



Ireland's waters are one of our major natural resources. Plentiful availability of good quality water offers a significant competitive advantage to sectors such as agriculture, industry and tourism. Water is a resource that must be carefully managed, and improving water quality status is a national priority for Ireland.



EPA Research's water pillar deals with groundwater, surface water, transitional and coastal water; as well as wastewater, drinking, bathing and shellfish waters.

It will support the emerging policy & implementation research needs in relation to the implementation of the Water Framework Directive (WFD), as well as marine research considerations to support to the formulation and implementation of policies. In addition, the EPA is coordinating a multi-agency transboundary programme of research on Environmental Impacts of Unconventional Gas Exploration & Extraction (UGEE), which has significant water elements, and is included under Thematic area 5: Emerging and Cross-cutting Issues.

The overall aim of the water pillar is to support relevant water policy and to protect our water environment, contributing to achieving excellent water quality in Ireland

EPA Research's Water Pillar

EPA Research's water pillar has a strong focus on policy and has been driven by national regulations and European Directives. Policy-related research plays a vital role in ensuring that EU and national policies are implemented in the most cost-effective manner. A long-term water research programme is an essential component of Ireland's role in protecting its water resources and meeting its requirements under water-related EU directives and national policies. Ireland has a high-quality research, technical and scientific base in the water sector but this needs to be further strengthened if we are to meet the major environmental and socio-economic challenges ahead. Technology and innovation have a significant role to play in meeting the environmental challenges and can also deliver economic benefits through enhanced

competitiveness and improved efficiency. Behavioural change is another key area that requires focus .

Between 2007-2013, the EPA STRIVE Programme funded over 100 research projects with a budget over €10,000 related to water with a total commitment from the EPA of approximately €19.5m. The range of projects funded includes desk-studies, scholarships, fellowships and large-scale multi-annual and multi-partner awards.

Thematic areas

The thematic areas under EPA Research's Water Pillar for 2014-2020 will be:

1. Safe Water;
2. Ecosystem Services and Sustainability;
3. Innovative Water Technologies;
4. Understanding, Managing and Conserving our Water Resources
5. Emerging and Cross-cutting Issues

Multi- and inter-disciplinary research is required on these themes, with expected social, economic, technology, environment and policy impacts.

These thematic areas also reflect EPA Research's effort to align, where relevant, its programme with the international Strategic Research Agenda which was launched by the Water Joint Programming Initiative in May 2013.



Theme 1: Safe Water

Water quality and human health may be threatened by emerging pollutants, priority substances, endocrine disruptors and emerging risks such as pathogens (including antibiotic resistant bacteria and viruses), cyanotoxins and nanomaterials. Key knowledge gaps remain concerning their environmental behaviour in surface water, treated waters and groundwater, and their impact on human health through the irrigation of crops, water supply, distribution and storage in rural or urban environments. In addition, water quality and supply can be threatened by climate change, natural hazards and extreme events such as droughts and floods.

This thematic area will:

- Provide a better understanding of the fate and behaviour of new or poorly understood contaminants and their impacts on water quality with a particular emphasis on drinking and bathing waters, and on ecosystems and human health.
- Improve our resilience to climate change, extreme events and natural hazards. It will support the implementation and refinement of the relevant policies and also develop new tools and best practices in relation to water infrastructure and the prediction & management of natural hazards to ensure that economic investments in this area will result in the on-going availability and delivery of high quality water.
- Develop a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area, including impact of water charges on water consumption, as well as behavioural changes in relation to water conservation and consumption.

Theme 2: Ecosystem Services and Sustainability

Water demand and availability pressures, amplified by climate change (including the apparent changing frequency and severity of extreme events such as floods and droughts) have increased the stress on water bodies and associated ecosystems. The environment doesn't exist in isolation; it both affects and is affected by many aspects of our lives. Environmental resources and ecosystem services are direct inputs into the economy (EPA, 2012). The concept of ecosystem services is based upon the assumption that there is a connection between good ecological status and the provision of several benefits, such as water supply, food supply, biodiversity, landscape value, and others, and it is already used by some managers and decision makers as a powerful tool for building and implementing programs of measures. Approaches using ecosystem services could therefore potentially support WFD objectives.

This thematic area will:

- Further our understanding of ecosystems context, functions and processes, and safeguard natural resources for future generations by identifying measures to help the adaptation and reaction to current and future pressures on the aquatic environment.
- Develop new tools in the field of ecological engineering and early-warning systems.
- Develop a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area, including issues of preservation vs. restoration costs and the demonstration of the economic value and social benefits of aquatic ecosystem services.



Theme 3: Innovative Water Technologies

Innovative technologies are required by the water industry to create products and services. This thematic area will contribute to improving the quantity and quality of water bodies, such that our resources will be used in a more efficient way; and gain a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area. The objectives of this research area are aligned with the aims of the European “Resource Efficiency Roadmap”.

This thematic area will:

- Develop novel treatment and distribution options and improve water systems efficiency focusing on aspects such as new materials and processes, new management tools, Information and Communication Technology (ICT), energy efficiency, and small scale water storage.
- Develop problem-solving research leading to the development of market-orientated solutions such as the development of sensor networks and real-time information systems in the water cycle and improved water treatment technologies.
- Improve the quantity and quality of water bodies and developing ways to use these resources more efficiently.
- Gain a better understanding of the socio-economic aspects, governance and behavioural changes associated within this area, including social acceptance of reused waste and assessing costs against beneficial outcomes to avoid disproportionate costs.

Theme 4: Understanding, Managing and Conserving our Water Resources

This thematic area will contribute to better use and protection of water resources, by gaining a better understanding of the potential impacts of human activities, such as abstractions, discharges and land-use on groundwater, rivers, lakes, estuaries and coastal waters; of the views of local communities and the ways of encouraging behavioural change; and of the means of minimizing these impacts. Particular attention will be given to pressures on water arising from agricultural activities. Regulatory measures are essential tools to ensure compliance with environmental standards of water quality and quantity. Understanding the mechanisms leading to improved water management will lead to better policy design, implementation and adaptation.

This thematic area will:

- Further an integrated approach to water management by improving our understanding of the impact of pressures on water quality and quantity, looking at adaptive water management approaches, as well as socio-economic issues.
- Promote the concept of water footprinting while increasing water resource efficiency and reducing water pollution.
- Strengthen socio-economic approaches to conserve our water resources, covering governance issues such as public participation and decision support systems (DSS) as critical tools to integrate scientific knowledge into decision-making, and facilitating buy-in/ policy acceptance from the public.
- Deal with socio-economic considerations and practical measures for mitigating the impacts of pressures.

Theme 5: Emerging and Cross-cutting Issues

This thematic area will cover the emerging policy and implementation research needs in relation to the implementation of the Water Framework Directive (WFD), as well as marine research considerations in support to the formulation and implementation of policies over the period 2014-2020.

Unconventional Gas Exploration & Extraction (UGEE)

This thematic area will include the multi-agency transboundary programme of research on the environmental impacts of Unconventional Gas Exploration & Extraction (UGEE). UGEE is an emerging issue in Ireland and involves high volume hydraulic fracturing (fracking) of low permeability rock to permit the extraction of natural gas on a commercial scale from unconventional sources such as shale gas deposits, coal seams and tight sandstones. The EPA is coordinating a multi-agency transboundary programme of research on environmental impacts of UGEE, which have significant water elements. This research will involve an extensive desk-based literature review of UGEE practices worldwide and some baseline-monitoring. It has been designed to assist regulators North and South in fulfilling their statutory roles regarding this activity. This research programme is funded by the Environmental Protection Agency, the Department of Communications Energy and Natural Resources (DCENR) and the Northern Ireland Environment Agency (NIEA).

National and International linkages

Water Research Coordination Group

In 2010 the EPA and Enterprise Ireland (EI) established a national Water Research Coordination Group (WRCG), which is a research-funders forum, where research priorities for inclusion in calls for research proposals and longer-term objectives are presented and discussed, with the aim of enhancing synergies and collaboration with other national funders, and avoiding duplication. As of 2014, the WRCG comprises of the EPA, EI, the DECLG, the Department of Agriculture, Food and the Marine, Teagasc, Science Foundation Ireland, Irish Research Council, the Geological Survey of Ireland, Marine Institute, Inland Fisheries Ireland, Office of Public Works, and Irish Water.



International Linkages

A number of critical international linkages have also been established to promote Irish environmental research into the international arena including enhanced participation in the European Research Area (e.g. Framework Programme, Joint Programming Initiatives, Horizon2020, and European Innovation Platform on Water). By ensuring that Ireland is represented in significant European initiatives related to Water, the EPA will promote an increased efficiency, critical mass and impact of water research in Ireland.

Further Information

Over 70 research reports have been published by the EPA in the past 10 years in the area of Water, including policy support for WFD, novel treatment technologies, early warning systems, monitoring of priority substances, management strategies and more. For more, see www.epa.ie/researchandeducation/research/