chomhshaoil.

Bainistíocht Uisce

- Monatóireacht agus tuairisciú a dhéanamh ar cháilíocht aibhneacha, lochanna, uisce idirchriosacha agus cósta na hÉireann, agus screamhuiscí; leibhéal uisce agus sruthanna aibhneacha a thomhas.
- Comhordú náisiúnta agus maoirsiú a dhéanamh ar an gCreat-Treoir Uisce.
- Monatóireacht agus tuairisciú a dhéanamh ar Cháilíocht an Uisce Snámha.

Monatóireacht, Anailís agus Tuairisciú ar an gComhshaoil

- Monatóireacht a dhéanamh ar cháilíocht an aeir agus Treoir an AE maidir le hAer Glan don Eoraip (CAFÉ) a chur chun feidhme.
- Tuairisciú neamhspleách le cabhrú le cinnteoireacht an rialtais náisiúnta agus na n-údarás áitiúil (m.sh. tuairisciú tréimhsiúil ar staid Chomhshaoil na hÉireann agus Tuarascálacha ar Tháscairí).

Rialú Astaíochtaí na nGás Ceaptha Teasa in Éirinn

- Fardail agus réamh-mheastacháin na hÉireann maidir le gás ceaptha teasa a ullmhú.
- An Treoir maidir le Trádáil Astaíochtaí a chur chun feidhme i gcomhair breis agus 100 de na táirgeoirí dé-ocsaíde carbóin is mó in Éirinn

Taighde agus Forbairt Comhshaoil

- Taighde comhshaoil a chistiú chun brúnna a shainaithint, bonn eolais a chur faoi bheartais, agus réitigh a sholáthar i réimsí na haeráide, an uisce agus na hinbhuanaitheachta.

Measúnacht Straitéiseach Timpeallachta

- Measúnacht a dhéanamh ar thionchar pleananna agus clár beartaithe ar an gcomhshaoil in Éirinn (m.sh. mórfheananna forbartha).

Cosaint Raideolaíoch

- Monatóireacht a dhéanamh ar leibhéal radaíochta, measúnacht a dhéanamh ar nochtadh mhuintir na hÉireann don radaíocht ianúcháin.
- Cabhrú le pleananna náisiúnta a fhorbairt le haghaidh éigeandálaí ag eascairt as taismí núicléacha.
- Monatóireacht a dhéanamh ar fhorbairtí thar lear a bhaineann le saoráidí núicléacha agus leis an tsábháilteacht raideolaíochta.
- Sainseirbhísí cosanta ar an radaíocht a sholáthar, nó maoirsiú a dhéanamh ar sholáthar na seirbhísí sin.

Treoir, Faisnéis Inrochtana agus Oideachas

- Comhairle agus treoir a chur ar fáil d'earnáil na tionsclaíochta agus don phobal maidir le hábhair a bhaineann le caomhnú an chomhshaoil agus leis an gcosaint raideolaíoch.
- Faisnéis thráthúil ar an gcomhshaoil ar a bhfuil fáil éasca a chur ar fáil chun rannpháirtíocht an phobail a spreagadh sa chinnteoireacht i ndáil leis an gcomhshaoil (m.sh. Timpeall an Tí, léarscáileanna radóin).
- Comhairle a chur ar fáil don Rialtas maidir le hábhair a bhaineann leis an tsábháilteacht raideolaíoch agus le cúrsaí práinnfhreagartha.
- Plean Náisiúnta Bainistíochta Dramhaíola Guaisí a fhorbairt chun dramhaíl ghuaiseach a chosc agus a bhainistiú.

Múscailt Feasachta agus Athrú Iompraíochta

- Feasacht chomhshaoil níos fearr a ghiniúint agus dul i bhfeidhm ar athrú iompraíochta dearfach trí thacú le gnóthais, le pobail agus le teaghlacha a bheith níos éifeachtúla ar acmhainní.
- Tástáil le haghaidh radóin a chur chun cinn i dtithe agus in ionaid oibre, agus gníomhartha leasúcháin a spreagadh nuair is gá.

Bainistíocht agus struchtúr na Gníomhaireachta um Chaomhnú Comhshaoil

Tá an gníomhaíocht á bainistiú ag Bord lánaimseartha, ar a bhfuil Ard-Stiúrthóir agus cúigear Stiúrthóirí. Déantar an obair ar fud cúig cinn d'Oifigí:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig Forfheidhmithe i leith cúrsaí Comhshaoil
- An Oifig um Measúnú Comhshaoil
- An Oifig um Cosaint Raideolaíoch
- An Oifig Cumarsáide agus Seirbhísí Corparáideacha

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag comhaltaí air agus tagann siad le chéile go rialta le plé a dhéanamh ar ábhair imní agus le comhairle a chur ar an mBord.



Environmental Protection Agency
An Ghníomhaireacht um Choimhínú Comhshaoil

Headquarters

**PO Box 3000,
Johnstown Castle Estate
County Wexford, Ireland**

T: +353 53 916 0600

F: +353 53 916 0699

E: info@epa.ie

W: www.epa.ie

LoCall: 1890 33 55 99

Regional Inspectorate
McCumiskey House,
Richview, Clonskeagh Road,
Dublin 14, Ireland

T: +353 1 268 0100

F: +353 1 268 0199

Regional Inspectorate
Inniscarra, County Cork,
Ireland

T: +353 21 487 5540

F: +353 21 487 5545

Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny, Ireland

T +353 56 779 6700

F +353 56 779 6798

Regional Inspectorate
John Moore Road, Castlebar
County Mayo, Ireland

T +353 94 904 8400

F +353 94 902 1934

Regional Inspectorate
The Glen, Monaghan, Ireland

T +353 47 77600

F +353 47 84987

Regional Offices

The Civic Centre
Church St., Athlone
Co. Westmeath, Ireland

T +353 906 475722

Room 3, Raheen Conference Centre,
Pearse House, Pearse Road
Raheen Business Park, Limerick,
Ireland

T +353 61 224764

