

## **10. IRELAND**

This country fiche provides a comprehensive overview and assessment of climate change adaptation in Ireland. After detailing the vulnerability of Ireland's coastal zones, the responsibility and financing for coastal protection is explained. Next, the fiche presents the relevant research activities, the coastal defence, risk reduction and adaptation plans available in Ireland as well as the current and future protection and adaptation expenditure. The persons contacted and sources of information used are listed at the end.

### **10.1. VULNERABILITY OF IRELAND'S COASTAL ZONES TO CLIMATE CHANGE**

Ireland is the third largest European island. It is situated at the north-west of continental Europe. The coastline measures 4 577 km, bordering the Atlantic Ocean on the north-west and the Irish Sea on the south-east. More than 50% of the population lives within 15 km of the Irish coastline. Most of the population is concentrated in cities, with the major coastal cities being Dublin, Cork, Limerick and Galway.

The following paragraphs discuss the main climate change risks for the coastal zones of Ireland. Overall, Ireland is mainly vulnerable to both coastal flooding and erosion in differing degrees of risk over its coastline.

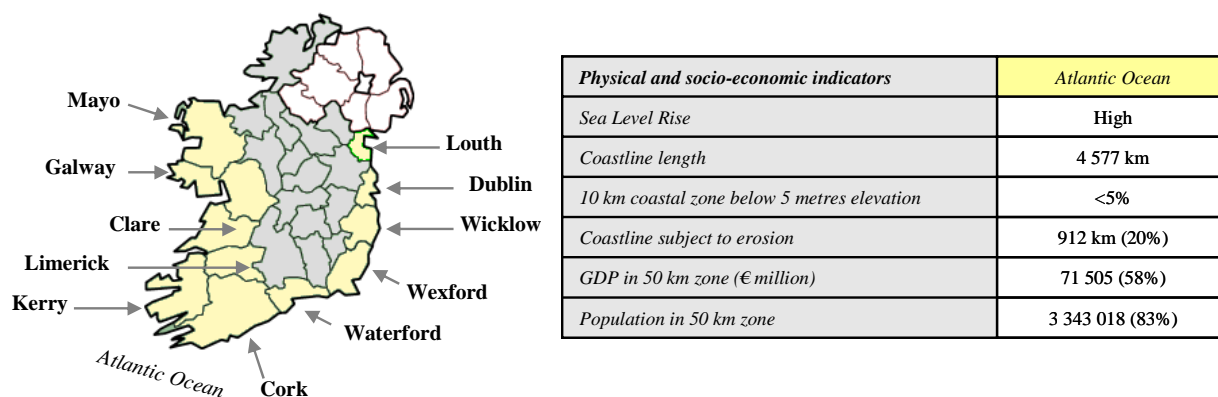
#### ***a/ Flooding and erosion***

In Ireland, a high relief (500 m) and rocky cliffs interspersed with bays define the topography along the Atlantic coastline. The coast is also characterised by high wave energy generated by winds coming from the Atlantic Ocean, causing it to be more subject to erosion than the rest of the country. It also receives the full force of North-Atlantic storms. As coastal erosion may weaken the structure of these rocky cliffs, which are particularly vulnerable due to their geological nature, parts of it sometimes collapse (either or not after an extreme storm event).

The Irish Sea coast on the other hand is composed mainly of low-lying regions with non-consolidated sediments and glacial tills. Furthermore, the Irish Sea coast only receives about 20% of the wave energy levels of the Atlantic coast. Nevertheless, erosion rates reach values of 1-2 m annually.

Approximately 20% of Ireland's entire coast is at risk of erosion. Sea Level Rise (SLR) combined with an increase in severity and frequency of coastal storms is expected to exacerbate the problems, especially along the Atlantic coast. In February 2002 for example, a low pressure system in the southern Irish Sea coincided with the spring tide, leading to an extreme water level of 2.9 m above mean sea level. This storm surge led to widespread flooding in Dublin and Belfast and marked coastal erosion between Cork and Belfast. *Figure 10-1* provides an overview of the most vulnerable Irish counties and the main physical and socio-economic indicators of the coastal zones.

**Figure 10-1: Counties of Ireland and overview of main physical and socio-economic indicators of the coastal zones**



*Source: Policy Research based on EEA, 2006, The changing faces of Europe's coastal areas (for Sea Level Rise and 10 km coastal zone below 5 metres elevation); European Commission (Eurosion study), 2004, Living with coastal erosion in Europe: Sediment and space for sustainability (for coastline length and coastline subject to erosion); Eurostat 2004 (for GDP and population in 50 km zone)*

A national study of 2004<sup>1</sup> estimated that the county Wexford has the highest proportion of vulnerable coast, with 40% of it in need of protection. The same review indicated that the county Cork has, with 149 km, the longest stretch of coast needing protection.

**b/ Freshwater shortage**

Ireland has one of the highest water availability levels in Europe so freshwater shortage is not regarded as a problem yet. Over 70% of the population draws its water from freshwater lakes and

<sup>1</sup> The Department of Communications, Marine and Natural Resources, 2004, *Value for money review of the coast protection programme*.

other surface waters, the remaining 30% is drawn from groundwater supplies. The proportion supplied from groundwater is likely to increase in the future. SLR may affect coastal aquifers<sup>2</sup> by saltwater intrusion and lead to reduced freshwater discharge<sup>3</sup> but at present, this is not yet the case. Seeing the low risk of freshwater shortage in Ireland, no national adaptation actions are currently being undertaken.

*c/ Loss of coastal eco-systems*

Climate change may also impact natural areas. SLR and its subsequent increase in wave energy could cause salt marshes on the Irish coast to migrate landwards. As salt marshes and sand dunes are important migratory bird habitats, the loss of these habitats could present problems for species diversity.

Ireland has designated many of such habitats as protected areas. Coastal protection in these designated areas is subject to EU directives<sup>4</sup> as well as national environmental legislation. Proposed protection measures go through a system of consent involving the relevant stakeholders in order to ensure that no measures are contravened by the protection measures taken in these areas.

## **10.2. RESPONSIBILITY AND FINANCING FOR COASTAL PROTECTION AND CLIMATE ADAPTATION**

In Ireland, responsibility and financing for coastal protection is shared between the national and local authorities.

At national level, the authority most concerned with coastal protection is the *Office of Public Works*, an operational agency of the government. Its main tasks in relation to coastal protection include the evaluation of coastal protection schemes submitted by local authorities and the attribution of grant payments for these schemes<sup>5</sup>.

The *Department of Environment, Heritage and Local Government* is responsible for the Irish Spatial Strategy and other planning guidance, as well as environmental protection and assessment of the impacts of climate change.

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<sup>2</sup> Underground layers of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt or clay) from which groundwater can be usefully extracted.

<sup>3</sup> In addition, there is also a risk of contamination by waste during flood events that would negatively impact the water quality in these aquifers.

<sup>4</sup> Such as the EU Habitat Directive of 1992 and the EU Bird Directive of 1979.

<sup>5</sup> To date, the Department of Agriculture, Fisheries and Food and the Department of Communications, Marine and Natural Resources have been most concerned. As their coastal protection responsibilities have only moved to the Office of

At the sub-national level, the 29 County Councils assume the role of coastal zone managers in Ireland. They identify the areas in need of protection and apply to the national government for funding. They also prepare development plans for their areas and develop and execute plans for coastal protection. Coastal protection is primarily financed through the Coastal Protection Programme, a sub-programme of the National Development Plan 2007-2013<sup>6</sup>. The programme is managed by the Office of Public Works. In areas where the need for protection schemes is identified, funding will be provided to the relevant local authorities by means of a grant payment. Funding will be granted up to a maximum of 75%. The remaining share needs to be funded by the local authorities.

### **10.3. RESEARCH INTO IRELAND'S VULNERABILITY TO CLIMATE CHANGE AND CLIMATE CHANGE SCENARIOS**

Climate change research is mainly performed under national initiatives in Ireland. The main actors involved are the *research unit ICARUS*, the *Irish National Meteorological Service 'Met Éireann'* and the *Environmental Protection Agency (EPA)*.

The *Irish Climate Analysis and Research Unit (ICARUS)*, funded under the National Development Plan and by the Irish Environmental Protection Agency, is the leading centre for climate change research in Ireland. It was established in 2001, due to a greater need for research on climate and climate change impacts. One of the current areas of research includes the establishment of climate change scenarios on temperature and precipitation. With regard to SLR, the projections of the 3<sup>rd</sup> IPCC report (2001) were used.

*Met Éirann* carried out the 'Community Climate Change Consortium for Ireland (C4I)' project with the aim of stimulating climate change research in Ireland and to provide support to Irish scientists by putting in place a regional climate modelling and prediction facility. The study was undertaken during the period 2003-2007. The C4I project was supported by several Irish agencies<sup>7</sup> and had a budget of €1.5 million. Although the funding for this project ended in 2007, *Met Éireann* has decided to continue the research as one of their core activities, with an allocated budget of €100 000 per year.

The *EPA research programme* for the period 2007-2013 is entitled Science, Technology, Research and Innovation for the Environment (STRIVE). One of its principal thematic areas relates to climate change. Several research projects will be carried out under this programme focusing on climate

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Public Works on 1 January 2009, it is not clear yet which specific tasks of these former departments have been attributed to the Office of Public Works.

<sup>6</sup> Coastal protection was previously funded in a limited way under the Operational Programme for Environmental Services of the National Development Plan 1994-1999 and under the Operational Programme for Economic and Social Infrastructure of the National Development Plan 2000-2006.

<sup>7</sup> The Environmental Protection Agency (under the National Development Plan), *Met Éireann*, Sustainable Energy Ireland and the Higher Education Authority.

modelling and climate observations that will help to reduce uncertainties about climate change and its potential impact. Furthermore, research necessary to support the implementation of the National Climate Change Strategy 2007-2012 will also be undertaken. About €8 million of the total budget of €101 million has been earmarked for climate change research so far.

#### **10.4. COASTAL DEFENCE, RISK REDUCTION AND ADAPTATION PLANS IN RELATION TO CLIMATE CHANGE**

Ireland does not have any national coastal defence plans available. Protection measures are proposed by local authorities but can be eligible for funding under the coastal protection sub-programme of the 2007-2013 National Development Plan.

At strategic level, Ireland established a Climate Change Strategy in 2007. In preparation of a national adaptation strategy, scheduled for 2009, the Irish government published preliminary 'Planning Guidelines on the Planning System and Flood Risk Management' and supports the national projects 'National Coastal Protection Strategy Study (CPSS)' and the 'Flood Risk Assessment and Management Studies (FRAM)'.

##### *a/ Initiatives at national level*

Since 1994, Ireland finances coastal protection under *National Development Plans*. Under the current 2007-2013 plan, the Irish government created for the first time a sub-programme dedicated to coastal protection to fund risk evaluations, the development of procedures and guidelines for the selection of protection schemes as well as the development and implementation of capital coastal protection projects.

For the period 2007-2012, Ireland established a *National Climate Change Strategy* based on the climate change scenarios presented in the IPCC 4<sup>th</sup> Assessment Report. This strategy includes protection measures for all types of climate change impacts, both inland and coastal. The measures proposed and relevant in the scope of this study include the development of a flood risk strategy and the development of an overall adaptation strategy by 2009.

As a first step towards developing such an adaptation strategy, the Department of Environment Heritage and Local Government and the Office of Public Works recently published preliminary '*Planning Guidelines on the Planning System and Flood Risk Management*'. These guidelines provide a comprehensive statement of good planning practice which will become a key step towards a national climate change adaptation strategy. The aim is to 'guide development away from areas at risk from flooding using a sequential approach'. This approach makes use of flood zones for river and coastal flooding. The areas with highest risk would be designated flood zone A, moderate risk flood zone B and lowest risk flood zone C. Planning restrictions would be different for each of these zones.

Furthermore, two national projects are currently undertaken to facilitate the incorporation of climate change effects into a national adaptation strategy: the 'National Coastal Protection Strategy Study' (CPSS) and the 'Flood Risk Assessment and Management Studies' (FRAM).

The *National Coastal Protection Strategy Study* started in 2002 and is targeted to be finalised by 2013. The purpose of this study is to:

- Review vulnerability and current level of protection along the coast;
- Examine coastal protection policy options;
- Set out a basis for effective decision-making in regard to financial resource allocation.

The overview of the status of coastal protection in Ireland has been established in 2004. At present, a series of work packages are implemented for pilot stretches of the coastline including for example the development of a coastal GIS database and a coastal flood warning system as well as an economic assessment of assets at risk<sup>8</sup>. Part of this study is also financed under the Coastal Protection sub-programme of the National Development Plan 2007-2013.

With the *Flood Risk Assessment and Management Studies (FRAM)*, the people from the Office of Public Works, together with the Department of Agriculture, Fisheries and Food, continue their work in establishing flood maps and flood-risk management plans, in partnership with local authorities, the Environmental Protection Agency and other relevant departments and bodies and in accordance the EU Flood Directive.

The FRAM pilot studies began in 2006 and will continue till 2011. The aim of the studies is to help Ireland fulfil the key requirements of the EU Flood Directive. Hydrological analyses will be performed and flood maps as well as flood-risk management plans will be developed. Furthermore, a prioritised set of measures will address risks in flood-prone areas. In the long term potential climate change effects, including SLR, will be incorporated. After completion of the pilot assessments, the study will be undertaken at national level. The entire study is targeted to be completed by 2015.

#### ***b/ Initiatives at sub-national level***

Regional authorities do not have their own coastal protection action plans that incorporate measures to protect against climate change yet. In their role as coastal managers, counties mainly focus on the identification of areas in need of protection. However, some regional administrations are investigating coastal processes and have started developing coastal management strategies which do take climate change into account.

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<sup>8</sup> This assessment will look at the cost associated with doing nothing as well as the economic cost of damages; at this stage, SLR and its impacts have not been factored into the analysis and there is not enough information gathered yet to make a comparison between the cost and benefits.

### *Coastal management strategies*

The two counties Cork and Waterford, both highly exposed to the problem of erosion can be considered as forerunners with regard to the development of coastal management strategies.

The county *Cork* is one of the stakeholders in the new Cork Harbour Integrated Management Strategy. The aim of the strategy is to bring together all those involved in the development, management and use of Cork Harbour to encourage the integration of their interests and responsibilities to achieve common objectives in a sustainable manner. One of the proposed actions from the strategy is to plan for flood-risk management (e.g. status of seawall defences), taking future development needs and climate scenarios into consideration.

The development of the strategy and its subsequent implementation will put Cork Harbour at the forefront of coastal management practice in Ireland. In addition to the strategy, an Action Plan will be developed for the period 2008 to 2011 based on priorities identified from this strategy document. This will form the next step in the implementation process and EU funding has already been secured to facilitate this.

The *Waterford* County Council commissioned a review study on the coastal protection at Tramore Strand in order to support coastal management of the site and provide recommendations for future research programmes. Tramore Strand is heavily used by local residents as well as tourists. The Back Strand at Tramore, a tidal lagoon, is designated as a Special Protection Area under the EU Birds Directive and is also a candidate for a Special Area of Conservation under the EU Habitats Directive.

The entire site of Tramore Strand is subject to coastal erosion, from both natural processes and levels of use. Climate change and SLR are not particularly mentioned. However one of the recommendations was to install a baseline monitoring programme to record coastal processes and a dedicated GIS, illustrating and quantifying coastal change over time. The latter would also take into consideration the change of coastline with respect to areas of significance.

### *Operational coastal protection actions*

The need for coastal protection is identified at sub-national level in Ireland. The different regions identify public areas that need protection or maintenance, propose protection schemes and apply for funding under the National Development Plan 2007-2013. Prior to 2007 coastal protection was funded to a limited extent under the Operational Programme for Environmental Services of the National Development Plan 1994-1999 and under the Economic and Social Infrastructure Operational Programme of the National Development Plan 2000-2006. The National Development Plan 2007-2013 is the first programme that has a specific sub-programme dedicated to coastal protection.

From 2000-2006 the counties with the highest amount of total funding were Kerry (€2.36 million), Cork (€2.28 million) and Wexford (€2 million). In 2007-2008 these were Wexford (€1.3 million), Kerry (€1.09 million) and Waterford (€0.41 million). In Kerry and Cork, measures undertaken are mainly hard measures such as revetment works and building or strengthening of sea walls. The counties Wexford and Waterford rely on hard as well as soft measures (e.g. beach nourishments, rock revetments and dune reconstruction).

### **10.5. PAST, PRESENT AND FUTURE ADAPTATION EXPENDITURE**

In Ireland, the expenditure to protect the coast from flooding and erosion over the period 1998-2015 totals €95 million<sup>9</sup>. About 75% is supported through National Development Plans, the remaining 25% has to be matched by local authorities.

In 2008, the expenditure for carrying out maintenance and coastal protection works proposed by the counties totalled €2.97 million. In addition, the indirect expenditure, including money spent under the STRIVE research programme, the Coastal Protection Strategy Study, the preparation of tender and planning documents as well as coastal surveys and environmental impact assessments, was close to €0.90 million.

More detailed information can be found in *Table 10-1*.

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<sup>9</sup> In the period 1994-1999 the National Development Plan accounted for approximately €10.4 million coastal protection investments; during the period 2000-2006 €52 million was projected; for the period 2007-2013, €23 million is earmarked under the Coastal Protection sub-programme of the National Development Plan 2007-2013; indirect expenditure over the period 1998-2015 totals around 9.6 million.



**Table 10-1: Expenditure to protect against coastal flooding and erosion (in € million)**

Year	MAINTENANCE EXPENDITURE*	CAPITAL EXPENDITURE*		INDIRECT EXPENDITURE***	TOTAL
		Hard**	Mixed & soft**		
1998	n.a.	n.a.	n.a.	0.00	1.58
1999	n.a.	n.a.	n.a.	0.00	3.73
2000	0.87	2.11	9.22	0.59	12.79
2001	3.45	7.53	3.24	0.60	14.82
2002	1.88	3.01	2.44	0.89	8.22
2003	0.23	0.99	1.21	1.33	3.77
2004	0.57	0.37	1.34	1.30	3.59
2005	0.27	1.09	2.13	0.87	4.36
2006	0.31	1.89	3.11	0.67	5.98
2007	0.31	0.46	1.10	2.47	4.34
2008	1.42	0.51	1.04	0.90	3.87
2009***	1.03	1.18	1.77	0.00	3.98
2010	1.03	1.18	1.77	0.00	3.98
2011	1.03	1.18	1.77	0.00	3.98
2012	1.03	1.18	1.77	0.00	3.98
2013	1.03	1.18	1.77	0.00	3.98
2014	1.03	1.18	1.77	0.00	3.98
2015	1.03	1.18	1.77	0.00	3.98
<b>TOTAL</b>	16.52	26.21	37.23	9.62	<b>94.89</b>
		63.44			

\* Maintenance and capital expenditure is shared between the national government and local authorities; the different regions identify public areas that need protection or maintenance, propose protection schemes and apply for funding, which will be granted up to 75%, the remaining part needs to be matched by the local authorities

\*\* Hard measures include revetment works and building or heightening of sea walls; soft measures include beach nourishments and dune restoration works

\*\*\* Maintenance and capital expenditure from 2009 up to 2015 are calculated by Policy Research on the basis of the average expenditure in the previous years

## 10.6. PERSONS CONTACTED AND SOURCES OF INFORMATION USED

### 10.6.1. PERSONS CONTACTED

Name	Organisation
Adamson, Mark	Office of Public Works
Casey, Jim	Coastal protection - Department of Agriculture, Food and Fisheries
McGrath, Ray	Met Éireann, the Irish National Meteorological Service
O'Donovan, Linda	Sea Fisheries Administration – Department of Agriculture, Food and Fisheries
O'Regan, Patrick	Sea Fisheries Administration – Department of Agriculture, Food and Fisheries

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