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Governance and Climate Change: Making the Transition to an Adapted Ireland

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EPA Climate Change Research Programme 2007-2013

**Governance and Climate Change:
Making the Transition to an
Adapted Ireland**

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Prepared for the Environment Protection Agency

by

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The EPA CCRP addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

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Executive Summary

This report presents an initial assessment of local authority climate change adaptation preparations, and identifies ways to increase the number of local authorities addressing climate change. While national government can advance local climate change adaptation through incentives and regulations, adaptation also requires local actions. International good practice examples show that local governments are ideally placed to adapt to climate change.

Research Approach

The work was conducted in two phases: first, a quantitative vulnerability assessment was prepared using existing datasets for physical climate-related exposures and using newly created datasets for exposures related to capacity levels (these were based on policy analysis and two nationwide surveys of all local authorities). Second, a qualitative exploration of adaptation barriers was carried out using data collected through the above surveys as well as four case studies that incorporated interviews with staff members of local authorities, regional authorities, and the national Department of the Environment, Community and Local Government (DoECLG).

The work extends the current knowledge in relation to Irish climate vulnerability in several ways. First, the study addresses the mismatch between nationally scaled impact studies and locally scaled responses by providing a cross-sectoral scoping of climate vulnerability for each city and county. Second, the work is the first to evaluate how well Irish local government policies address climate change. Third, the research integrates data from historical records, policy documents and staff member perceptions. Finally, this research evaluates and explores governance issues related to climate change adaptation in Ireland.

Key Findings

All counties are exposed to climate impacts to some degree. However, some counties are more exposed than others for overall climate-related exposures and for specific sectors, such as flooding, water supply and biodiversity.

Assessing climate vulnerability highlights the opportunities for councils to minimise climate impacts by taking more actions and thereby reducing their vulnerability.

Local authorities have taken limited actions on climate change because of a lack of statutory requirements, no dedicated resources for addressing climate change, and limited integration both between central and local government and among departments within each local authority.

Some proactive local authorities are sponsoring small-scale projects, adopting new structures and policies, strengthening local flood regulations, and promoting individual behavioural changes among staff and the general public.

Regional authorities have limited potential to advance climate policies due to resource shortages and fragmented division of responsibilities.

National government has not yet integrated climate change into other policy areas, as evidenced by limited statutory backing for climate mitigation and the absence of regulations or incentives for climate change adaptation.

Recommendations

While Ireland's climate change response needs an integrated approach to avoid gaps and maladaptations, existing government structures have the potential to address climate change. Challenges need to be addressed at each level and by integrating the levels.

Local authorities can address climate change as follows:

- Build adaptive capacity by sharing information among local authorities;
- Adopt climate change strategies, add specific measures to general policies, and establish climate change teams with management buy-in; and
- Report progress annually regarding voluntary and mandatory measures.

Regional authorities can facilitate climate measures as follows:

- Serve as an information clearinghouse for local authorities;
- Oversee local authority climate change strategies;
- Establish directly elected regional representatives, with a remit solely for regional level policies.

National government can address climate change and facilitate actions in subnational government levels as follows:

- Adopt legislation for climate mitigation and climate change adaptation;
- Establish and enforce specific standards for regional and local governments;
- Include climate change criteria and adaptation measures in national policies;
- Continue raising awareness to build public consensus;
- Monitor progress through baselines, benchmarks and annual targets;
- Report progress annually by departments and by the Taoiseach.

A coherent approach that is integrated both vertically among all government levels and horizontally with strong cross-sectoral links is needed. This will require all levels to:

- Maintain the Climate Change Working Group with representatives from local authorities, energy management agencies, the Office for Local Authority Management (OLAM) and DoECLG;
- Establish an internal climate change team at each level with specific responsibilities for each department;
- Establish cross-sectoral forums at national, regional and local levels;
- Establish formal links between similar authorities in different jurisdictions;
- Incorporate climate change criteria into annual assessments.

Overall, these shifts require formal structures and legislative support for the existing informal process. Without this, Ireland will remain unprepared to deal with the imminent climate change challenges and environmental issues more generally.

1 Introduction

With climate change, average temperatures will rise and winters will be wetter in Ireland. This will result in increased seasonal flooding. Summers will be dryer. This will increase water shortages in the summer months. These climatic changes will produce impacts across a wide spectrum, particularly affecting water resources, agriculture, forestry, biodiversity, and marine and coastal environments (Sweeney *et al.*, 2003; McGrath and Lynch, 2008; Sweeney *et al.*, 2008). The future effects of climate change include known exposures, based on historical records and projected climatic changes, and will likely include new challenges that have yet to be identified. Coping with such challenges is necessary to ensure that the costs of climate change for Ireland do not impose a heavier than necessary burden, and that any positive opportunities presented by it are grasped fully. Apart from the environmental considerations, it is essential that economic competitiveness is not lost in the medium and longer term through making the wrong choices in the short term (Stern, 2007).

The ability to achieve these objectives will be determined by vulnerability to climate change and the capacity to adapt. Climate change will place added stress on the built environment, including roads, water treatment plants, and private homes. The current infrastructure, with a lifespan of 60–100 years or more, will be affected by climate change impacts. For example, flood risks increase due to changes in magnitude and the frequency of extreme weather events. The standard of planning

for the 100-year flood-return period, based on historical records, may leave public and private investments at risk.

Addressing these challenges and acting now, by building climate change issues into planning processes and relevant policies, will increase available options in the future. Adaptation is not limited to planning for climate change, but rather adaptation is an accumulation of actions, motivated by a complex set of perceptions of changed risk. Adaptation can be carried out at an individual level, such as a householder deciding to move to a higher level in a flood plain, or by groups such as farmer bodies instituting changes in cropping systems or management practices, or by governments. Governments act to protect their citizens, and environmental assets, in the medium and long term. Policies and legislative measures, to be most effective, require an approach that integrates actions among different levels of government and includes anticipatory actions – also referred to as proactive adaptation – that prepare in advance for the projected impacts occurring.

The alternative is reactive adaptation, which will involve repairing damage to infrastructure and ecosystems after severe weather events – and this is in addition to the original need to protect investments and natural resources from future harm. A reactive adaptation strategy will limit Ireland's ability to function effectively alongside its competitors in a changing climate milieu.

2 Vulnerability

To help prepare for the consequences of climate change, evaluating vulnerability requires evaluating physical exposure, sensitivity to associated impacts and adaptive capacity.

2.1 Defining Key Terms

Within the context of this research, vulnerability is defined as:

... the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

(Intergovernmental Panel on Climate Change [IPCC], 2007: 883)

The system within this research is the social system of the city and county councils in Ireland, and this study assesses their vulnerability and adaptive capacity. As shown in Fig. 2.1, assessing **vulnerability** requires consideration of exposure, sensitivity, impacts, and adaptive capacity (Füssel and Klein, 2006). The **exposure** indicates 'the nature and degree to which

a system is exposed to significant climatic variations' (IPCC, 2001: 987) from climate-related **impacts** such as flooding and threats to biodiversity. **Sensitivity**, as relates to the social system, is indirect sensitivity, which is the degree that society will be affected by the exposures (IPCC, 2001: 21). **Adaptive capacity** is the 'ability of a system to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences' (IPCC, 2007: 869). Finally, vulnerability and impacts are not static conditions: they can be reduced through adaptation. **Adaptation** is 'adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities' (IPCC, 2007: 869).

2.2 Assessing Vulnerability

Vulnerability has been assessed in many ways throughout the world. The current assessment is based on elements of methodologies from three international studies that use a common scale with rankings of 'low' to 'high' vulnerability: the United States Geological Survey Coastal Vulnerability Index (Pendleton *et al.*, 2004), the South Pacific Applied Geoscience Commission Environmental Vulnerability Index (Kaly *et al.*, 2004),

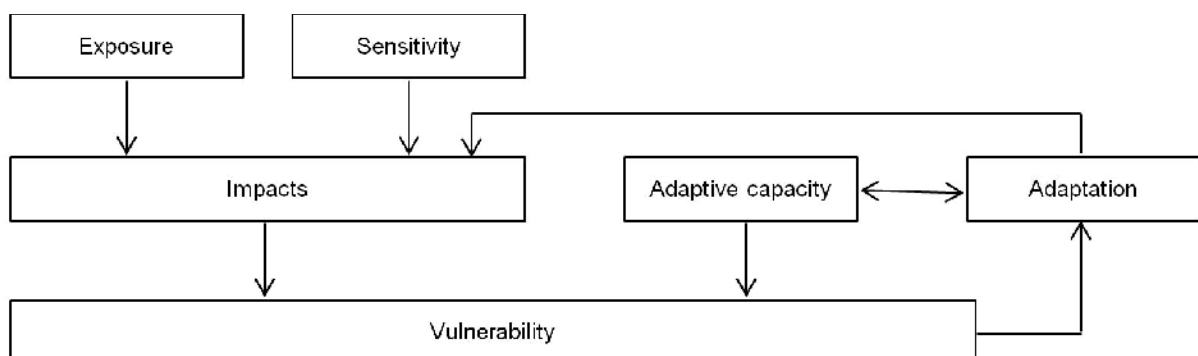


Figure 2.1. Assessing vulnerability (adapted from Füssel and Klein, 2006).

and Norway's subnational climate vulnerability (Norwegian assessment) (O'Brien *et al.*, 2006). The first two evaluate physical exposures, and the Norwegian assessment addresses both sub-national physical exposures and adaptive capacity relevant to the agriculture sector.

2.3 How Governance affects Vulnerability

Governments and society do not always address environmental hazards, even when vulnerability has been assessed (O'Brien *et al.*, 2006; Tompkins *et al.*,

2010; Berrang-Ford *et al.*, 2011). When governments fail to protect society from demonstrated environmental hazards such as climate change, some critics claim that they no longer are unitary actors and are unable to steer society (Rhodes, 1996). However, others maintain that governments can still steer society and achieve collective goals such as adapting to climate change (Bell and Hindmoor, 2009). This is important because a coordinated approach will be needed to address future climate vulnerability, which includes actions from all levels of government and the private sector (individuals, communities and industry) (Adger *et al.*, 2005; Wilbanks, 2007).

3 Adaptation in Other Countries

Climate change adaptation has been a challenge for countries around the world. Some, like the UK and Sweden, have national frameworks in place. The UK also has requirements for local action and offers economic incentives at the municipal level (Keskitalo, 2010: 2). For example, the NI188¹ required local governments to report their progress in addressing climate change. Even with this requirement, only 6% of UK local governments had progressed beyond public commitments and risk assessment after the first year (Davies, 2009). Since then, the NI188 reporting framework is no longer mandatory for local governments (Department for Environment, Food and Rural Affairs, 2010). This reduced priority may result in decreased actions by local governments. Sweden also has a national framework, but it has yet to mainstream climate change adaptation into national regulations or objectives (Keskitalo, 2010a: 192), and thus municipalities have not yet adequately 'consider[ed] climate change in physical planning' (Granberg and Elander, 2007: 545). Australia, by contrast, has no national framework and no mandatory subnational requirements. Several Australian states have adaptation measures, but they tend to be rebranded existing policies, which were not designed specifically to address future trends and extremes (Byrne *et al.*, 2009). This is part of the reason that critics maintain economic development has eclipsed environmental protection (Bulkeley and Kern, 2006; Granberg and Elander, 2007; Byrne *et al.*, 2009).

1 The NI188 is a performance indicator, which was launched as part of the 2008/2009 Local Government White Paper (Keskitalo, 2010).

However, some municipalities around the world have taken the matter into their own hands, and they are building capacity and changing infrastructure. Municipalities build capacity by making public commitments, establishing climate action teams and plans, and raising awareness. Public commitments include the UK Nottingham Declaration, ICLEI's Five Milestones for Climate Adaptation, and the Covenant of Mayors. Climate action teams have been established, for example, in California (Wheeler, 2009) and Chicago (Coffee *et al.*, 2010). Climate action plans are also in place, such as the Toronto Climate Change, Clean Air and Sustainable Energy Action Plan (International Council for Local Environmental Initiatives, n.d.).

Municipalities are adapting infrastructure by increasing green spaces in cities (Howard, 2009), and accommodating sea level rise and increased flooding. For example, sea level rise is being accommodated with the increased height of a Canadian bridge, an elevated sewage treatment plant in Massachusetts (IPCC, 2007: 724), and elevated metro stations in Denmark (Gagnon-Lebrun and Agrawal, 2006). In addition, municipalities are climate-proofing water treatment systems in New York (Gagnon-Lebrun and Agrawal, 2006) and managing flood risk to ensure that current infrastructure, such as the Thames Barrier, will withstand long-term climate change impacts (Greater London Authority, 2008). Overall, these good-practice examples are a start, but they will be insufficient to adapt to climate change. Without a shift in national priorities as well, governments will remain unprepared for climate change.

4 Irish National Policies for Climate Change Adaptation

Ireland's first National Climate Change Strategy in 2000 (NCCS 2000) set overall mitigation targets but lacked specific metrics to evaluate progress. The follow-up NCCS for 2007–2012 (NCCS, 2007) goes further by adopting a cross-sectoral approach and requiring public bodies to create baseline inventories as a first step towards setting mitigation targets. The NCCS 2007 also includes detailed plans for climate change mitigation, such as committing €11M to develop combined heat and power applications. In addition, the motor tax system was revamped to incentivise the purchase of environmentally friendly cars. With regard to adaptation, the NCCS 2007 has only looked at one climate change exposure: flooding. In a related policy, this exposure was addressed partially through draft flood management guidelines issued by the Office of Public Works (OPW), as the lead agency for flood-risk management in Ireland.

Adaptation is addressed in a limited way through national policies, such as the National Development Plan, the National Spatial Strategy and the National Sustainable Development Plan. The National Development Plan (2007–2013) allocated €270M for climate change trading allowances purchases but did not propose any actions. It merely acknowledged the links between climate change and the following sectors: public transport, energy, agriculture and heritage. Similarly, the National Spatial Strategy (2002–2020) defers specifics to the 'National Climate Change Strategy (2000), [with] measures to support sustainable agriculture, and initiatives to address the impact of transport on the environment' (DoEHLG, 2002a: 114). Likewise, the National Sustainable Development Plan (1997 and 2002) highlights the importance of climate change as a key policy area; however, it refers to the NCCS for details on climate change actions (DoEHLG, 2002b). Clearly, national policies lack detailed plans, and no national adaptation strategy has been adopted.

In addition to the foregoing broad national policies, national government is seeking to increase vertical integration by strengthening the regional level of government. This will have benefits for climate change adaptation by increasing possibilities for a coordinated approach. Regional authorities were established in 1991 to coordinate public services within their region, monitor EU structural fund spending, and prepare regional planning guidelines (DoEHLG, 2010). The national government is now strengthening the role of regional authorities for both governance and effects on the local authorities in their region. In December 2010, the DoEHLG issued *Implementation of Regional Planning Guidelines: Best Practice Guidance*, which details changes in the Planning and Development (Amendment) Act 2010 and highlights the need 'to demonstrate how the development plan and the housing strategy are consistent with RPGs [Regional Planning Guidelines] and the NSS [National Spatial Strategy]' (DoEHLG, 2010: 4). This new requirement assigns a reporting role to regional government regarding local authorities in their region. The *Best Practice Guidance* squarely addresses the lack of vertical integration among the different levels of government.

This review of Irish policies, coupled with consideration of climate measures in other countries, raises the question of how well positioned Ireland is to address projected climate impacts. As shown in the UK, Swedish and Australian examples, without an adequate mandate from national government, sub-national actions are limited and therefore countries are more vulnerable. Irish national policies take a limited approach to climate change adaptation, and this research explored ways to advance local measures to help meet the challenges of adapting to climate change where there is no national policy or legislation. To this end, this research explored the spatial distribution of local climate measures and explored factors affecting policy implementation at the local level.

5 Data and Methodology

This research used a two-phase methodology to draw conclusions about how to advance subnational climate change adaptation. The first phase assessed vulnerability through a multi-step quantitative scoping of climate-related exposure, sensitivity and impacts as well as adaptive capacity, as illustrated by the earlier Fig. 2.1. Thereafter, the second phase built on the vulnerability assessment by exploring ways to enhance local authorities' adaptive capacity through further analysis of the survey responses and interviews with governmental staff.

5.1 First Research Phase

The first research phase evaluated climate-related vulnerability of Irish local authorities. First, this assessment evaluated sector exposures relevant to local authorities using national datasets. Second, the assessment evaluated adaptive capacity. Third, the impacts (consequences of exposures) were evaluated by weighting the exposure results with population density by city and county. Finally, climate vulnerability was evaluated given current information regarding exposures and impacts.

5.1.1 Step 1: Assessing Climate-related Exposures

Table 5.1 shows the indicators (middle column) based on national datasets (right-hand column). These indicators make use of the best datasets that are available on a nationwide basis. These indicators provide information about climate variability and projected climate change; however, the effects of climate change are always complicated by other factors, such as land-use development, which must be considered for adaptation policies. Because this research aims to increase the adaptive capacity of local authorities, it limits the focus to six sectors: (i) flooding, (ii) landslides, (iii) water supply, (iv) coastal erosion (v) sea-level rise and (vi) biodiversity.

Physical exposures were evaluated using data for land attributes, recorded hazardous events, and/or designated protected spaces and species. Climate projections were also included for sectors where a clear signal of projected climate change applied. The data for each indicator was aggregated to the county level, and then these county totals were converted to a unit-less scale by dividing them into five

Table 5.1. Sectors, indicators and data sources.

Sectors	Indicator list	Data source
Flooding	Recorded flood events	Office of Public Works (2011) Flood Data Archive
	Winter rainfall % increase	Met Éireann, unpublished data
Landslides	Peat bogs as % of land area	Co-ORDination of INformation on the Environment (CORINE) land cover database 2000 held by the Environmental Protection Agency (EPA), unpublished data
	High slope area as % of land area	Digital Elevation Model held by EPA, unpublished data
	Recorded landslides 1900–2009	Geological Survey of Ireland (GSI) (2009) National Landslide Database
Water supply	Public Water Supply at risk	EPA Remedial Action List 2010 (Feehan <i>et al.</i> , 2011: 24)
	Summer rainfall % decrease	Met Éireann, unpublished data
Coastal erosion	Coast at risk	Environmentally Friendly Coastal Protection (1996)
	Erosion trends	European Environment Agency (2009) EUROSION dataset
Sea-level rise	Elevation less than 1 metre	Digital Elevation Model held by EPA, unpublished data
	Storm surge	McGrath and Lynch, eds. (2008) <i>Ireland in a Warmer World</i>
	Coastal aquifers	GSI (2011) Groundwater aquifers
Biodiversity	Protected sites as % of land area	National Parks & Wildlife Service (NPWS) (2011) Designated site data
	Protected species	NPWS (2011) Habitats & species data

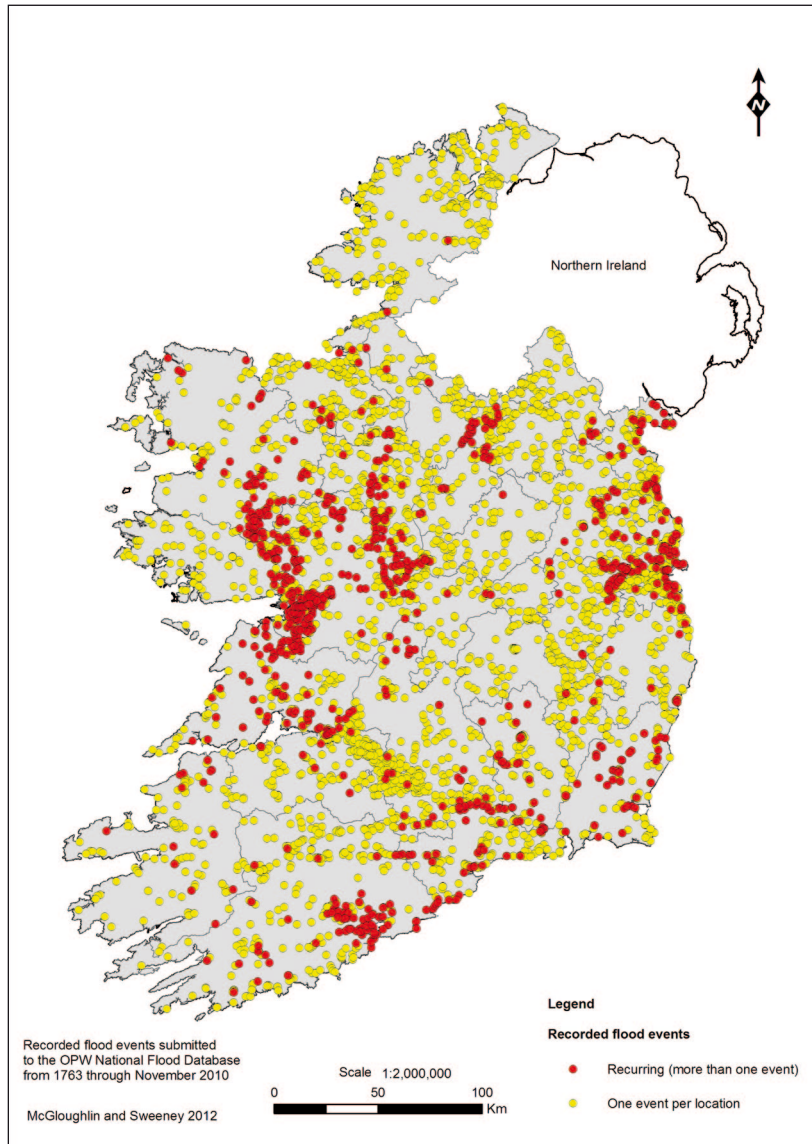
categories² (similar to the relative ranking methodology used for the earlier described Environmental Vulnerability Index, Coastal Vulnerability Index and Norwegian assessment). These categories were labelled with a range from 1 (very low exposure) to 5 (very high exposure). The exposure value for each county was calculated by averaging the category values for the relevant indicators.

While local-scale assessments are required to fully evaluate the vulnerability of specific places and people, the physical exposures were assessed at the county scale for three reasons. First, available data is limited

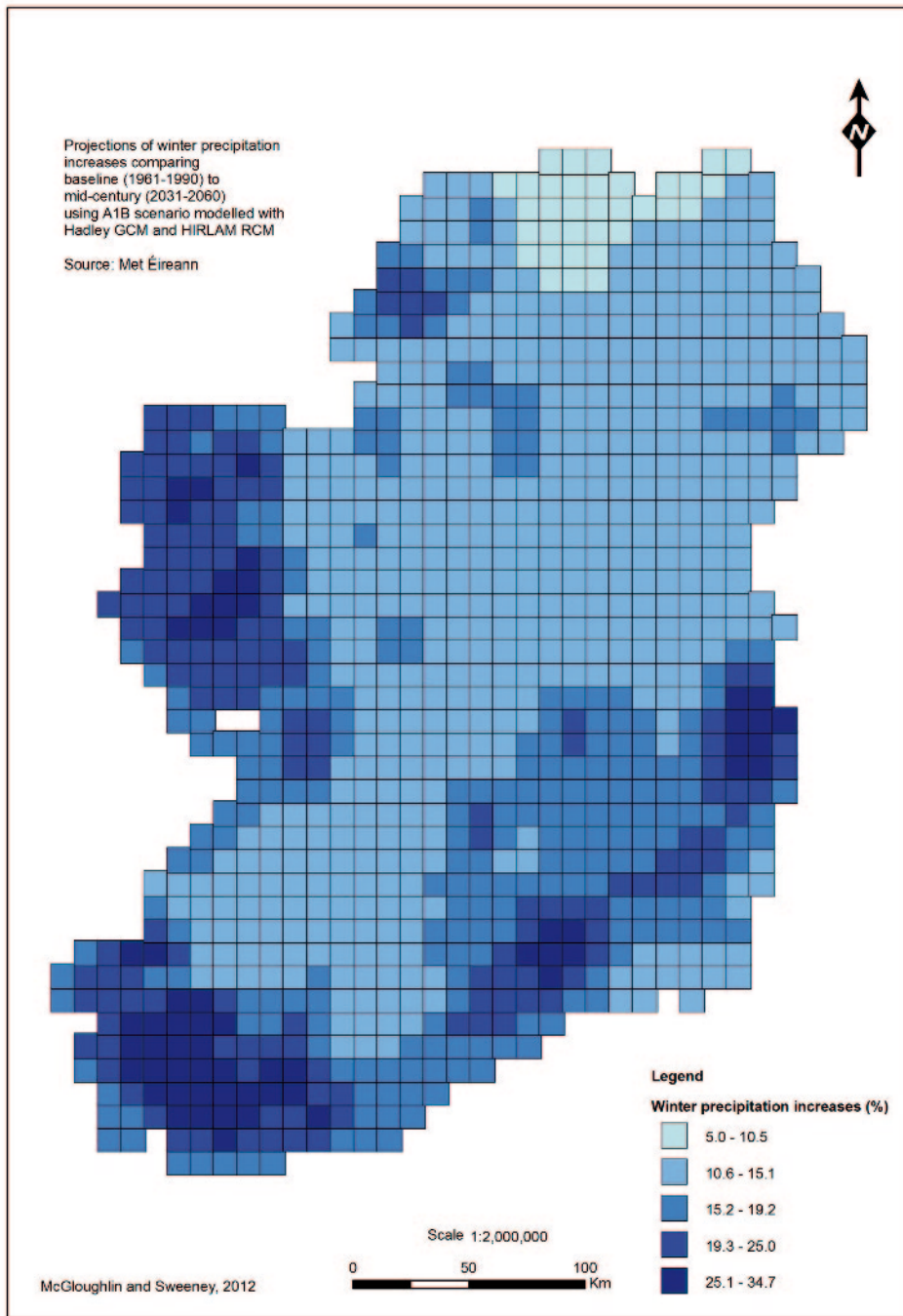
2 The categories were calculated using the Jenks optimisation method that 'maximize[s] variation between classes and minimize[s] variation within classes' (Smith, 1986: 64).

to a coarser county-level scale for exposures including flood events and biodiversity. Second, administrative responsibilities are set at the county level, with the exception of the five cities that are situated within the broader county boundaries. Third, this assessment uses a relative ranking approach, and a wide range of values shows extremes, but obscures variations in the middle range. These county rankings were used as proxy for the cities within their geographic boundaries. Conversely, because adaptive capacity relates directly to the administrative units, this was evaluated for each city and county council.

Flooding was evaluated through two indicators: reported flood events and projected precipitation changes. Reported flood events include the full records from the OPW national floods database as shown on Map 5.1.



Map 5.1. Reported flood events.



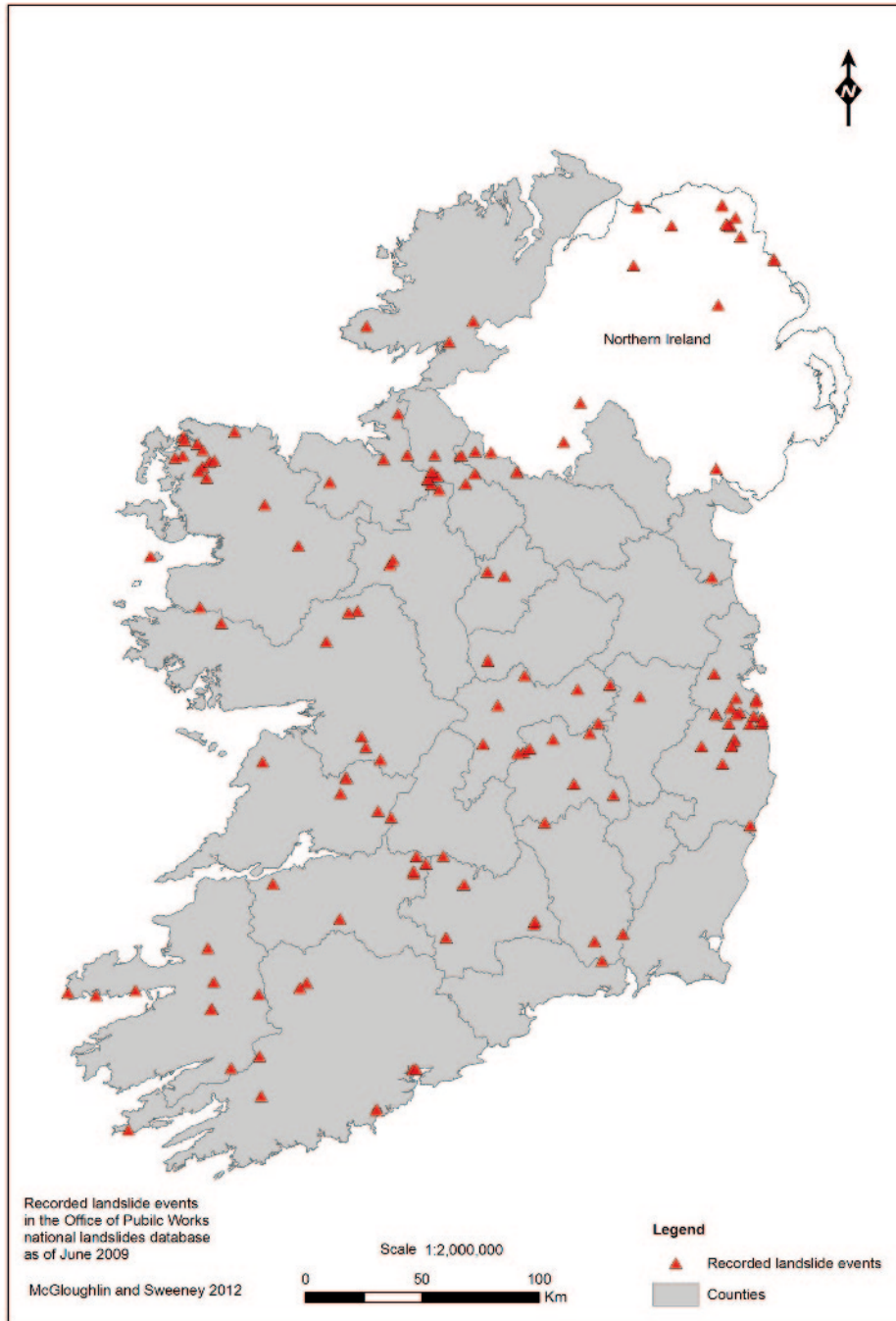
Map 5.2. Projected winter precipitation.

Winter rainfall increase compares observed baseline data (1961–1990) with mid-century projections (2031–2060) for the winter months of December, January, and February as shown on Map 5.2.

The second physical exposure, *landslides*, was evaluated with three indicators: recorded landslide events, high slope areas and peat bogs. As shown on Map 5.3, the first indicator, recorded landslide events,

which was drawn from the Irish nationwide landslide database and maintained by the Geological Survey of Ireland (GSI) includes 119 landslides,³ of which 63 are

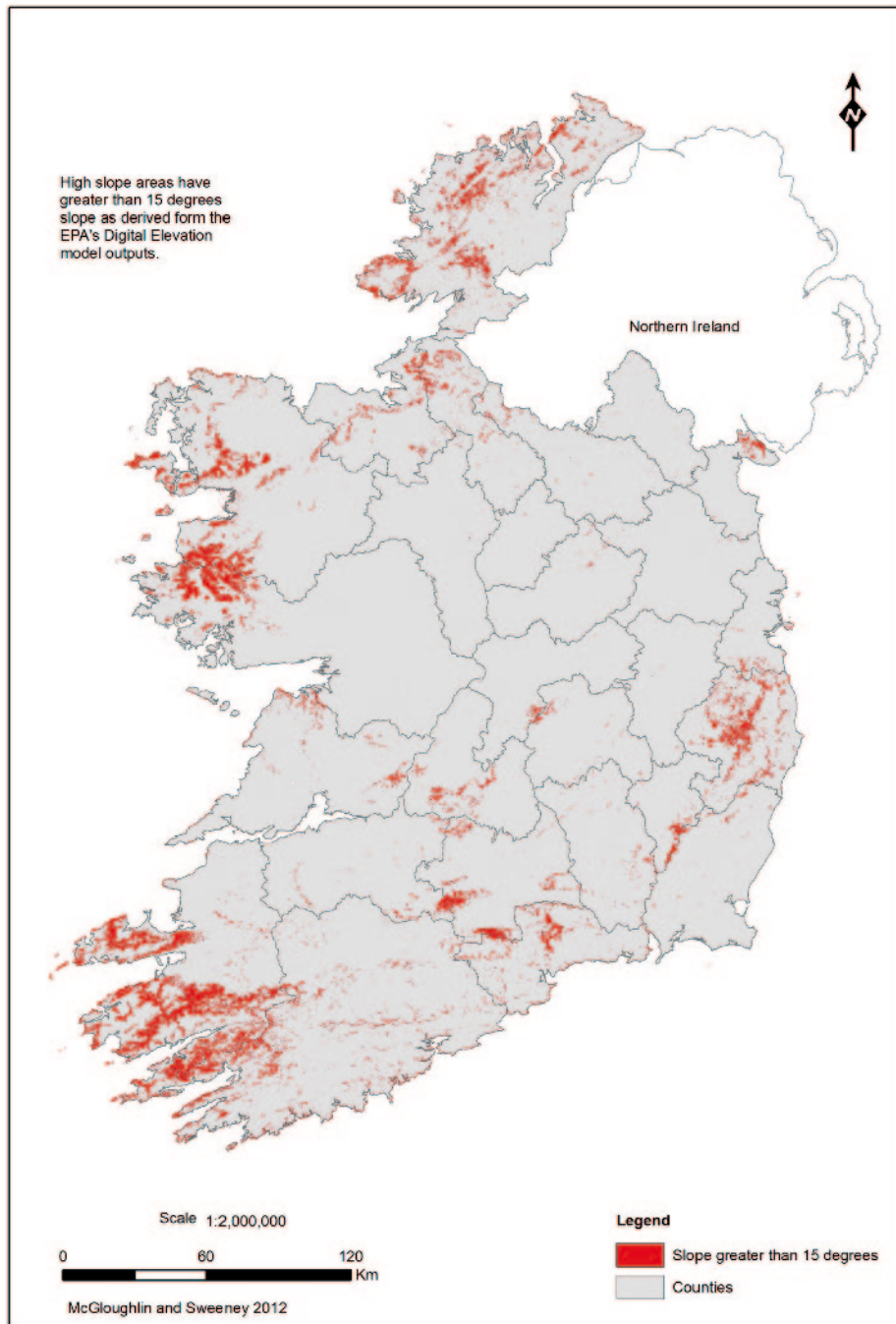
3 The landslide data used in this research was provided by the GSI by personal communication June 2009 as the data was not publicly available at the time. The GSI has updated and made their database available online as of October 2011. Available at: http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple (accessed 28 September 2012).



Map 5.3. Recorded landslide events.

bog related and 25 occurred within cities and towns such as Dun Laoghaire and Bray. As shown on Map 5.4, the second indicator, high slope areas, represents the percentage of each county's total land area that has a slope greater than 15 degrees. As shown on Map 5.5, the third indicator, peat bogs, represents the percentage of each county's total land classed as 'peat bogs' as per CORINE 2000.

The third physical exposure, *water supply*, was evaluated with two indicators: (i) public water supply at risk and (ii) summer rainfall percentage decrease. Public water supplies at risk are those on the Remedial Action List as of September 2010 indicating inadequate treatment through microbiological and/or chemical indicators (Feehan *et al.*, 2011). Decreases in summer rainfall will affect water availability and

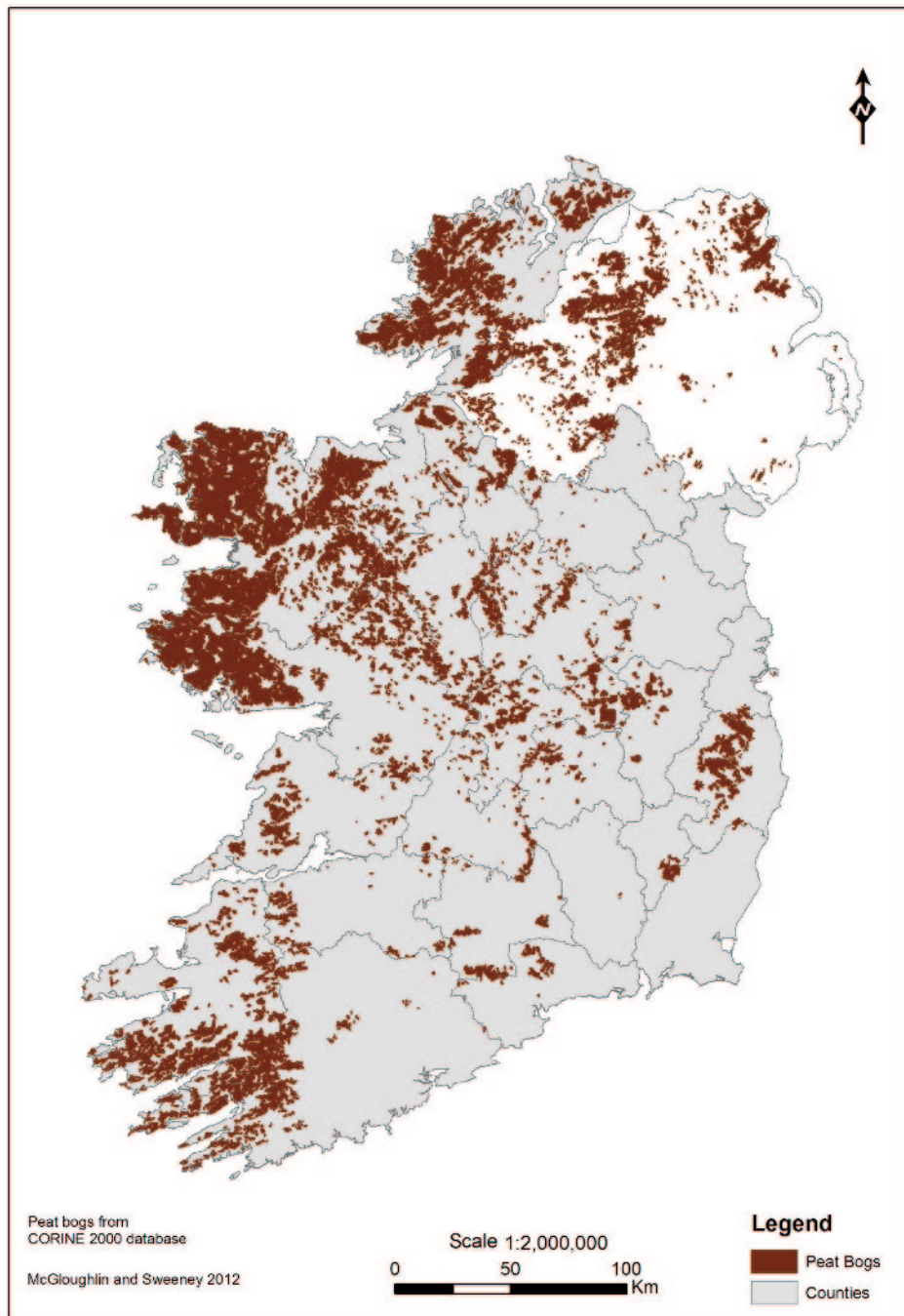


Map 5.4. High slope areas.

quality (Murphy and Charlton, 2008; Dunne *et al.*, 2009).

The fourth physical exposure, *coastal erosion*, was evaluated with two indicators: (i) coastline at risk length and (ii) coastal erosion trends. Coastline at risk (in metres) was determined by Carter in 1988 (Environmentally Friendly Coastal Protection (ECOPRO), 1996: 109). The coastal erosion trends

indicator addresses temporal changes between 1990 and 2004, as evaluated by the pan-European study EUROSION (Lenôtre *et al.*, 2004). The two coastal datasets were largely compatible, with one notable exception. The ECOPRO study classed Limerick as a coastal county based on its extensive estuary boundary with the River Shannon. Conversely, the EUROSION project did not class estuaries as coastal

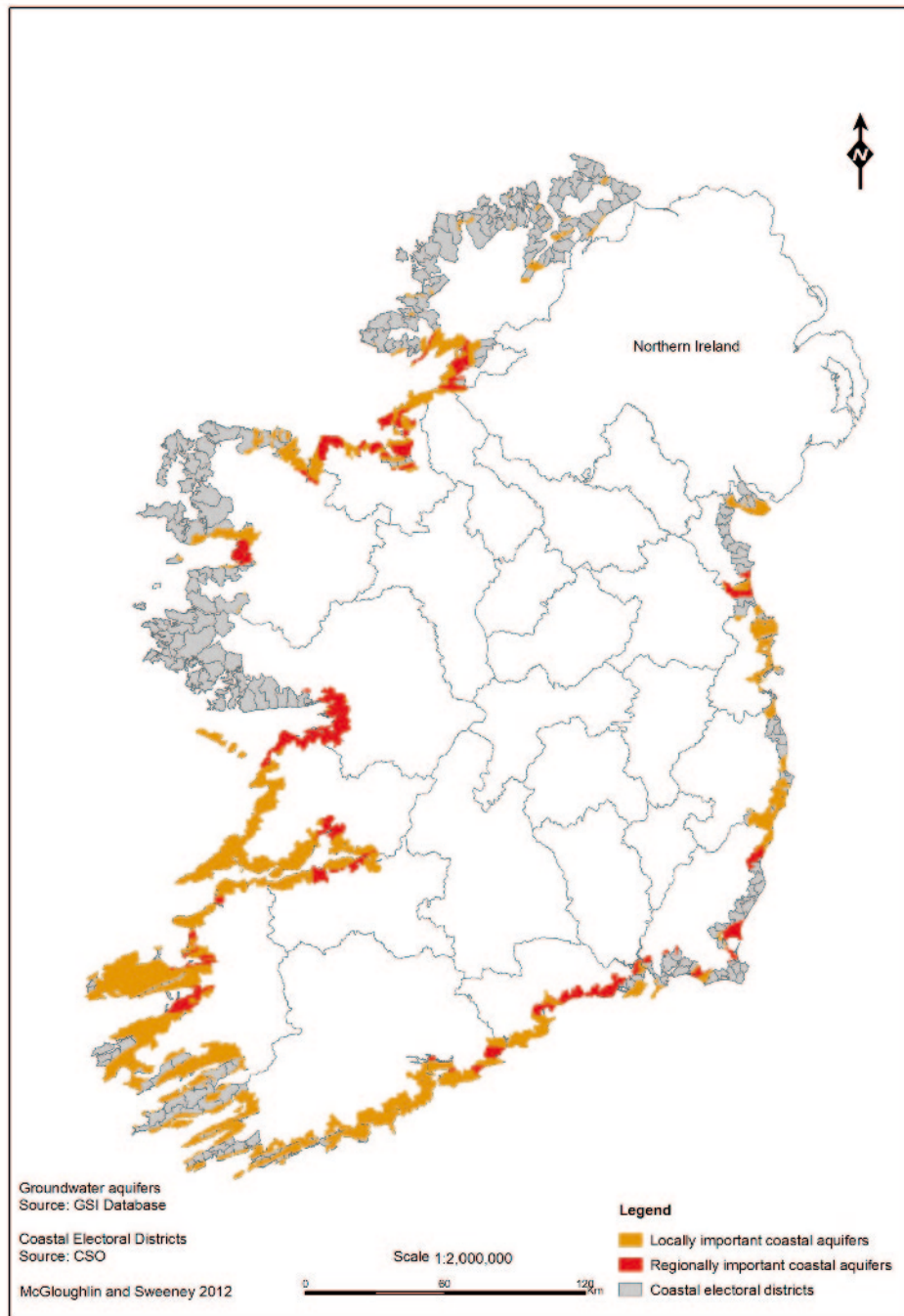


Map 5.5. Peat bogs.

and, therefore, did not list Limerick as a coastal county. While the current assessment excluded Limerick from the list of coastal counties, Limerick and Clare councils have greater exposure to erosion, which could be fully evaluated through detailed risk assessments.

The fifth physical exposure, *sea level rise*, was evaluated with three indicators: (i) low elevation

areas, (ii) storm surge and (iii) coastal aquifers. Ireland's low-lying coasts (elevation less than 1 metre above sea level) will be affected by the projected sea level rise during the 21st century (Fealy, 2003). Storm surges will increase this exposure as projected by the C4I climate-modelling project. The third indicator, coastal aquifers, are the 632 regionally important and

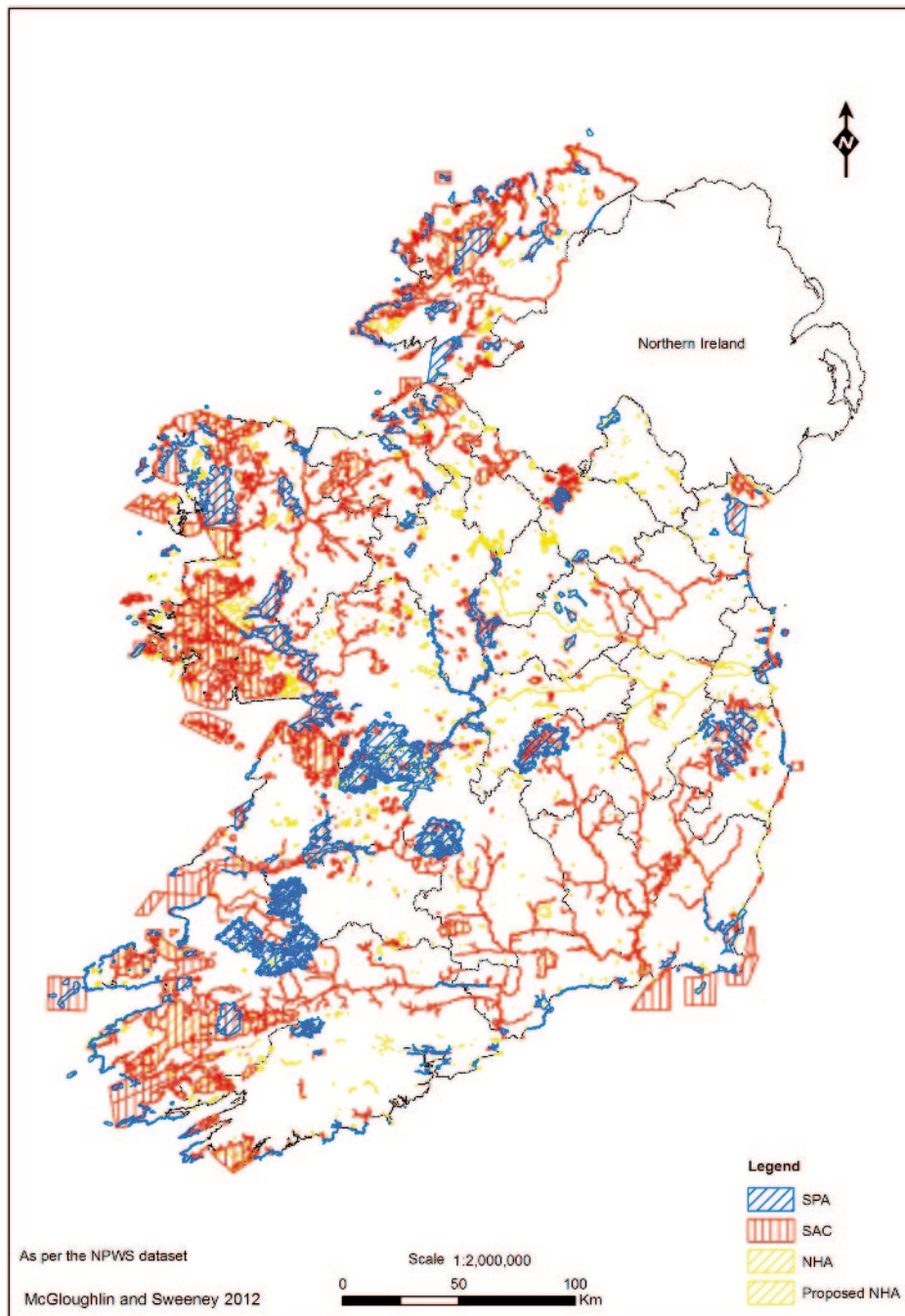


Map 5.6. Coastal aquifers.

2,433 locally important aquifers in coastal electoral districts as identified by the GSI, as shown on Map 5.6. These coastal aquifers will be threatened by saltwater inundation (Fealy, 2003).

The final physical exposure, *biodiversity loss*, was evaluated with two indicators: (i) protected sites and

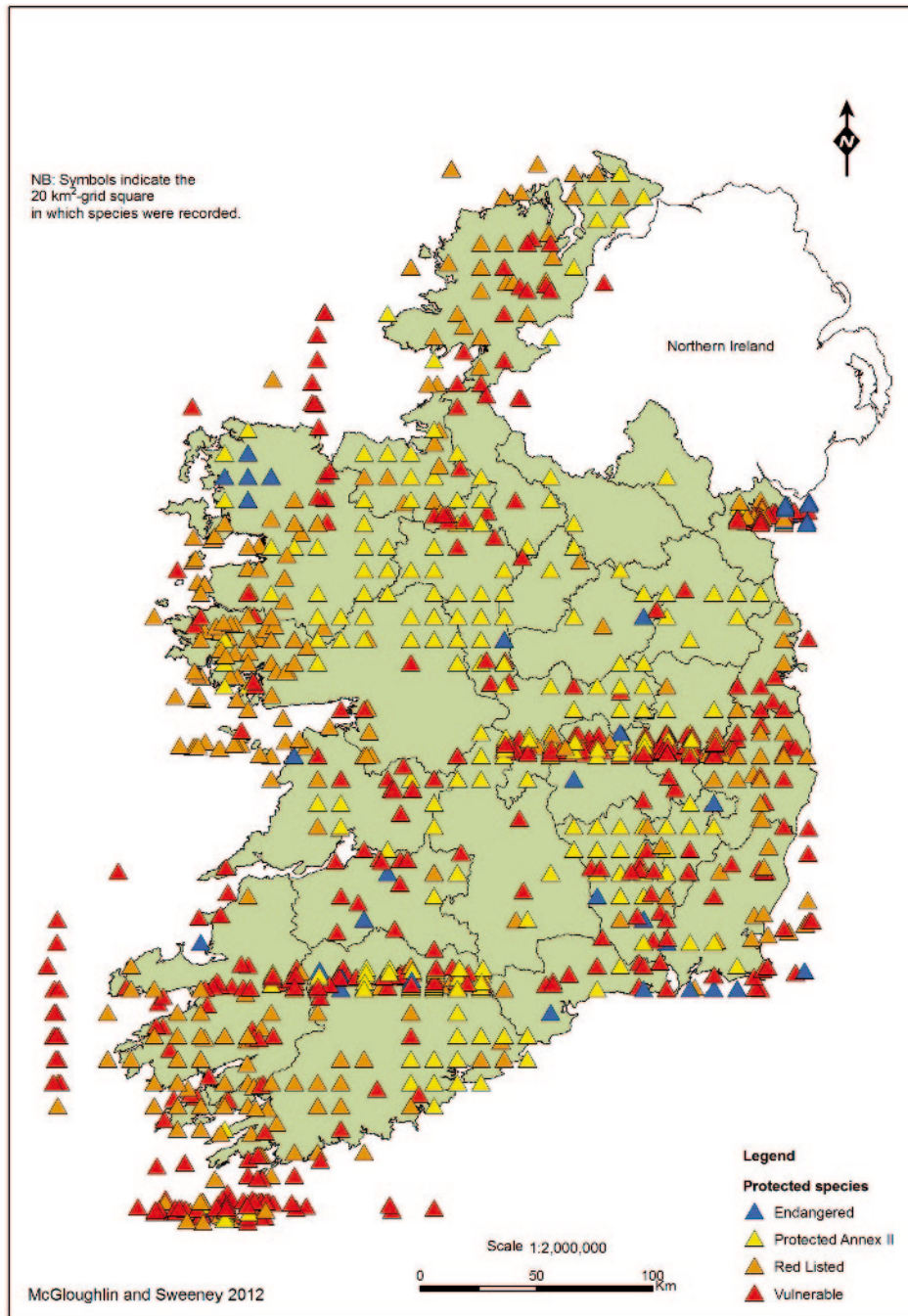
(ii) protected species. As shown on Map 5.7, Ireland has designated areas to ensure the protection of endangered species in accordance with EU regulations. The protected site indicator is a measurement of the designated land area as a percentage of the total land area for each county. (A low percentage of protected



Map 5.7. Protected areas.

area in a given county is associated with greater exposure.) The second indicator, protected species, measures how many discrete species protected by the Habitats Directive (including those that are endangered, vulnerable or rare as per the NPWS) have been recorded within each county (Map 5.8). (A relatively high number

of discrete species in a given county is associated with greater exposure.) There is potential to also use climate change projections to assess the impact of climate change on biodiversity; however, a detailed analysis of the effects of the wide range of habitats and species was beyond the scope of this assessment.



Map 5.8. Protected species.

5.1.2 Step 2: Evaluating Adaptive Capacity

'Adaptive capacity' refers to a council's ability to moderate potential damages or to cope with the consequences of climate change. Because adaptive capacity is an intangible resource, it was evaluated using the proxy of climate-related actions by city and

county councils (hereafter referred to as 'councils' in this section). Adaptive capacity was evaluated through the three indicators as listed below in Table 5.2. For this, the indicator values were sorted from high to low so that the councils with the most measures were classed with the lowest exposure.

Table 5.2. Adaptive capacity indicators and data sources.

	Indicator list	Data source
Adaptive capacity	Development plans	City/county development plans
	Climate change strategies	Local authority survey and personal communication
	Forward planning staff numbers	DoECLG 2009 planning statistics

For the first adaptive capacity indicator, *development plans*, current council development plans were reviewed for links with climate change for (i) impacts, (ii) greenhouse gas reductions, or (iii) added measures beyond those required by national policies. These notes were aggregated to relevant sectors (references to climate change, energy-demand management, energy-renewables, flooding, transport, increased residential density, and other).

For the second adaptive capacity indicator, *climate change strategies*, responses from a 2011 survey of all local authorities were used to ascertain each council's status. Survey responses from 27 councils were augmented by telephone interviews with the 7 remaining councils who did not participate in the survey. The categories were based on survey responses (indicated for each) as follows: very low exposure (published draft or strategy), low exposure (completed unpublished strategy), moderate (strategy in process), high (stated objective to prepare a strategy), and very high (no current plans to prepare a strategy). A list of all subnational climate change strategies is included in Appendix D.

For the final adaptive capacity indicator, *number of forward planning staff*, the 2009 DoECLG planning statistics were used. Because there are no dedicated funds for climate change, the number of forward planning staff was used as a proxy for available resources to address climate change.

5.1.3 Step 3: Evaluating Sensitivity and Impacts

The exposures explored in Step 1 show where Ireland is most exposed to climate-related events and conditions. This does not consider the distribution of people who will be affected and the associated climate-related impacts on them. Step 2, a sensitivity analysis, was added that weighted the exposures with population density

based on the 2011 Census. Climate events that occur in densely populated areas affect more people (i.e. disruption of economic hubs and mass evacuations).

It is important to note that population density by itself cannot account for all the potential damage to society, as this prioritises the impacts on urban areas and may underrepresent how rural areas and natural systems are affected.⁴ However, as an initial assessment, this research provides a metric to evaluate what impact climate change will have on society. Future research should incorporate economic considerations (such as critical infrastructure and/or local authority budgets), environmental considerations (such as ecosystem goods and services), and equity considerations (such as gender, ageing populations and/or deprivation indices).

5.1.4 Step 4: Evaluating Vulnerability

Evaluating vulnerability is a function of impacts (exposures and sensitivity) and adaptive capacity. As noted previously, impacts on society can be reduced when adaptive capacity is exercised and adaptation occurs. All these impacts will not affect Ireland equally; therefore, the five sectors were weighted (Table 5.3), based on local authority planners' expertise. The planners' input was collected through a 2009 nationwide survey with responses received from 31 of the 34 planning offices. The survey assessed planning practitioners' perceptions about local climate change impacts, identified barriers limiting local action, and pinpointed good-practice examples.

⁴ Both climate-related exposures and impacts are important when adapting to climate change. In this report, results for exposures and impacts are presented for the reader's consideration in tandem. This study does not take a position on resource allocation, but rather presents the information policy-makers must consider when allocating resources.

First, overall physical ranking was calculated for each county using the above five physical impacts. Using flooding as an example, 15 of 19 coastal councils anticipate a 'high impact' and 4 anticipate a 'limited impact'. Therefore, the total was comprised of $[(15 \times 2) + (4 \times 1)]$ which equals 34. As Table 5.3 shows, the weighting for each impact is the relative percentage of the total values for all impacts. Aggregated climate impacts were then calculated by combining the weighted sector results for each county. Lastly, the county rankings were derived by dividing them into five categories using the Jenks natural breaks method (as was used for the individual indicators and each sectoral impact). The categories were labelled with a range from 1 (very low impact) to 5 (very high impact). Because the physical exposures were evaluated at the county level, the city values were entered using the value of the surrounding county.

The final step in evaluating vulnerability brought together the disparate physical impacts and adaptive capacity through a matrix with physical impacts on the horizontal axis and adaptive capacity on the vertical axis.

5.2 Second Research Phase

Unlike the quantitative first research phase that assessed relative climate vulnerability, the qualitative second research phase assessed staff member perceptions of climate change exposure and the government's potential for adaptation. The second research phase was broken down further into two parts. For the first part, survey responses were analysed, and areas for further exploration were identified. For the second part, these areas were explored through case studies and through interviews with staff members of local authorities, regional authorities, and the national government. The case studies focused on four local authorities that were selected based on the following criteria: (i) both city and county authorities, (ii) located in different regions, (iii) physical exposure levels, and (iv) adaptive capacity levels. The interviews with local authority staff members explored perceptions and practices beyond what is included in the formal policy documents. The interviews with regional authority and national government staff members explored plans to advance climate measures at all government levels.

Table 5.3. Sector weighting based on stakeholder input.

Councils	Impact levels**	Sectors				
		Flooding	Water	Biodiversity	Coastal*	Landslides
Coastal councils (n=19)	High	15	9	10	14	3
	Limited	4	8	9	5	12
	None anticipated	0	2	0	0	4
	Total	34	26	29	33	18
	Weighting factor	.243	.186	.207	.236	.129
Inland councils (n=7)	High	3	4	2	0	0
	Limited	4	3	5	0	3
	None anticipated	0	0	0	7	4
	Total	10	11	9	n/a	3
	Weighting factors	.303	.333	.273	n/a	0.91

*Coastal includes erosion and sea level rise.

**Responses are multiplied by the value listed below for each level: high impact = 2, limited impact = 1, no anticipated impact = 0.

6 Results

These results are the outcome of the above methodology and are presented in two parts. From the first research phase, results are presented for sectoral exposures and impacts (methodology Steps 1 through 3) and for climate vulnerability (methodology Step 4). From the second research phase, results about local level barriers and opportunities are presented together with information about how higher government levels are moving forward.

6.1 First Research Phase: Assessing Exposures and Vulnerability

Assessment of each council's exposure and overall climate vulnerability, as well as the impact for specific sectors, shows that some counties are more exposed to climate change than others. It is likely that the counties with low exposure and vulnerability will require fewer adaptation measures. Of course, even counties with low vulnerability are likely to experience some challenges associated with climate change impacts. For example, even if there are few floods in a given area, a small increase in the number or intensity of floods can threaten people, their homes, and public buildings. On the other end of the spectrum, a very high ranking indicates that further in-depth risk assessments are warranted. The results from this research phase are presented in three parts: (i) physical exposures/impacts, (ii) adaptive capacity exposure/impact and (iii) climate vulnerability.

Exposure levels vary throughout the country as discussed below and summarised in Appendix B, with different counties having 'very high exposure' due to local physical characteristics. Meanwhile, there is 'very high impact' for all sectors in the greater Dublin area (hereafter referred to as 'Dublin') due to its high population density. Coastal erosion is the only sector with 'very high impact' in an additional county, Louth, as well as Dublin.

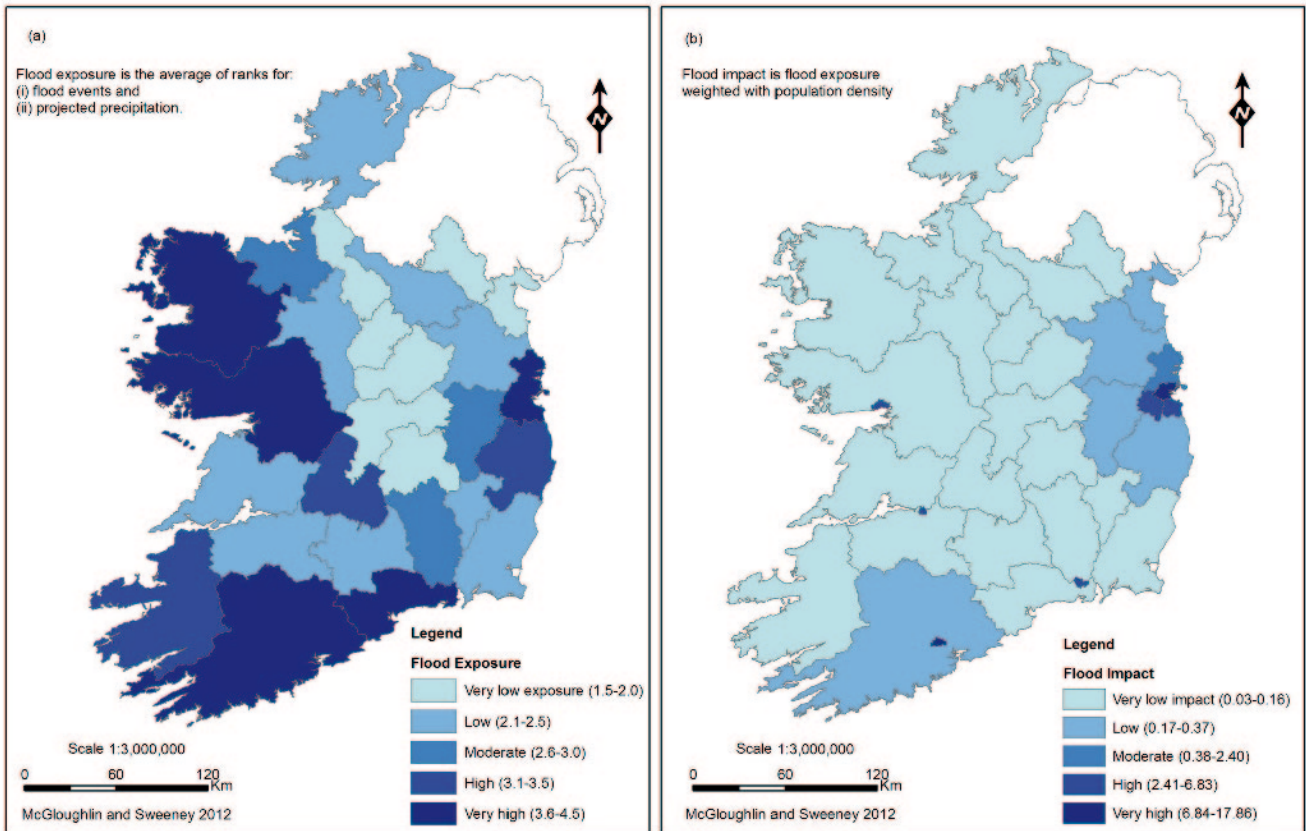
6.1.1 Physical Exposures and Impacts

Six sectors are examined for exposure and for impact (exposure weighted with population density). As shown in Map 6.1a, there is very high flood exposure in Cork, Dublin, Galway, Mayo and Waterford; and high flood exposure in Kerry, North Tipperary and Wicklow. Considering population as shown in Map 6.2b, very high flood impact is in the cities of Cork and Dublin, with high impact in the cities of Galway, Limerick, and Waterford as well as Dun Laoghaire-Rathdown and South Dublin.

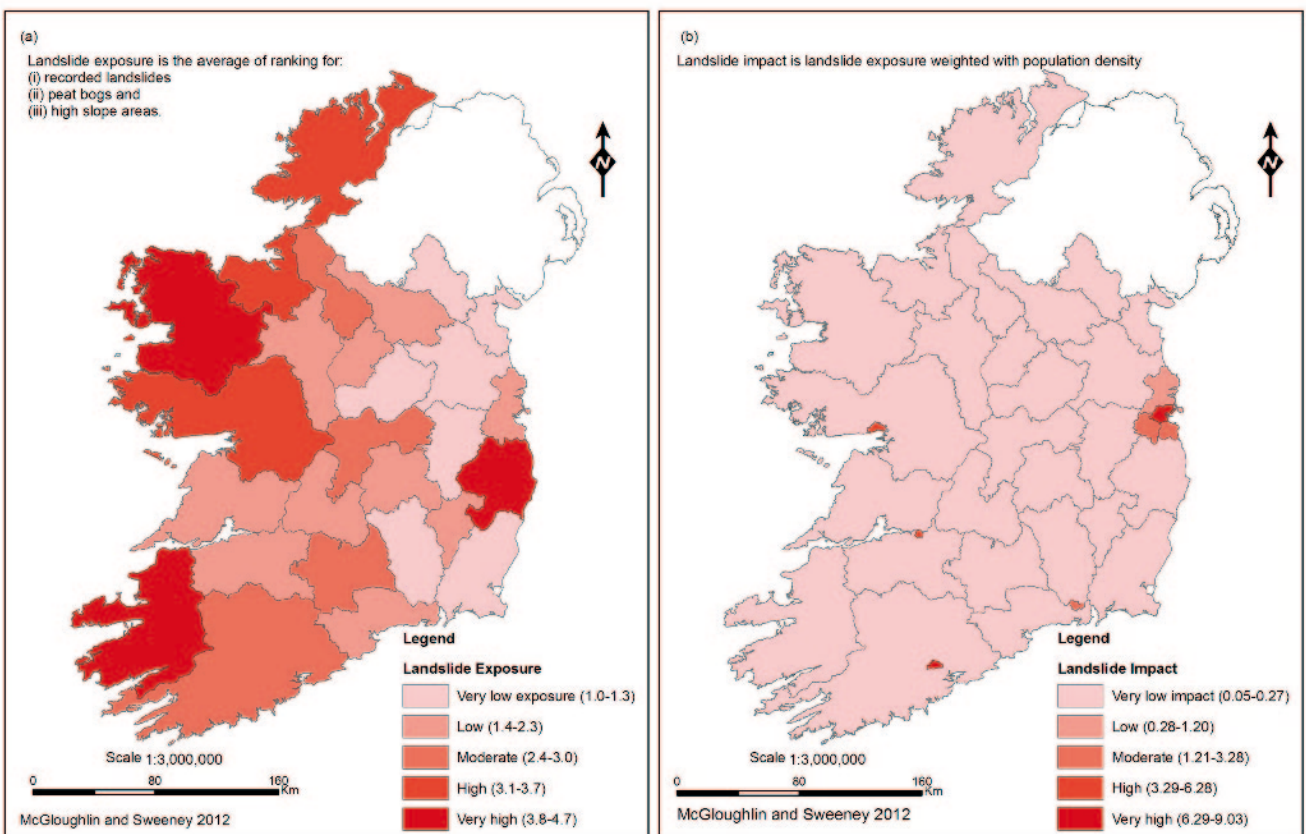
The most reported flood events (very high exposure) were in Galway (519), Cork (472) and Dublin (329); however, the greatest increases in winter precipitation are not projected for these counties. The very high exposure for precipitation was in Wicklow (22.4%), Mayo (20.4%), Kerry (20.8%) and Waterford (20.4%) with smaller increases (high exposure) for the very high flood-event counties (Galway [17.9%], Cork [19.0%] and Dublin [18.0%]). Therefore, overall flood *exposure* (considering both indicators) shows the councils that will experience the most floods, and overall flood *impact* shows the councils where most people will be affected.

Landslides are the second sector examined. There have been a relatively low number of landslides in Ireland historically. However, within the national context and as shown in Map 6.2a, some councils are exposed to this hazard due to high slope areas and peat bogs as well as being reflected in reported landslide events. There is very high exposure in Kerry, Mayo, and Wicklow, as well as high exposure in Cork, Donegal, Galway, and Sligo.

Considering population as shown in Map 6.2b, the very high landslide impact is in the cities of Cork and Dublin. While there have been no recorded landslides within Dublin City and the exposure is low, landslides did affect Dublin City when the 2000 Killiney landslide disrupted rail services (O'Brien, 2000: 4) and there have been five other landslides in the Greater Dublin Area



Map 6.1a and 6.1b. Flood exposure and impact.



Map 6.2a and 6.2b. Landslide exposure and impact.

(Creighton, 2006). Similarly, there were eight reported events in Cork (Creighton, 2006). The landslide impacts are high in the cities of Galway and Limerick.

As Map 6.3a shows, water-supply exposure is very high in Cork, Kerry, Roscommon and Sligo due to their high percentage of public water supplies requiring remedial action (Feehan *et al.*, 2011) coupled with greatest decreases in summer precipitation by mid-century (2031–2060).

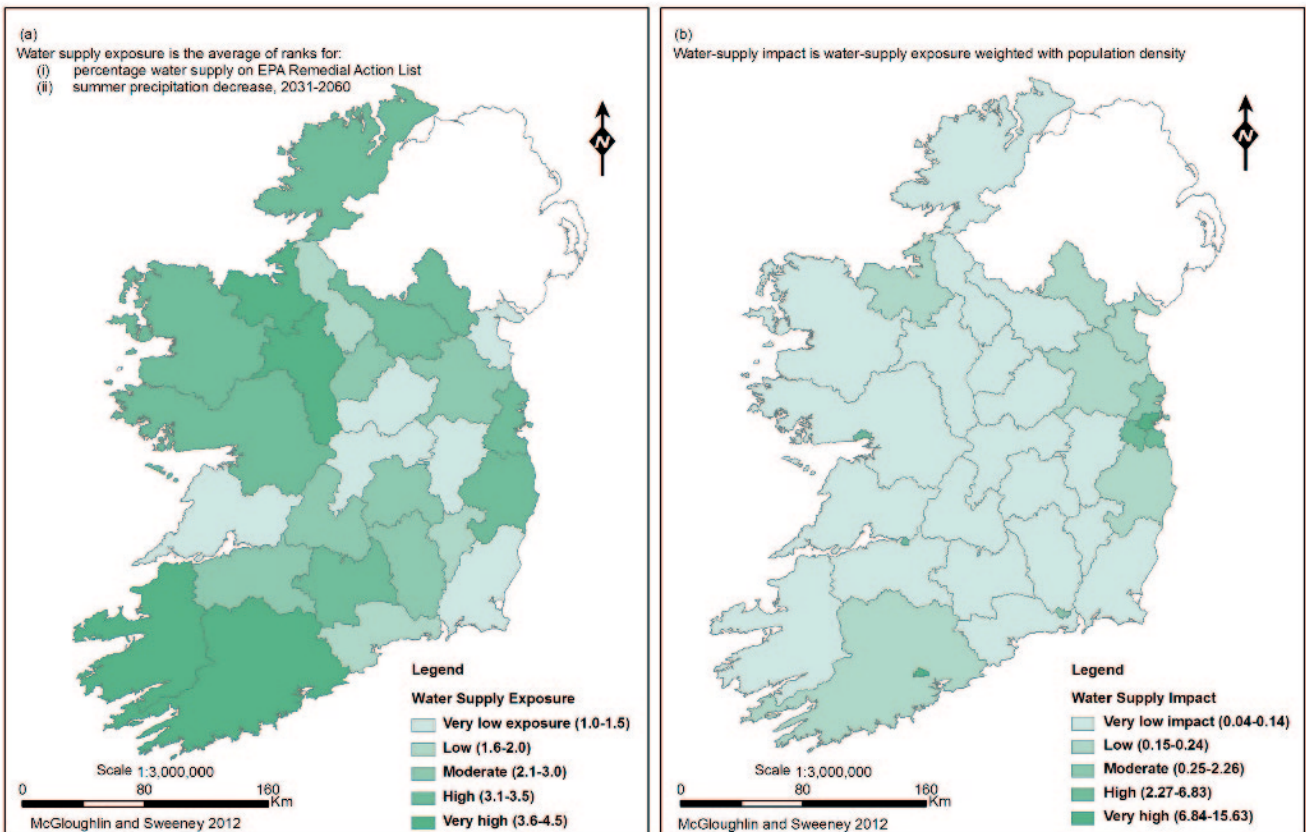
When considering population as shown in Map 6.3b, the water supply impacts are greatest ('very high') in the cities of Cork and Dublin, followed closely by high impacts in the cities of Galway and Limerick as well as Dun Laoghaire-Rathdown and South Dublin.

Coastal erosion exposure is very high in Cork, Galway, Kerry and Mayo followed closely by high exposure in Clare, Donegal and Wexford (Map 6.4a) due to coastline at risk and recorded erosion trends. The cities of Cork, Limerick and Waterford are located on estuaries rather than directly on the coast and their exposure is not represented in this study.

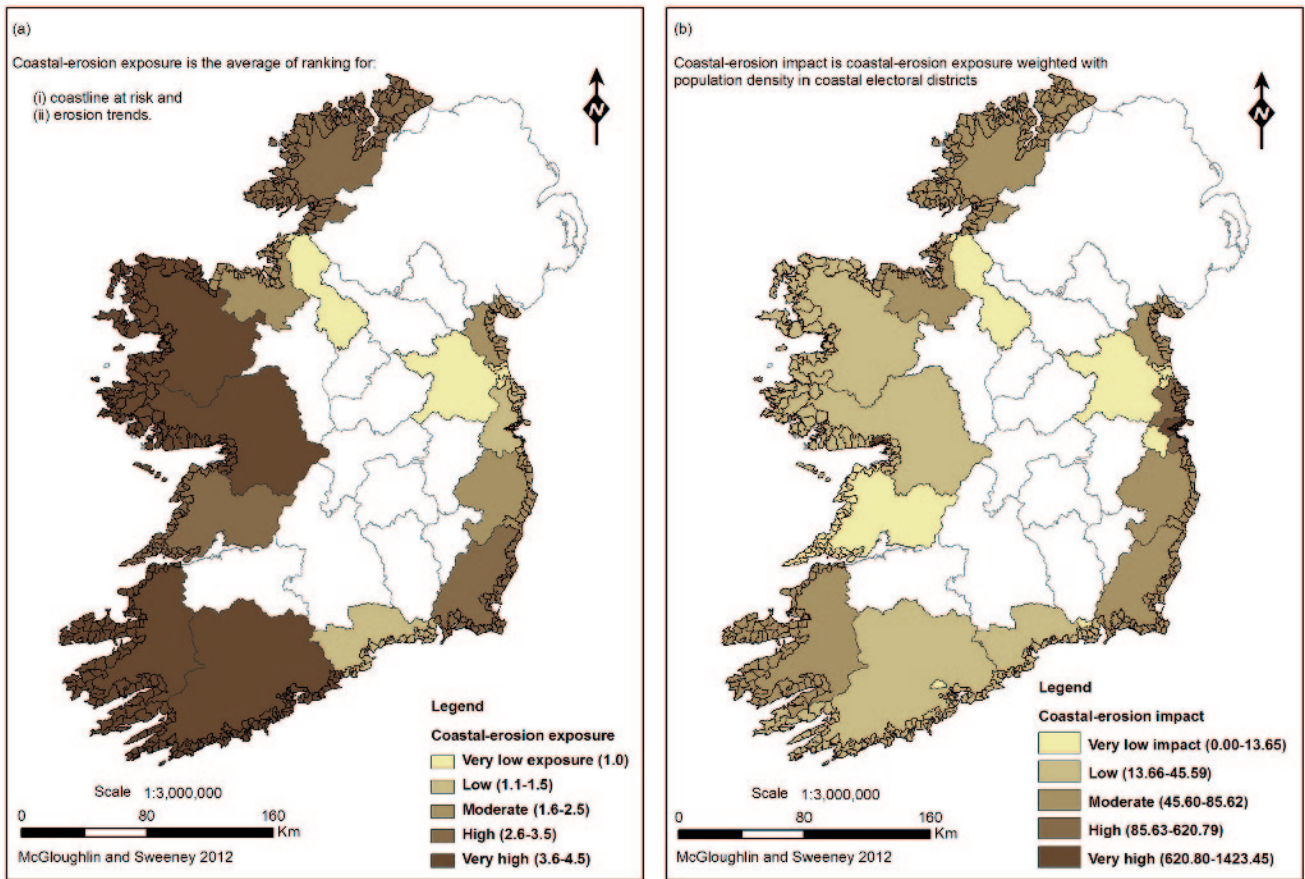
However, when considering population, the greatest impact (shown on Map 6.4b) will be in councils with very high impact (the cities of Dublin and Galway) and high impact (Dun Laoghaire-Rathdown and Fingal). Ireland is already taking action and the OPW allocated funds in 2009 and 2010 for coastal protection: €1.5M to western counties and €379,000 to eastern counties (OPW 2011a; OPW 2011b).

Sea-level rise exposure is very high in Clare, Galway, Kerry and Sligo as well as high exposure in Cork, Donegal and Mayo (Map 6.5a), because of low-lying coasts (elevation less than 1 metre above sea level), high storm surge projections and coastal aquifers which will be threatened by saltwater inundation. The cities of Cork, Limerick and Waterford are located on estuaries rather than directly on the coast and their exposure is not represented in this study.

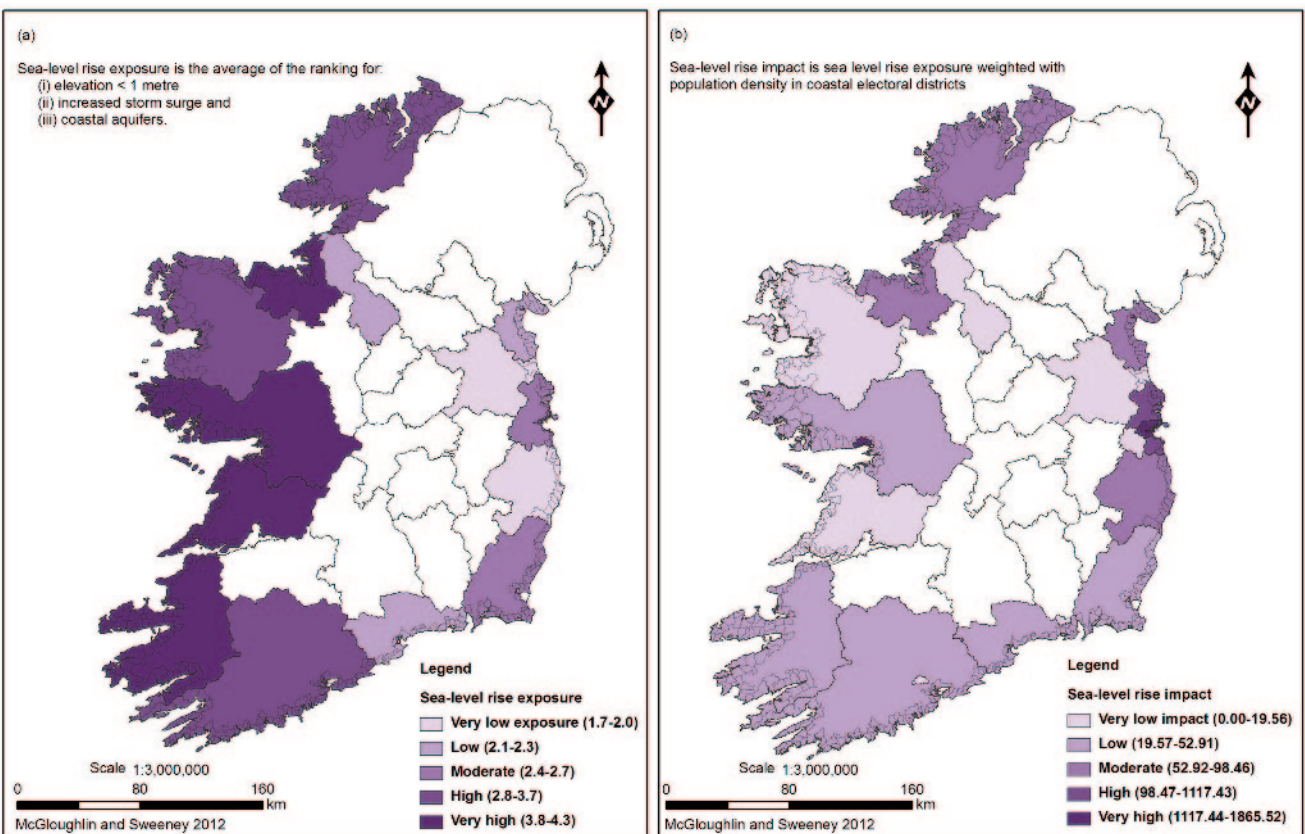
When considering population (Map 6.5b), the greatest impact will be in councils with very high impact (the cities of Dublin and Galway) and high impact (Dun Laoghaire-Rathdown and Fingal).



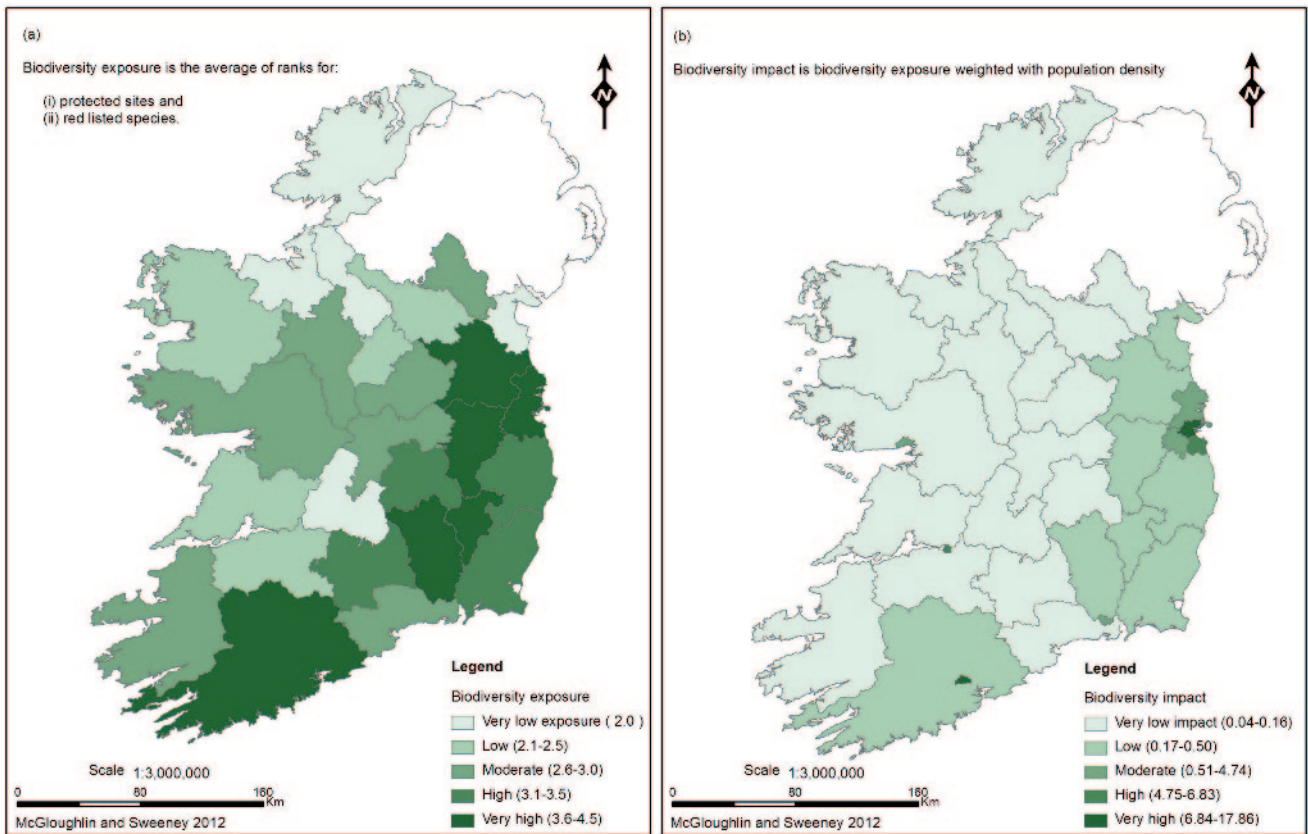
Map 6.3a and 6.3b. Water supply exposure and impact.



Map 6.4a and 6.4b. Coastal erosion exposure and impact.



Map 6.5a and 6.5b. Sea level rise exposure and impact.



Map 6.6a and 6.6b. Biodiversity exposure and impact.

Biodiversity exposure is very high in Carlow, Cork, Dublin, Kildare, Kilkenny and Meath (Map 6.6a) because they have limited areas designated for endangered species protection and higher numbers of those endangered species. Similarly, but to a lesser degree, biodiversity exposure is high in Laois, South Tipperary, Wexford and Wicklow.

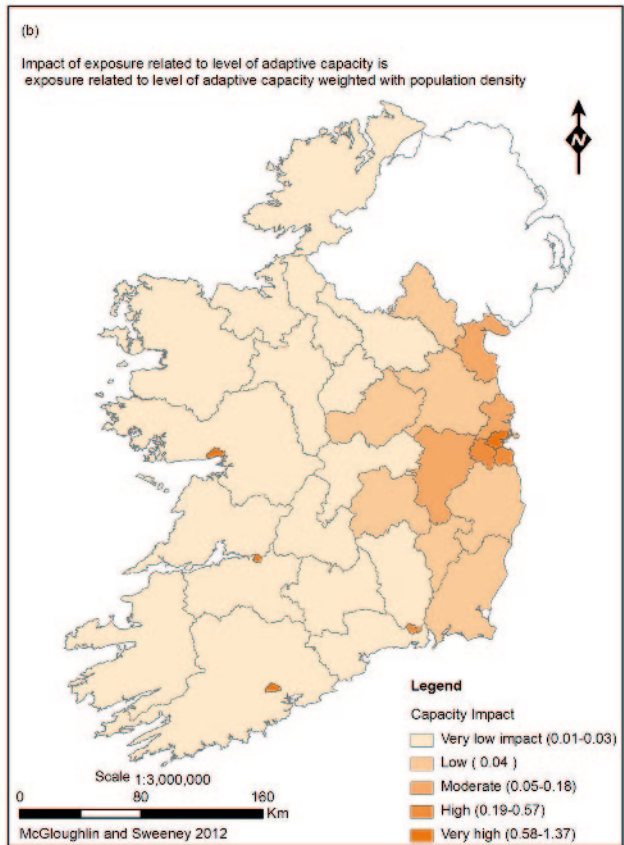
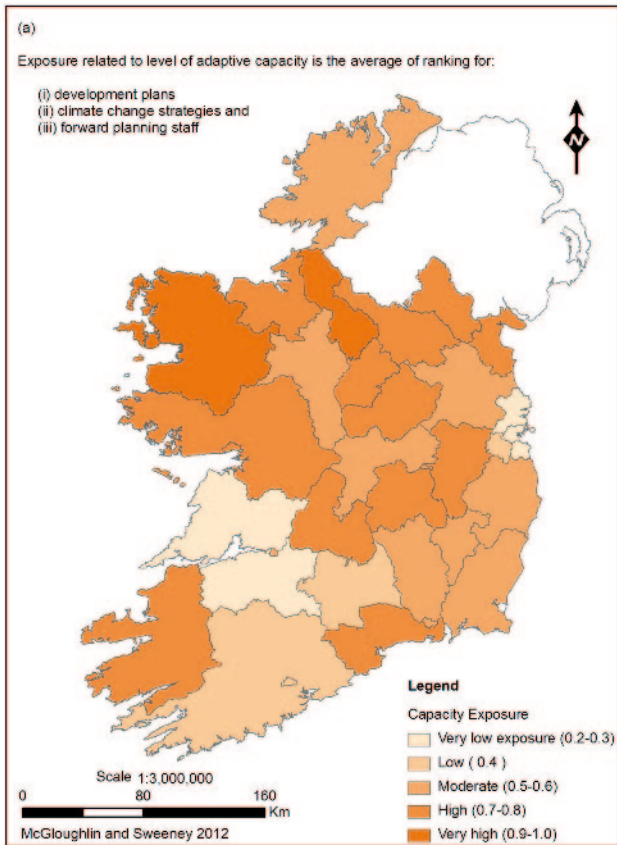
When considering population (Map 6.6b), there is very high impact in the cities of Cork and Dublin as well as 'high' impact in Dun Laoghaire and Limerick City.

6.1.2 Adaptive Capacity Exposure and Impact

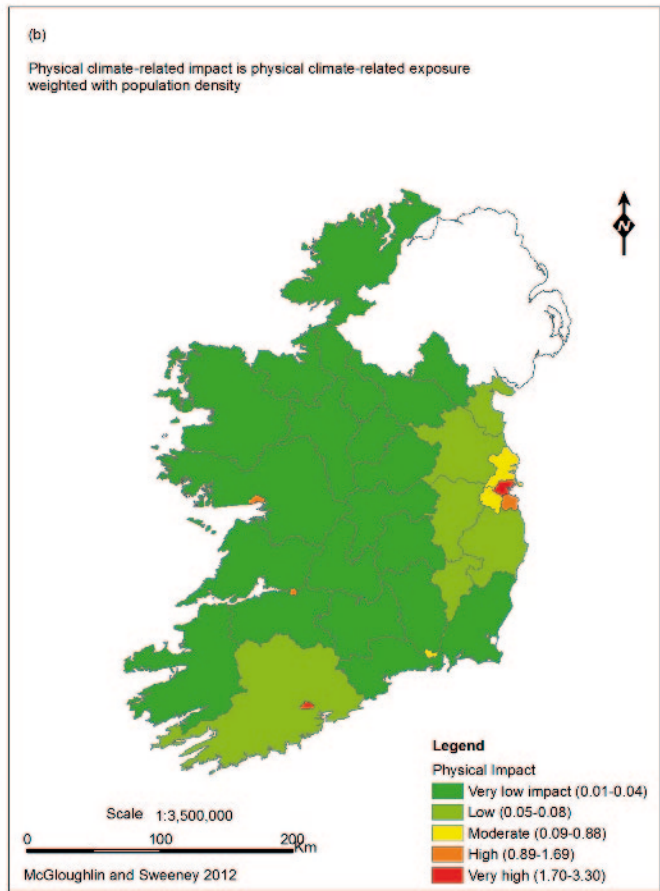
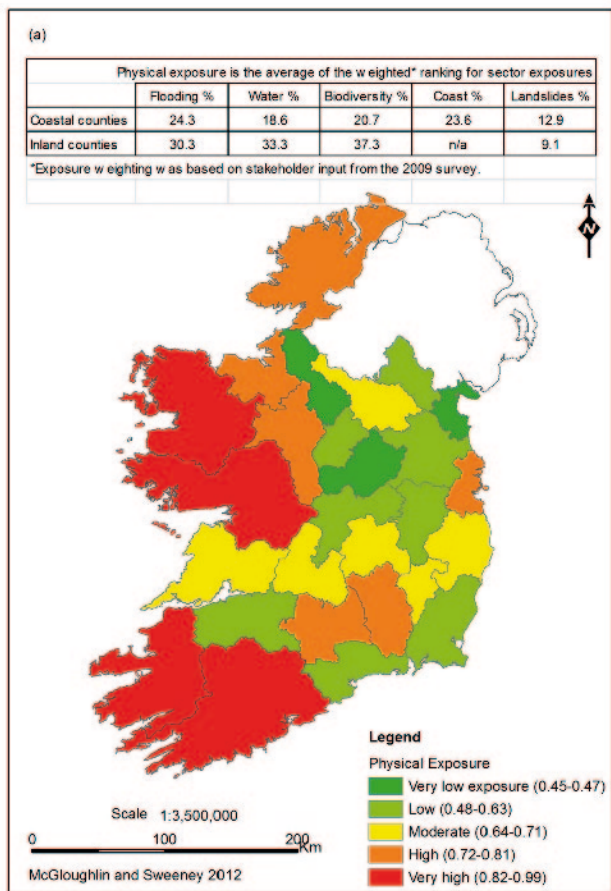
Adaptive capacity, the second type of exposure, refers to how prepared councils are to address anticipated climate impacts. Although most local authorities anticipate high impact for flooding (61%), water supply (42%), biodiversity (39%), and coastal issues (48%), few are prepared for these. Most local authorities have

no published climate change strategy, development plans only partially address climate change, and they have few staff members dedicated to forward planning. The councils that have not prepared for climate impacts will face greater challenges in reducing the negative effects on their area. Based on publicly available information, there is very high exposure related to adaptive capacity (i.e. the councils least prepared for climate change) in Galway City, Kerry, Leitrim, Mayo, Monaghan and Westmeath (Map 6.7a); nine other councils have high exposure: Cavan, Co. Galway, Kildare, Laois, Longford, Louth, North Tipperary, Sligo, and Co. Waterford.

When considering population (Map 6.7b), there is very high impact related to adaptive capacity in the cities of Cork, Galway and Limerick as well as high impact in Dublin City, Dun Laoghaire-Rathdown, South Dublin and Waterford City.



Maps 6.7a and 6.6b. Exposure and impact related to capacity levels.



Map 6.8a and 6.8b. Physical climate-related exposure and impact.

6.1.3 Physical Climate-related Exposure and Impacts

As a separate exercise from the foregoing exposures and impacts, each council's *overall climate exposure and impact* was assessed with the weighted physical impacts as described in the methodology section. As shown on Map 6.8, overall climate exposure is very high in Cork City and County, Galway City and County, Kerry and Mayo as well as high in Donegal, councils in the Greater Dublin Area (Dublin City, Dun Laoghaire-Rathdown, Fingal and South Dublin), Kilkenny, Roscommon, Sligo and South Tipperary.

Again, in terms of population, Map 6.8b shows that overall climate impact is very high in the cities of Cork and Dublin and high in Dun Laoghaire-Rathdown and the cities of Galway and Limerick.

The exposure as shown in Map 6.8a and impact as shown in Map 6.8b together highlight the areas where Ireland will be exposed to climate changes as well as the very high impact area where the greatest number of people will be affected.

6.1.4 Climate Vulnerability

Figure 6.1 shows that climate vulnerability results from the relationship between climate exposures and the actions taken to prepare for climate events (adaptive capacity). The greatest vulnerability occurs where both criteria are at their highest levels.

Table 6.1 shows the climate vulnerability (combination of exposures and level of preparation) for each city and county in Ireland, which shows climate exposure in section a on the left and climate impact in section b on the right. On the vertical axis of section a, councils at the top have taken few steps to plan for climate change, and therefore have high exposure on the adaptive capacity axis. Conversely, councils at the bottom have taken more actions and have lower exposure on the adaptive capacity axis. Figure 6.2 depicts the same information in a more schematic form.

The horizontal axis of section a of Figure 6.2 and in section a of Table 6.1 shows physical climate exposure, which is the combination of the previously discussed flooding, landslides, water supply, coastal erosion, sea level rise, and biodiversity. Councils towards the left on the horizontal axis have relatively less exposure when compared to other councils. Conversely, councils on the right of the horizontal axis have relatively greater exposure when compared to other councils. Combining the two axes (the actions on the vertical axis and the physical processes on the horizontal axis) illustrates each council's relative vulnerability. For example, Leitrim (LM) has taken few actions (high exposure related to adaptive capacity) but has very low physical exposures. Therefore, they may have less to deal with regarding climate change, yet be unprepared to deal with things that do occur.

		Physical climate exposure		
		Limited exposures	Some exposures	High exposures
Exposure related to level of adaptive capacity	Few actions			Worst case scenario
	Some actions			
	Many actions			

Matrix adapted from Aall and Norland (2005)

Figure 6.1. Relationship between physical climate and adaptive capacity.

Climate vulnerability

Climate exposures in section a represent the likely climate effects that need to be addressed. Climate impacts in section b represent the number of people likely to be impacted by these exposures.

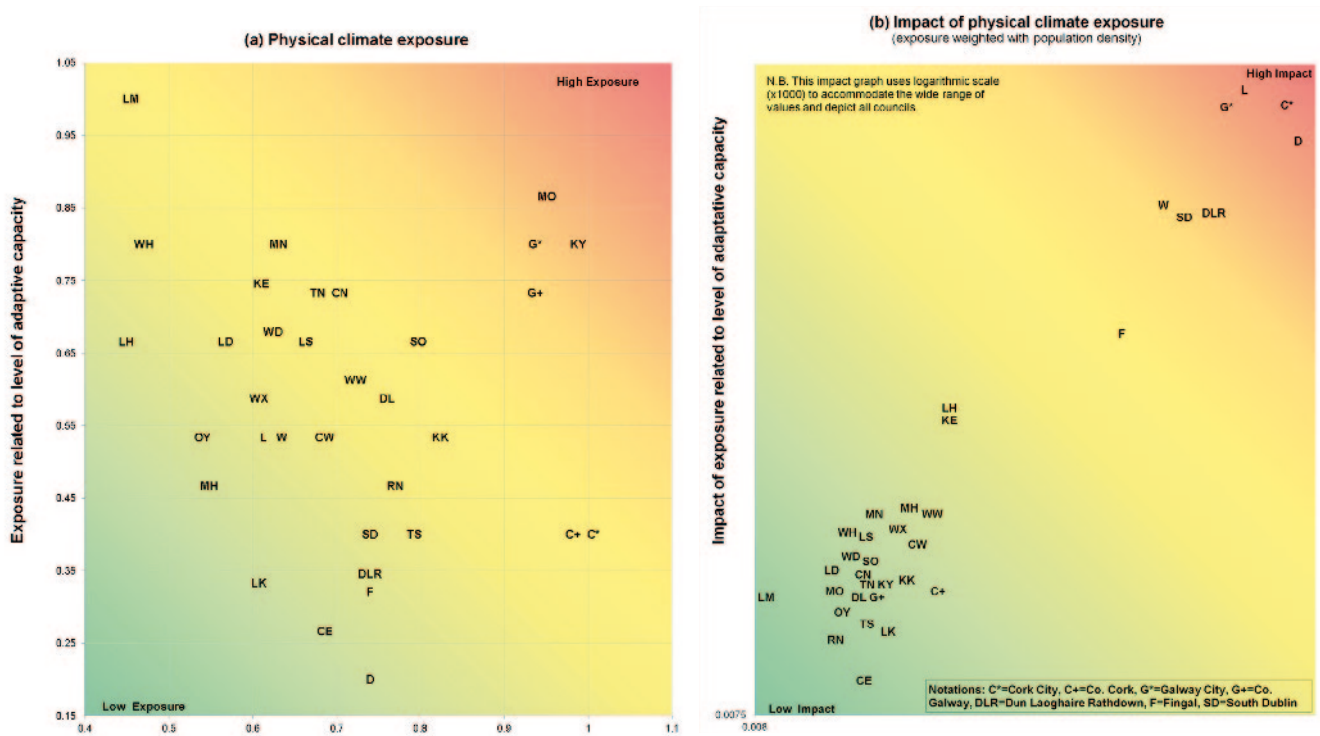


Figure 6.2. Climate vulnerability – exposure and impact scores.

Abbreviations used in figure: CN Cavan; CE Clare; C* Cork City; C+ Co. Cork; DL Donegal; D Dublin City; DLR Dun Laoghaire-Rathdown; F Fingal; G* Galway City; G+ Co. Galway; KY Kerry; KE Kildare; KK Kilkenny; L Limerick City; LD Longford; LH Louth; LK Co. Limerick; LM Leitrim; LS Laois; MN Monaghan; OY Offaly; RN Roscommon; SD South Dublin; SO Sligo; TN North Tipperary; TS South Tipperary; W Waterford City; WD Co. Waterford; WH Westmeath; WW Wicklow; WX Wexford.

In section b in both the figure and table, the focus is shifted to impacts and the number of people likely to be affected. The exposure scores illustrated on the left (and summarised in Appendix B) are multiplied by the population density in each council. Therefore, the impact of a council’s exposure related to adaptive capacity is reduced when there is a low population, as in the case of Leitrim. Similarly, the impact of a council’s physical exposure is reduced when there is a low population. Because Leitrim has the lowest exposure (in relation to other councils), it is still at the lowest end of the range. However, in councils with

greater population density, such as Dublin City (D), their low exposures in section a translate to higher impacts in section b because of the greater number of people likely to be affected.

6.1.5 Detailed County Summaries

Each council operates within the national context; however, information specific to each city and county is needed as well. All of the foregoing results, including exposure levels for relevant climate impacts, have been summarised for each council. This one-page overview shows both the city/county ranking as well as the

Table 6.1. Climate vulnerability – exposure and impact classes.

Climate vulnerability													
Climate exposures in section a represent the likely climate effects that need to be addressed. Climate impacts in section b represent the number of people likely to be impacted by these exposures.													
(a)		Physical climate exposure						(b)		Impact of physical climate exposure (exposure weighted with population density)			
Exposure related to level of adaptive capacity	Very high	LM										G* L	C* D
	High	WH	MN								SD W	DLR	
	Moderate	LH	KE L LD MH	OY W WD WX	CW CN LS TN WW	DL KK RN SO				KE LH	F		
	Low						SD TS						
	Very low		LK		CE		D DLR F						
		Very low	Low	Moderate	High	Very high			Very low	Low	Moderate	High	Very high

C* = Cork City, C+ = Co. Cork, DLR = Dun Laoghaire-Rathdown, F = Fingal, G* = Galway City, G+ = Co. Galway, SD = South Dublin

Matrix format adapted from Aall and Norland (2005).

national average, which provides a holistic assessment of areas that are likely to require additional attention. Figure 6.3 is an example of the one-page overview available for each city and county council as part of this research.

6.2 Second Research Phase

Unlike the foregoing quantitative results, the following qualitative results are drawn from stakeholder input through the 2009 survey at the local level and interviews at the regional and national levels. These results identify ways to improve widespread implementation and are presented in three sections: (i) local government findings regarding barriers and good-practice examples, (ii) regional government findings, and (iii) national government context.

6.2.1 Local Government

6.2.1.1 Challenges

The adaptation shortfall identified in the first research phase suggests that barriers are impeding action. The survey asked planners about barriers. The results are reported in Table 6.2, which highlights two types of information: (i) most commonly cited barriers (with the list being sorted from most common to least common barriers) and (ii) the types of barriers experienced.

The three most common barriers identified by survey respondents share a common theme: climate change is not prioritised as an issue. The first, *lack of funding*, is not a transitory issue related to the current recessionary times. Resource shortages were present even during the Celtic Tiger period as reported by Davies (2005), and these will extend into the future.

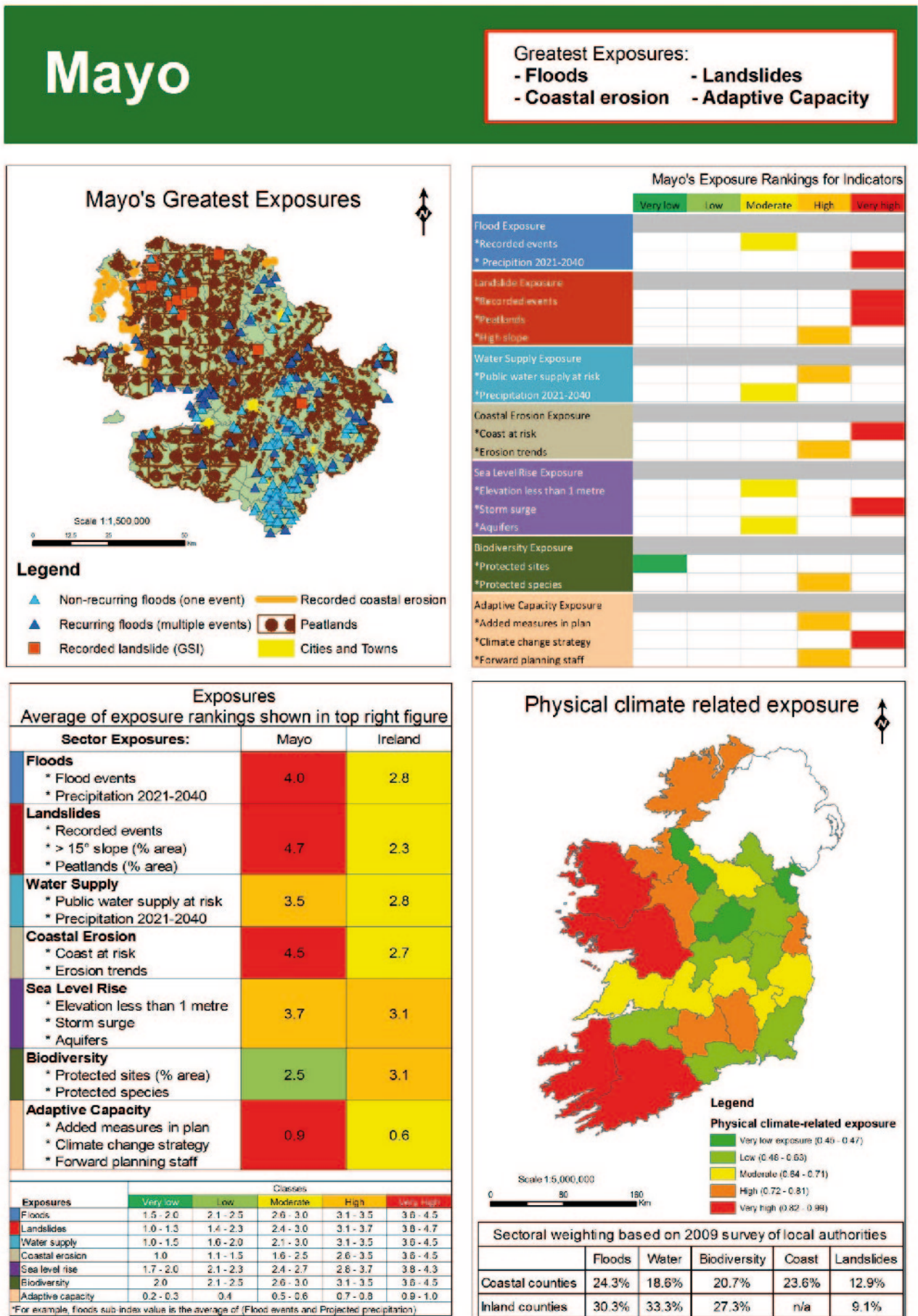


Figure 6.3. Sample county summary sheet.

The second, *other issues take priority in the authority*, is equally widespread, but is anticipated to decline in the future. The third, *no nominated champion*, is also a resource issue since there are no funds or designated positions for climate change officers within local authorities. These barriers share a common theme and represent two types of obstacle: (i) resource shortages and (ii) prioritisation or awareness. The third type of barrier, integration, was also recognised by more than half of survey respondents.

The first type of barrier – resource shortages – is a widespread concern, but it does not determine whether local climate measures occur. The associated lack of agency has been overcome by those local authorities who have incorporated climate change into their development plans and who have adopted climate change strategies. This suggests that some authorities are capitalising on the co-benefits of addressing climate change. For example, one survey respondent noted that there are potential cost savings because ‘energy efficiency mitigates against issues about lack of funding’. Therefore, increasing resources will help increase local authorities’ adaptive capacity.

The second type of barrier, prioritisation, relates to awareness and conflicting interests held by different actors. Most survey respondents cited lack of interest by councillors and the public; however, only one-third of local authorities attributed this same apathy to the public sector. This suggests that if a mandate came from the public, this would prompt elected officials to prioritise climate measures and, therefore, greater progress would be possible. However, even if the first two barriers were overcome, integration would still present challenges and resulting implementation deficits.

The third type of barrier, integration, has two components: (i) horizontal integration and (ii) vertical integration. Both types of integration relate to imperfect coordination resulting in policy gaps and/or detrimental overlaps in responsibilities.

Horizontal integration relates to the links at a given level of government – both internally, within an organisation, and externally among organisations

at that level. Table 6.2 illustrates internal links at the local level represented by two barriers: *coordination difficulties among departments within the authority* and *difficulty embedding climate change action in other plans and strategies*. The external links at the local level refer to *coordination difficulties regionally between areas*. Vertical integration also concerns coordination but rather focuses on integration between different levels of government (mainly local and national). To a lesser degree, vertical integration also encompasses coordination difficulties between towns and counties, and between counties and regional authorities. Many fewer local authorities cited these barriers, which might be explained by the fact that most sub-national services are carried out by the city and county councils rather than by the regional authorities above the county level or the town councils below the county level.

6.2.1.2 Opportunities

The foregoing barriers inhibit action; however, some innovative local authorities are taking action even though there is no direct statutory requirement to do so. These illustrative examples were collected as part of this research project, and they are not meant to be a comprehensive account of all actions taken in Ireland. Similar to the other countries, Irish local authorities are adapting in the following ways: governing by provision, by authority and through enabling (Bulkeley and Kern, 2006).

Local authorities are governing by provision, and are leading by example, as they reduce their emissions and build their adaptive capacity. Several small-scale sustainable energy projects include retrofitting existing properties and building new low-energy housing units. In addition, many local authorities are reducing energy demand and/or using renewable energy sources in their administrative buildings. Councils also use renewable sources, including solar panels (Kildare, County Limerick, Mayo, South Dublin, and Wexford), wind turbines (Cos Waterford and Wexford), wood-fired boilers (Kerry, Mayo, and Wexford), and geothermal heat pumps (Cos Cork and Kerry) (OLAM, 2008: 19–20). Several councils have quantified their energy reductions (Carlow, Galway City, Kilkenny, Sligo, Cos. Waterford and Wexford).

Table 6.2. Barriers to local authority climate change actions.

Types of barriers*	Specific barriers	Current (%)	Future (%)
R	Lack of funding	77	61
P	Other issues take higher priority in the authority	77	32
R	No nominated champion to drive it forward	71	26
P	Lack of awareness or interest from councillors	71	13
P	Lack of awareness or interest from the public	68	16
R	Insufficient staff/staff time	65	48
R	Lack of specialist knowledge in council	65	32
I _H	Coordination difficulties regionally between areas	65	32
I _H	Coordination difficulties among departments within the authority	65	23
I _V	Lack of appropriate central government guidance	65	10
I _V	Lack of appropriate central government regulations	61	10
I _V	Perceived lack of priority or leadership from central government	58	10
I _H	Difficulty embedding climate change action in other plans and strategies	55	19
I _V	Insufficient local authority powers	48	32
I _V	Risk of litigation (e.g. planning appeals)	39	26
I _V	Coordination difficulties between county and regional councils	39	19
P	Lack of awareness or interest from other public sector organisations	39	13
P	Lack of awareness or interest from staff	39	3
I _V	Coordination difficulties between county and town councils	29	10

*Types of barriers	R	Resource	P	Prioritisation	I _H	Horizontal integration	I _V	Vertical integration
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Local authorities are also addressing climate change as they govern by authority with policy change, both internally and externally. Councils have set up internal administrative structures and have changed their local flooding policies. Ten councils (Clare, Dublin City, Fingal, Co. Galway, Kilkenny, Limerick City, Mayo, Roscommon, Co. Waterford, and Wicklow) have established cross-departmental teams with a specific remit to address energy and/or climate change. Councils are also addressing effects externally by changing regulations to adapt to projected increased flood risk: North Tipperary requires that ‘in flood prone land, development, particularly housing, to be a minimum of 300 mm above centreline of roads where there is potential for flooding’ (North Tipperary County Council, 2004: 57). In addition, Waterford City limits developments in flood-prone areas ‘unless the finished floor levels can be raised to at least 3.50 metres Ordinance Datum Malin Head to prevent flooding’ (Waterford City Council, 2007: 107).

In another example of governing by authority through policy change, Dublin City Council has adopted a climate change strategy and gone to the next stage with the first-year review of its climate change strategy. This review includes ‘actions detailed [that] give priority to adaptation strategies that initiate, modify and enhance existing policies rather than solutions that require new funding/staffing’ (Dublin City Council, 2009: 1). Dublin City Council evaluated achievements in three ways: (i) types of actions, (ii) with measurable baseline indicators, and (iii) by departments.

First, the actions span the range of technological change, behavioural change, innovations, public and school education, strategic change. Second, the 12 measurable baseline indicators include specific energy targets (such as number of connected district and group heating units), alternative passenger transportation use (such as number of pedestrians and cyclists crossing the canals), waste-reduction targets

(such as percentage share of waste that is recycled), and protecting open spaces (such as number of trees within the city area). Third, the review includes specific actions from each council department. As an illustrative example, the Environment & Engineering Department has taken action to promote the use of 'grey' water⁵ where appropriate by '1) Determining the feasibility of retro-fitting a rainwater harvesting system in Water Services Depot in Marrowbone Lane by third quarter of 2010. 2) Water butts for sale at cost price throughout the City. 3) Complimentary water butts offered to all schools in the City' (Dublin City Council, 2009, Appendix II: 8).

The Greater Dublin Sustainable Drainage Study (GDSDS) is another excellent example of a council governing by authority. This study, which has been incorporated into the Dublin City Development Plan, includes a full chapter on climate science and impacts. This regional drainage policy gives specific recommendations, for example, to adopt the precautionary principle in recognising flow changes for water supply (minimum) and flooding (maximum). The GDSDS is an important example in another way. This innovative approach has been incorporated into development plans of other councils, including: Carlow, Dublin City, Dun Laoghaire-Rathdown, Kildare, Kilkenny, Louth, Meath, South Tipperary, and Wicklow. However, other councils, such as Cork City and Longford have not made this transition and, instead, defer flood risk assessments to the OPW, the national lead agency. Therefore, some counties are adapting as they govern by regulation, but these are still good-practice examples, rather than the status quo in Ireland.

Lastly, local authorities are governing through enabling by promoting individual behavioural changes, even in the absence of a central government mandate. They are raising awareness both internally with information for staff (Clare, County Cork, Dublin City, Kildare, Limerick City, and Sligo) and externally through public awareness campaigns (Carlow, Kildare, Kilkenny, County Limerick, Sligo, Waterford City, and Wexford). Some internal activities are not transparent, while

other activities are publicised and raise awareness. For example, in 2008 there were two conferences: the first in April, *Climate Change Conference for Directors of Service and Senior Local Authority Staff*, and the second in October, *The Way Forward for Local Authorities* that targeted the elected members and local authority staff. The external public awareness campaigns are typically more localised events. For instance, Carlow and Kilkenny raise public awareness through bi-weekly 'EcoChat' radio spots that translate national goals to specific actions that householders and business owners can take. Kilkenny County Council have also hosted public information days in public libraries to reach people who do not use the internet. Cork City is also raising awareness through the Lifetime Lab, an interactive environmental learning centre. Additionally, councils are working to increase public transport use by promoting cycling and walking routes, requiring mobility management plans for new builds, and conducting traffic and transportation studies. These measures highlight the councils' ability to affect individual behaviours where they have direct influence (e.g. planning) and where they have a less prescribed role (e.g. transportation). To conclude, these good-practice examples are ways that local authorities can move forward in addressing climate change, even in the absence of central government requirements.

6.2.2 Regional Government

The eight regional authorities,⁶ the next hierarchical tier of government, face more challenges than local authorities do. The challenges arise from this level's shared staffing with local authorities, fragmented division of responsibilities, limited resources, and lack of regional identity.

One of the main challenges preventing regional authorities from addressing climate change concerns staffing. While they recognise a need to address climate change with a coordinated approach, regional authorities are keenly aware that their bodies are comprised of city and county councillors. This staffing is complemented with one or two designated officials who are employed full time by the regional authority.

5 Grey water is recycled wash water that is used on site (e.g. landscape irrigation).

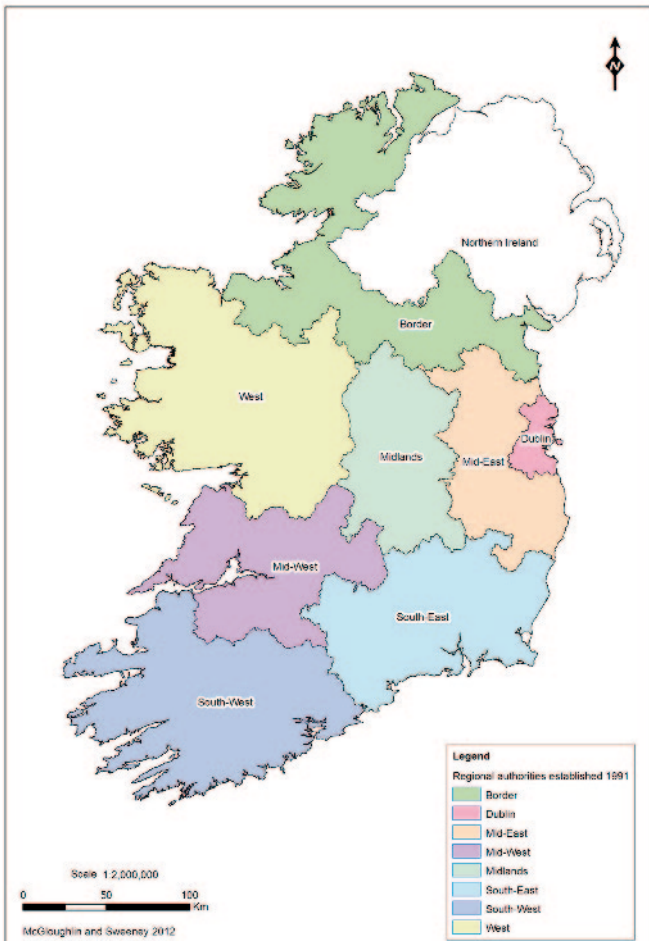
6 Regional authorities: Border, Dublin, Mid-east, Mid-west, Midlands, South-east, South-west, and West.

Other than this minimal staff, the regional authorities are staffed by county councillors rather than being a separate position without direct ties to a specific local authority. This staffing configuration results in a dual mandate for the councillors who serve their constituents while they are required to prioritise regional strategies, which may be detrimental to their local area.

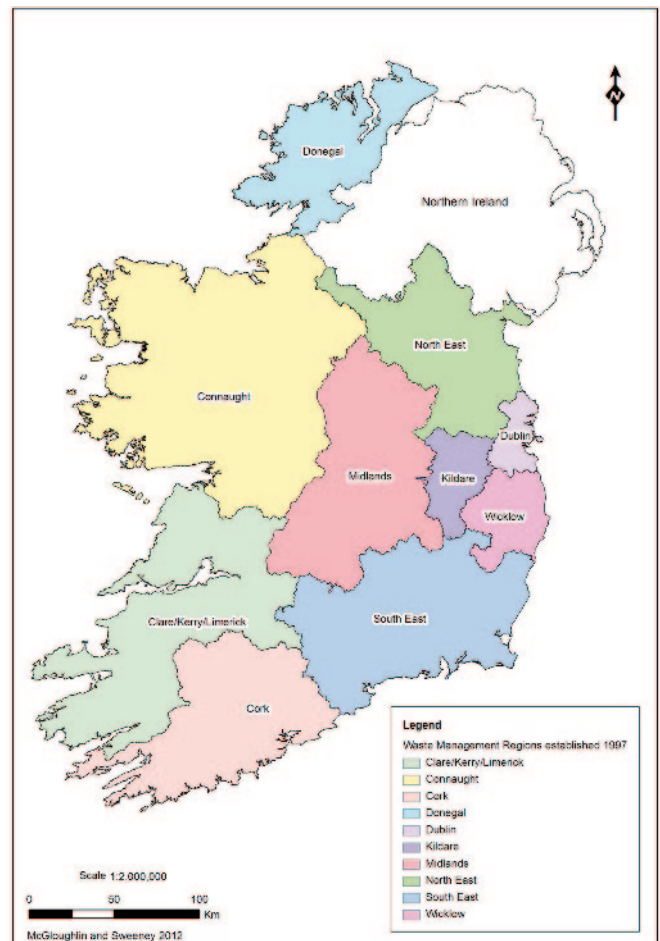
This staffing configuration is also present in the other middle-tier agencies that have a more narrow sectoral focus. The eight regional authorities, shown on Map 6.9, share competencies with sector-specific agencies [such as the ten Waste Management Districts depicted in Map 6.10 and the eight River Basin Management Districts shown on Map 6.11]. Similar to the regional

authorities, these other districts are staffed by county councillors rather than being a separate position without direct ties to a specific local authority.

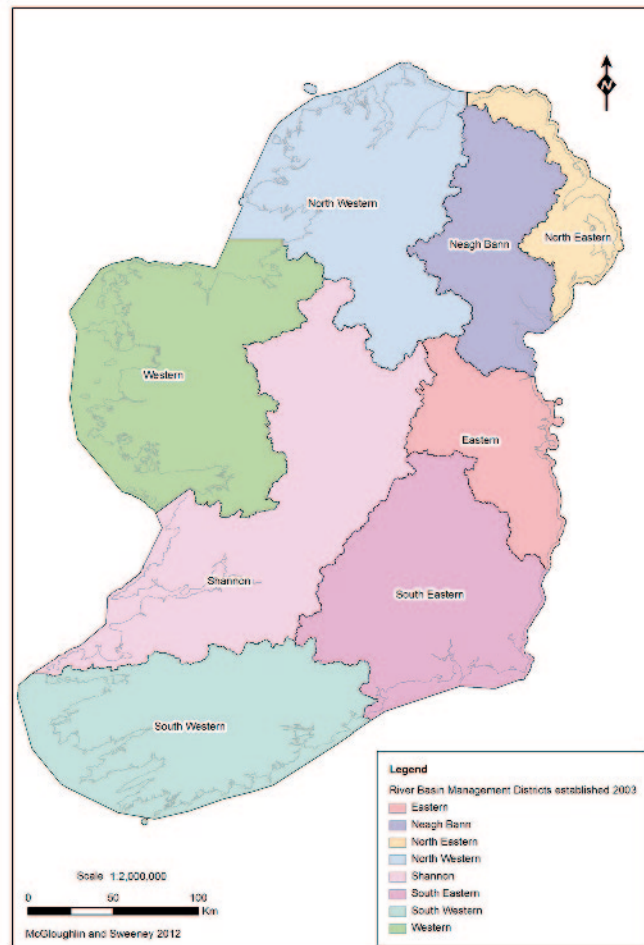
A second challenge for regional authorities is a lack of autonomous funding. Regional authorities are primarily funded by the local authorities in each region. While there are exceptions where regional authorities have successfully targeted EU funding, these funds are for regional projects, which are implemented jointly by the local authorities. The EU seed money is the starting point and the projects are brought to reality by matching funds from constituent local authorities and other private sector enterprises. Some examples include broadband initiatives, micro-projects for renewable energy, and even a regional



Map 6.9. Regional authorities.



Map 6.10. Waste management regions.



Map 6.11. River basin districts.

craft centre in one case. The broad-ranging examples illustrate the capacity for regional authorities to facilitate a coordinated regional approach and to act as a link between the local authorities and the EU.

A third challenge is the lack of regional identity by elected members and the public. Because the regional authorities are only relatively recently established, the long-standing history of the counties means there are much stronger county-level affiliations. Additionally, as one regional authority staff member noted, the strong local mentality in Ireland conflicts with the EU regional approach. It was noted that, in order to make a transition, national government would need to drive legislation forward.

6.2.3 National Government

National government also faces challenges in addressing climate change. Given the broad remit covered by national government, specialised departments each cover a narrow range of issues and this has resulted in a fragmented approach for mainstream issues as well as climate change considerations. Ireland, like many other countries, has placed climate change under the remit of their environment ministry. Even within the DoECLG, there is a segmented approach in that there is a Climate Change unit, which designs policies with a high-level strategic approach, and a Local Government unit, which implements these policies at the subnational level and adopts a more pragmatic approach. This dichotomy reflects the difference between hierarchical

levels in government put forth in the NSS. It also echoes the need at local level to be focused on implementing policies as local authorities are charged with day-to-day decisions regarding spatial planning, social housing, and water supply among other issues. Interviews with the principal officers of the Climate Change unit and the Local Government unit provide insights into national government perspectives on adapting to climate change.

As stated earlier, the Climate Change unit has a high-level strategic approach to addressing climate change. The principal officer of the DoECLG's Climate Change unit noted that public consensus is a necessary precursor to public policies. He also noted that central government provides leadership to 'refocus our priorities and build consensus'. This re-prioritisation requires 'buy-in from the highest levels' and this will be sought by the DoECLG as they move forward on the climate change agenda. The foregoing visionary approach has not been acted on yet: as Ireland is still in the early stages of moving forward on climate change and there is no statutory backing for climate change adaptation.

In addition to building support, the Climate Change unit's principal officer noted that 'central government's role is to clarify the message, methodology, policy and principles'. He also acknowledged that 'mitigation strategies need to be transferred to all levels of government' and that the 'adaptation agenda needs to be put on a statutory footing'. Therefore, he identified a need for 'central government to clarify policy principles' and 'to provide direction for laggards'.

The high-level strategies provide a clear vision of Ireland's end destination, but lack details about the pathways. These pathways will require horizontal integration at national level, and the ministerial remit includes broadening the DoECLG policies to the other government departments. For example, it was noted that funding climate change measures falls under the remit of the Exchequer, with a comment that 'they always find money for the high priority items'. Moreover, the current shortfall in local climate measures in Ireland highlights the importance of strong links between national government and the local authorities.

While the DoECLG has a Climate Change unit, the DoECLG Local Government unit also plays a key role

because it is responsible for the implementation of national policies. To complement the information from the Climate Change unit, an interview was also carried out with the principal officer of the Local Government unit. He acknowledged local authorities have responsibilities for implementing ministerial directives, and noted that these are driven by public consensus and by EU directives. He also noted that there is great potential to advance climate measures if they are driven forward by the ministers. This view was similar to the Climate Change unit principal officer's outlook that addressing climate change will require a mandate from the public, and that elected officials will need to advance this mandate at national and local levels.

With regard to the elected officials at the local level, the principal officer noted that the elected official at the local level has ultimate responsibility for development plans and that they have a strong impact on how these policies are developed. This decisive role is confirmed in the Department's official *Guidelines for Planning Authorities*:

Responsibility for making a development plan, including the various policies and objectives contained within it, in accordance with the various provisions of the Planning and Development Act 2000 as amended, rests with the elected members of the planning authority, as a reserved function under section 12 of the Act.

(DoEHLG,⁷ 2007: 5)

The comments from the Local Government unit draw on a long history of local authorities in Ireland as compared to the relatively newly established Climate Change unit in the DoECLG. It was noted that, in principle, subsidiarity applies to sub-national government policies; however, in practice, subsidiarity works to a limited extent. Therefore, the issue about subsidiarity – that policies be implemented at the lowest *effective* level – may require a more centralised approach for climate change measures.

7 The Department of Environment, Heritage and Local Government (DoEHLG) was restructured and renamed in May 2011 to the current Department of Environment, Community and Local Government (DoECLG).

The Local Government unit principal officer also addressed the issue of horizontal integration. This has been an established issue and, during the last ten years, joint committees between the DoECLG and County & City Managers' Association have been set up that meet approximately three times a year to address cross-cutting issues. These structures are mirrored at local level through the advisory County Development Boards.

When considering the two approaches in the Climate Change unit and the Local Government unit, there were similarities as well as sharp differences between

the two. As stated earlier, both units held out hope for addressing climate change within Ireland, and both acknowledged that public consensus is required to advance the process. This was noted explicitly and implicitly by the recognition that currently political realities are preventing strong climate measures at national and local level. To wrap up these results, the DoECLG has established departments to address issues and these departments have a clear delineation of their responsibilities. There is a recognised need for horizontal integration; however, this may be difficult to implement within the current structures.

7 Conclusions

Ireland's vulnerability to climate change is related not only to physical exposures, but also to society's capacity to adapt to those exposures. Although all parts of Ireland are exposed to some degree, some are more exposed than others. The foregoing results have shown which areas are the most exposed for specific impacts and for overall climate change. The current lack of widespread climate measures leaves Ireland with residual climate vulnerability. Ireland will need to overcome challenges related to its current government structures, if it is to protect its people and the natural environment. There are three main considerations with regard to the adaptive capacity shortfalls: (i) the different challenges and opportunities each level of government faces, (ii) vertical integration (links between the levels), and (iii) horizontal integration (breakdowns within each level). The related implications for Ireland are equally applicable to climate change and implementing other EU environmental directives.

7.1 Challenges Related to Specific Tiers of Government

Local authorities have made little progress on climate change due to barriers related to resources, prioritisation, and integration. These barriers have prompted local government to seek strong guidance and support from central government. The most pressing barrier is the current lack of public consensus for proactive measures on climate change and acceptance of implementation shortfalls by the public and their elected officials. However, proactive local authorities have demonstrated the potential for innovative solutions and changing public opinions. With adequate guidance and support from central government, local authorities are uniquely placed to act because they are the closest government unit to the citizen.

Regional authorities also have unrealised potential to advance climate policies. However, their capacity to realise strategic goals is compromised by shortages in staffing and budgets. Additionally, the fact that city and county councillors serve dual roles for the regional authority and for the local authority means that councillors have a dual mandate. However, the

challenges facing regional authorities extend beyond the dual mandate; their facilitative role lacks any statutory powers to advance a strategic agenda. The opportunities for regional authorities are demonstrated by the proactive authorities who have facilitated innovative solutions. Similar to the varied actions already completed, regional authorities could help advance climate change measures by coordinating regional projects.

National government too has its share of challenges and opportunities. National government has not set up a specific ministry for climate change, but rather has assigned responsibility for climate change to the DoECLG under the umbrella of environmental protection. By doing so, the national government has effectively sidelined the climate change issue and has heightened the tensions between economic development and environmental protection. An added challenge is that there are few laws for climate mitigation and none for climate change adaptation. Despite the foregoing challenges, national government has extensive possibilities for moving forward on climate change. The first stage of raising awareness has laid the groundwork and can continue to produce a meaningful shift towards public consensus. In addition, national government has the opportunity to advance to the second stage of policies with specific measures that are monitored and enforced.

7.2 Challenges Related to Integration

Vertical integration, which encompasses the links between the three levels of government, also presents challenges and opportunities. Central government's lack of a signalled priority to address climate change has resulted in limited actions at the local level. Ireland tends to operate policies in a top-down fashion where regulations are designed at national level, and local authorities are required to implement the measures. Similarly, information transfer tends to be top-down with some bottom-up input from local authorities through the County and City Managers' Association, which has direct links with central government through joint committees. Information transfer from local to central government

is generally less transparent and information is not publicly available. These structural barriers present significant opportunities to improve vertical integration by extending the focus of national policies to include specific information about how these strategic goals will affect local priorities, and how they will be implemented at the local level. Vertical integration can be improved as well by capitalising on local good-practice examples by facilitating widespread dissemination and uptake by local authorities.

Horizontal integration concerns the interactions and synergies at a given administrative scale. The challenges and opportunities associated with horizontal integration are universal, regardless of whether the focus is on the local, regional, or national level. The two types of horizontal integration – internal and external – have overlaps but require different types of actions to improve the linkages. Internal horizontal integration has been compromised within government agencies through the division of responsibilities into stand-alone directorates and departments. While this allows for greater provision of services for the specific area, it compromises possible synergies between different departments and their related sectors. For example, water supply engineers have a primary focus on maintaining that supply's security. Their service provision can also serve to reduce costs and to increase energy efficiency if their department is linked with the energy agency advisors and environmental awareness officers. In many cases, these synergies occur organically. However, if these synergies are prioritised and facilitated through joint committees, it

is possible to change this from an *ad hoc* arrangement into a structure that can be monitored and whose progress can be evaluated.

External horizontal integration, between government agencies and the private sector, requires different types of actions than internal integration. As stated earlier, governments administer their duties in three ways: (i) governing by provision, (ii) governing by regulation, and (iii) governing by enabling. Often, the government agencies are viewed as a separate entity and a more integrated approach to services and the private sector could facilitate a transition to greater sustainability. For example, government agencies govern by provision and these are internal activities; however, if governments publicise their good-practice examples, they can lead by example. The 'governing by regulation' actions separate government from the private sector even more distinctly. This can create an adversarial relationship between the government and individuals, putting strategic management goals up against private interests. However, some regulatory changes can create a win-win situation where a change in behaviour is incentivised. For example, collectively, consumers have responded to the 2008 amended motor tax rates by increasing their rate of energy efficient car purchases from 25% in 2000 to 80% in 2010 (Howley *et al.*, 2010). The third type of government actions, governing by enabling, has a specific focus on integrating actions between governments and private actors. These actions, such as public awareness campaigns, inherently link the strategic goals with private interests. The challenge with this genre is that private actions remain voluntary.

8 Recommendations

Ireland's climate change response needs an integrated approach to avoid gaps and maladaptations. Existing government structures have the potential to address climate change. Local government can expand on existing good-practice examples, regional government can coordinate local actions with a mid-level strategic approach, and national government can steer policies and provide statutory backing to advance action at all levels. Nonetheless, challenges are found at each level and with integrating the levels.

8.1 Local Authorities

By acting on climate change, local authorities can contribute to a more comprehensive climate change policy throughout Ireland. If they do not take action, they will be forced to adapt reactively, that is, respond to events after they have already caused damage, without becoming prepared for future events. Local authorities can address climate change in the following ways:

- Build adaptive capacity by sharing information among local authorities through web-based tools and databases, published reports, and targeted conferences. Some international websites are included in Appendix C.
- Establish structures such as a climate change team, a climate change strategy and specific measures in general policies. The climate change team should include directors of services, be accountable to the county manager, and report progress in the monthly council meetings. The climate change strategy should include concrete measurable actions for both climate mitigation and adaptation. General policies should incorporate specific climate change criteria into relevant areas, such as development control, flood management, and amenity. The template checklist included in Appendix A provides a starting point.
- Monitor progress by publishing specific, measurable targets for climate mitigation and adaptation. Initial requirements could be less rigorous, if necessary, such as a specific objective to prepare a climate change strategy within the lifespan of their current development plan.

- Report progress within annual council reports and budgets regarding voluntary and mandatory measures. For example, Mayo County Council's Annual Budget 2010 reports progress for energy, Green Schools Initiatives and Local Agenda 21 actions (Mayo County Council, 2010: 36).

8.2 Regional Authorities

Regional government has the potential to advance climate measures, even in their current role as facilitators, in the following ways:

- Serve as an information clearinghouse for local authorities.
- Oversee local authority climate change strategies and explore the possibility of regional climate change strategies.
- Establish directly elected regional representatives, with a remit solely for regional level policies. These posts are the European norm and will require additional resources and structure.

8.3 National Government

National government, with the statutory power that is lacking at local and regional levels, can join with the other two levels of government by establishing enforceable minimum standards and facilitating an integrated response in the following ways:

- Adopt legislation that will clearly signal climate change as a priority and advance climate measures.
- Establish and enforce specific, actionable standards for regional and local governments.
- Include climate change criteria and concrete climate change adaptation measures in national policy documents to increase transparency in the decision-making process.
- Continue raising awareness to build public consensus. Without a public consensus to move forward on climate change, there will be no mandate for the elected representatives to prioritise this issue.

This will leave Ireland in its current position of reactive management, largely driven the EU directives and sanctions.

- Monitor progress through specific measures, including baselines, benchmarks and annual targets.
- Report national progress annually by Departments and in the annual address by the Taoiseach. Annual reporting will increase accountability, give national government an opportunity to highlight its progress, and build further public support. Alternatively, if progress is not being made, then annual accountability will provide opportunity for early intervention and corrections.

8.4 Integration

A coherent approach that is integrated both vertically and horizontally is needed.

Vertical integration should:

- Maintain the Climate Change Working Group, which includes 'representatives from local authorities, energy management agencies, OLAM and the DoEHLG' (OLAM, 2008: 5).
- Incorporate explicit references to other tiers of government within policy documents at each level.

Horizontal integration should:

- Establish an internal climate change team at each level to oversee the directorates' address of climate change with specific responsibilities for each department.
- Establish cross-sectoral forums at all levels (national, regional, and local). This will minimise maladaptation, increase knowledge transfer, and strengthen potential synergies between different agencies with their separate agendas.
- Establish formal links among similar authorities in different jurisdictions at each level to address climate change. This will build capacity through knowledge transfer and increase potential synergies between adjacent jurisdictions.
- Incorporate climate change criteria to be incorporated into annual assessments.

8.5 Future Prognosis

Ireland has begun laying the groundwork to address climate change and will need to continue on this path with increased commitment. This will require national government to establish clear priorities through legislation with specific requirements by local authorities and private entities. Without this shift, Ireland will remain unprepared for the upcoming challenges related to climate change and general environmental issues.

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Acronyms and Annotations

DoECLG	Department of the Environment, Community, and Local Government
ECOPRO	Environmentally Friendly Coastal Protection
GDSDS	Greater Dublin Sustainable Drainage Study
IPCC	Intergovernmental Panel on Climate Change
NCCS 2000	National Climate Change Strategy 2000
NCCS 2007	National Climate Change Strategy 2007–2012
NSS	National Spatial Strategy (2002–2020)
OPW	Office of Public Works
RPGs	Regional Planning Guidelines

Appendix A. Climate Change Checklist Template

	Necessary actions	Timeline
Climate mitigation	<p>Collect baseline data, broken down by department, on energy use and emissions</p> <p>Set clear objectives and targets for reducing energy use</p>	
Risk assessment	<p>Identify potential local climate change issues</p> <p>Identify which risks will require a response</p> <p>Identify sectors requiring a more detailed risk evaluation</p> <ul style="list-style-type: none"> • built environment • cultural and religious heritage • local business, industry, and economy • energy generation and distribution system • health-care facilities • land use • transportation system • parks and natural environment • tourism 	
Building capacity	<p>Council staff members to attend workshops and trainings for mainstreaming climate change into their specific responsibilities</p> <p>Hold a series of workshops to build knowledge base among local government leaders, chief executives, and elected representatives to foster unity of purpose</p>	
Establishing structures	<p>Establish a cross-departmental team, staffed by senior management, with responsibility for taking action on climate change</p> <p>Establish a framework for evaluating, measuring and monitoring progress</p>	
Monitoring progress	<p>Incorporate reports from the climate change strategy team into monthly council meetings</p> <p>Incorporate departmental reports about climate change activities into the local authority's annual report</p>	
Building public consensus	<p>Designate responsibility with an individual or department for communicating climate change messages</p> <p>Carry out public information campaigns through public service announcements, leaflets, schools, and community groups</p>	

Appendix B. Summary Table for Sector Exposures and Impacts*

Climate-related exposures (impacts) categories								
Cities and counties (Abbreviation)	Flooding	Landslides	Water supply	Coastal erosion	Sea-level rise	Biodiversity	Combined physical	Adaptive capacity
Carlow (CW)	2 (1)	2 (1)	2 (1)	n/a	n/a	5 (2)	3 (2)	3 (2)
Cavan (CN)	2 (1)	2 (1)	4 (1)	n/a	n/a	2 (1)	3 (1)	3 (1)
Clare (CE)	2 (1)	3 (1)	1 (1)	4 (1)	5 (1)	2 (1)	3 (1)	1 (1)
Cork City (C*)	5 (5)	4 (5)	5 (5)	5 (1)	4 (1)	5 (5)	5 (5)	2 (5)
Co. Cork (C+)	5 (2)	4 (1)	5 (2)	5 (2)	4 (2)	5 (2)	5 (2)	2 (1)
Donegal (DL)	2 (1)	4 (1)	4 (1)	4 (3)	4 (3)	1 (1)	4 (1)	3 (1)
Dublin City (D)	5 (5)	2 (5)	4 (5)	2 (5)	3 (5)	5 (5)	4 (5)	1 (5)
Dun Laoghaire-Rathdown(DLR)	5 (4)	2 (3)	4 (4)	2 (4)	3 (4)	5 (4)	4 (4)	1 (4)
Fingal (F)	5 (3)	2 (2)	4 (3)	2 (4)	3 (4)	5 (3)	4 (3)	1 (3)
Galway City (G*)	5 (4)	4 (4)	4 (4)	5 (5)	5 (5)	3 (3)	5 (4)	4 (5)
Co. Galway (G+)	5 (1)	4 (1)	4 (1)	5 (2)	5 (2)	3 (1)	5 (1)	3 (1)
Kerry (KY)	4 (1)	5 (1)	4 (1)	5 (3)	5 (2)	3 (1)	5 (1)	4 (1)
Kildare (KE)	3 (3)	1 (1)	1 (1)	n/a	n/a	5 (2)	2 (2)	3 (3)
Kilkenny (KK)	3 (1)	1 (1)	3 (1)	n/a	n/a	5 (2)	4 (1)	3 (1)
Laois (LS)	1 (1)	3 (1)	3 (1)	n/a	n/a	4 (1)	3 (1)	3 (2)
Leitrim (LM)	1 (1)	3 (1)	2 (1)	1 (1)	2 (1)	1 (1)	1 (1)	5 (1)
Limerick City (L)	2 (4)	3 (4)	3 (4)	n/a	n/a	2 (4)	2 (4)	3 (5)
Co. Limerick (LK)	2 (1)	3 (1)	3 (1)	n/a	n/a	2 (1)	2 (1)	1 (1)
Longford (LD)	1 (1)	2 (1)	3 (1)	n/a	n/a	2 (1)	2 (1)	3 (1)
Louth (LH)	1 (2)	1 (1)	1 (2)	3 (3)	2 (3)	1 (2)	1 (2)	3 (3)
Mayo (MO)	5 (1)	5 (1)	4 (1)	5 (2)	4 (1)	2 (1)	5 (1)	4 (1)
Meath (MH)	2 (2)	1 (1)	3 (2)	1 (1)	1 (1)	5 (2)	2 (2)	3 (2)
Monaghan (MN)	1 (1)	1 (1)	4 (2)	n/a	n/a	3 (1)	2 (1)	4 (2)
Offaly (OY)	1 (1)	3 (1)	1 (1)	n/a	n/a	3 (1)	2 (1)	3 (1)
Roscommon (RN)	2 (1)	2 (1)	5 (1)	n/a	n/a	3 (1)	4 (1)	3 (1)
Sligo (SO)	3 (1)	4 (1)	5 (2)	3 (3)	5 (3)	1 (1)	4 (1)	3 (1)
South Dublin (SD)	5 (4)	2 (3)	4 (4)	2 (1)	3 (1)	5 (3)	4 (3)	2 (4)
Tipperary North (TN)	4 (1)	2 (1)	3 (1)	n/a	n/a	1 (1)	3 (1)	3 (1)
Tipperary South (TS)	2 (1)	3 (1)	4 (1)	n/a	n/a	4 (1)	4 (1)	2 (1)
Waterford City (W)	5 (4)	2 (3)	2 (3)	2 (1)	2 (1)	3 (3)	2 (3)	3 (4)
Co. Waterford (WD)	5 (1)	2 (1)	2 (1)	2 (2)	2 (2)	3 (1)	2 (1)	3 (1)
Westmeath (WH)	1 (1)	1 (1)	1 (1)	n/a	n/a	3 (1)	1 (1)	4 (2)
Wexford (WX)	2 (1)	1 (1)	1 (1)	4 (3)	3 (2)	4 (2)	2 (1)	3 (2)
Wicklow (WW)	4 (2)	5 (3)	4 (2)	3 (3)	1 (3)	4 (2)	3 (2)	3 (2)

*Climate exposures represent the likely climate effects that need to be addressed.
Climate impacts represent the number of people likely to be impacted by these exposures

Appendix C. Useful International Guidelines for Local Authorities

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An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaoil do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntimid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomhnithe a bhfuilimid gníomhach leo ná comhshaoil na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

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

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaoil i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitrealí;
- scardadh dramhuisce;
- dumpáil mara.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil - aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí chomhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaoil mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRSCIÚ AR AN GCOMHSHAOIL

- Monatóireacht ar chaighdeán aer agus caighdeán aibhneacha, locha, uisce taoide agus uisce talaimh; leibhéal agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdeán aer agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaoil na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaoil a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaoil na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstíúrthóir agus ceithre Stíúrthóir.

Tá obair na Ghníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar inní iad agus le comhairle a thabhairt don Bhord.



Climate Change Research Programme (CCRP) 2007-2013

The EPA has taken a leading role in the development of the CCRP structure with the co-operation of key state agencies and government departments. The programme is structured according to four linked thematic areas with a strong cross cutting emphasis.

Research being carried out ranges from fundamental process studies to the provision of high-level analysis of policy options.

For further information see
www.epa.ie/whatwedo/climate/climatechangeresearch



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