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Literature Review on Enhancing Integration of Disaster Risk and Climate Change Adaptation in Irish Emergency Planning

13/07/2020

Greene, S., Medway, P., Cubie, D., Le Tissier, M.

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Table of Acronyms

AGS	An Garda Síochána
AR	Assessment Report
CCA	Climate Change Adaptation
COP	Conference of the Parties
DAFM	Department of Agriculture, Food and the Marine
DCCAE	Department of Communications, Climate Action and the Environment
DEASP	Department of Employment Affairs and Social Protection
DF	Department of Finance
DHPLG	Department of Housing, Planning and Local Government
DJE	Department of Justice and Equality
DM	Disaster Management
DRCD	Department of Rural and Community Development
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DTTS	Department of Transport, Tourism and Sport
GHG	Greenhouse Gases
GTF	Government Task Force
HSE	Health Service Executive
IFRC	International Federation of Red Cross and Red Crescent Societies
IPCC	Intergovernmental Panel on Climate Change
IRCG	Irish Coast Guard
LGD	Lead Government Department
MEM	Major Emergency Management
NAF	National Adaptation Framework
NDC	Nationally Determined Contributions
OPW	Office of Public Works
PA	Paris Agreement (under the UNFCCC)

PRAs	Principal Response Agencies
SDG	Sustainable Development Goals
SEM	Strategic Emergency Management
SFDRR	Sendai Framework on Disaster Risk Reduction
TII	Transport Infrastructure Ireland
UNDRR (UNISDR)	United Nations Office for Disaster Risk Reduction (formerly United Nations International Strategy for Disaster Risk Reduction)
UNFCCC	United Nations Framework Convention on Climate Change

Key Definitions

The following definitions draw primarily from the definition presented in the relevant Irish frameworks. Where the definition of a term is not present in an Irish context, the international or EU definition has been used, and in some cases, both are used to exhibit how they correspond with one another.

Climate Change Adaptation	A change in natural or human systems in response to the impacts of climate change. These changes moderate harm or exploit beneficial opportunities and can be in response to actual or expected impacts (National Adaptation Framework, DCCAE, 2018; 98). The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014b).
Climate Change Mitigation	Describes action to reduce the likelihood of an event occurring or reduce the impact if it does occur. This can include reducing the causes of climate change (e.g. emissions of greenhouse gases) as well as reducing future risks associated with climate change (National Adaptation Framework, DCCAE, 2018; 99). A human intervention to reduce emissions or enhance the sinks of greenhouse gases (IPCC, 2018).
Disaster Risk Management	Application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses (UNDRR Terminology, 2017).
Disaster Risk Reduction	Disaster risk reduction is aimed at preventing new and reducing existing disaster risk (exposure, hazard or vulnerability), and managing residual risk, all of which contributes to strengthening resilience and therefore to the achievement of sustainable development (IPCC, 2014a; UNDRR Terminology, 2017).
Exposure	The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas (UNDRR Terminology, 2017).
Emergency	An event which, usually with little or no warning, causes or threatens to cause death, serious injury, serious disruption to essential services, the economy or critical infrastructure, significant damage to property or the environment, and which requires the activation of national resources to ensure an effective coordinated response and recovery (SEM Framework, DoD, 2017; 2).
Hazard	Any phenomenon with the potential to cause direct harm to members of the community, the environment or the physical

	infrastructure, or being potentially damaging to the economic and social infrastructure (SEM Framework, DoD, 2017; 16). A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (UNDRR Terminology, 2017).
Impact	The consequences of a hazardous event actually happening, expressed in terms of a negative impact on human welfare, economic activity, environmental welfare or societal structures (SEM Framework, DoD, 2017; 16).
Loss and Damage	The harms caused by anthropogenic climate change (UNFCCC, 2003).
Resilience	Community resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management (SEM Framework, DoD, 2017; 18). The consequences of a hazardous event actually happening, expressed in terms of a negative impact on human welfare, economic activity, environmental welfare or societal structures (National Adaptation Framework, DCCAE, 2018; 100).
Risk	The combination of the likelihood of a hazardous event and its potential impact (SEM Framework, DoD, 2017; 16).
Vulnerability	The predisposition to be adversely impacted by the effects of climate change (IPCC, 2014a). The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (UNDRR Terminology, 2017).

Executive Summary

The scope of the present literature review is under the remit of a wider project entitled *Enhancing Integration of Disaster Risk and Climate Change Adaptation into Irish Emergency Planning* which is funded under the Environmental Protection Agency's Climate Topic 3 funding call. The project, which began in March 2020, is due to run until March 2021. The objective of the project is to help institutions responsible to further 'climate-proof' emergency planning and risk management systems in Ireland to the increasing risk of extreme hydrometeorological events, by addressing national policy and decision-making processes, as well as local and regional planning and response mechanisms. In order to do this, the project sets out three deliverables, the first of which is the present initial literature review. The second, is an extensive mapping of key stakeholders in both CCA and DRM institutions, assessing how SEM structures and functions may be affected based on a range of scenarios and timeframes. The third deliverable is a guidance roadmap, which will – with the aid of three case studies – examine the understanding of key stakeholders of how climate-related factors are currently affecting the vulnerability and resilience capacity of communities and sectors to short- to medium-term extreme events and how these are likely to be affected by climate change. Reflecting the impacts of physical distancing arising from the COVID-19 restrictions, the project will identify appropriate methods for engaging with communities and key local, regional and national stakeholders. Reports from these stakeholder engagements will feed into the project roadmap by elaborating community understanding of current and future climate risks and impacts and the implications for emergency planning in the context of existing policy instruments and approaches, aiming to build a more climate and disaster resilient Ireland.

What's the issue?

The Government's National Risk Assessment 2019 highlighted climate change as one of the nation's **highest strategic priorities**. The public rightly expects effective action to manage this risk. Significant research and policy development work has occurred in Ireland to identify the interlinkages between Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA). The interlinkages and dependencies are well recognised and are reflected in a range of Irish policies such as the Strategic Emergency Management (SEM) Framework, National Adaptation Framework and Local Authority and Sectoral Adaptation Strategies. However, there is much to be gained from improving the alignment and integration of DRR and CCA, reducing risk and increasing resilience. Venton & La Trobe (2008) have observed that DRM measures will lessen climate impacts, and adaptation measures will reduce disaster risk. Moreover, the similar aims and agenda of DRM and CCA would benefit both areas, increasing awareness and knowledge development in both paradigms.

The present literature review explores how the various policy strategies and approaches that address aspects of DRR and CCA interact with each other, and the various gaps and challenges that exist in

integrating both areas. Moreover, it highlights various good practices and opportunities going forward to advance integration between both sectors. Although there has been recognition of the mutual benefits in integrating both areas, which is apparent throughout Irish policy and legislation, achieving this integration remains a gap. The key issues that have emerged from this initial review of the literature are outlined below.

Issues that merit further investigation:

1. Terminology and fundamental concepts often differ across sectors, leading to miscommunication and discordance in actions and policies. This is particularly relevant in the term 'resilience'. In a disaster risk management context, the concept of resilience is normally used in the context of returning to normal, or pre-disaster conditions. However, for climate change adaptation, resilience relies on advancing forward, with returning to normal regarded as regressive.
2. There is room for a stronger identification of the most vulnerable groups and communities, with their specific needs and interests prioritised, and resilience to future shocks supported. Moreover, their presence and participation in preparation and response processes is integral.
3. The importance of stronger coordination and information-sharing mechanisms for the horizontal integration of DRM and CCA at a national and sub-national level.
4. A stronger focus on the Sendai Framework's *'Build Back Better'* during disaster response and recovery, to add additional resilience of infrastructure and communities, particularly those facing a heightened threat of climate-induced severe events.
5. Taking into account the financial repercussions of unmitigated climate risk, consideration should be given to the alignment of financial and economic systems to support CCA and DRM planning and implementation leading to more efficient use of resources (EEA, 2017).
6. Acknowledging the impact of climate change and disasters in all sectors, how best can CCA and DRM methods be mainstreamed to promote a multi-sectoral approach to both areas.

This review is the first step in the project deliverables, providing an overview of the relevant literature, as well as highlighting examples of good practices and potential barriers in enhancing the integration of disaster risk and climate change adaptation into Irish emergency planning. It provides background on material at an international, European and national level, and how Ireland interacts with key legal and policy instruments. Moreover, it highlights the need for enhanced integration, setting the foundation for the completion of future project deliverables. It should also be noted that as this publication was being finalised, a new coalition Government was sworn in, and the issue of climate change was identified as a clear priority in the Programme for Government. Any changes to the existing policies and structures will be therefore be closely tracked over the course of the current project.

Introduction & Background

Global trends, including population growth, poverty reduction, unsustainable urbanisation and poor land management, ecosystem degradation and climate change have led to an increase in the frequency, intensity and impact of disaster risks over the last number of decades (EC, 2016). A study conducted in 2017, and published in the Lancet, observed that weather-related disasters could potentially affect two-thirds of the European population by the year 2100, causing fifty times the number of fatalities compared to today (Forzieri et al, 2017; 1). The Irish Government acknowledges that the projections of rising sea levels, extreme weather, pressure on water resources, flooding, displacement and heightened risk of diseases will undoubtedly have an impact on every individual, household and community across Ireland (Government of Ireland, 2019). Moreover, there is growing recognition of the effect climate change will have on the current emergency management structures. Highlighting these issues and recognising the mutual benefits of working collaboratively, will strengthen disaster risk management (DRM), while concurrently allowing for a more comprehensive approach to climate change adaptation (CCA).

As understanding of the relationship between CCA and DRM grows, there has been increasing recognition of the common objectives that both fields share – not only the importance of adaptation and risk reduction in climate action, but the co-benefits when integrated with one another. This is supported by the 2014 IPCC Report, which indicates that disaster risk management and adaptation policies – if well-coordinated – can be reinforcing and supportive of one another, leading to positive outcomes for both spheres. Failing to consider the predicted increasing intensity and frequency of natural hazards as a result of climate change has the potential to lead to maladaptation (Banwell et al, 2018; 9).

Ireland, as a nation, has increased its resilience to climate change through its legislative frameworks and planning requirements to adapt to climate impacts and manage disaster risk. As stipulated in the National Adaptation Framework (2018):

> *"There is a growing recognition at EU/international level of the need for greater integration of emergency planning (particularly disaster risk reduction) and climate change adaptation. As also indicated earlier, this has already begun in Ireland. Under this Framework, it is foreseen that these relationships will continue to strengthen over time"* (National Adaptation Framework, 2018; 69).

Although there has been recognition of the mutual benefits in integrating both DRM and CCA, which is apparent throughout Irish policy and legislation, achieving this integration remains a challenge. The draft fiche for Ireland in the European Commission's Directorate General for Climate Action Preparedness Scoreboard finds that *"There is not an integration of [disaster risk reduction] and [Climate Change Adaptation] policies in Ireland, although there are plans to promote it"* (Shine, 2018; 14). This review aims to contribute to that promotion by highlighting these gaps and challenges, and outlining the potential opportunities for integration, moving forward toward a more climate and disaster resilient Ireland.

The present literature review is completed in unusual circumstances, with the emergency management system in Ireland facing its largest public health emergency to date. The COVID-19 crisis will undoubtedly have an impact on sustainable development and disaster risk management in Ireland. However, the current global situation illustrates the benefit of integrated frameworks at a national and sub-national level, and vertical alignment from the international to the local. The threat of climate change has not disappeared with the COVID-19 pandemic, but rather exhibits their resemblance with one another. The pandemic has shown how vulnerable we are to a global emergency, and that unless sufficient planning and preparedness in anticipation of these events are not taken, we will once again face global consequences that – according to the 2018 IPCC Report – will be unsurmountable. The most recent National Risk Assessment Overview (2019) affirms this and recognises that "planning and preparedness are critical to help mitigate the impact of a pandemic. When the next pandemic occurs, it will require a whole-of-government response to ensure that threat to public health and disruption of services and society are minimised" (Government of Ireland, 2019; 64).

Similar to the reasoning for integrating CCA and DRM to pursue the goal of community resilience, the COVID-19 recovery period addresses a similar aim, with former UN Deputy Secretary-General Lord Mark Malloch Brown, forecasting that the term *'resilience'* will be the buzzword for the COVID-19 recovery. Similarly, Raul Salazar, head of UNDRR's Regional Office for the Americas and the Caribbean, speaking on the pandemic, expressed how the current global situation has conveyed the importance of national governments integrating different sectors, ensuring they work together rather than in silos. He acknowledged the importance of a systemic approach to prevention activities to ensure that disaster risk is reduced and lives saved (UNDRR, 2020).

Section one of this review provides an overview of climate change adaptation and disaster risk management at a national, European and international level outlining various frameworks and instruments such as the EU Civil Protection Mechanism (2013), the UN Sendai Framework for Disaster Risk Reduction (2015-2030) and the Paris Agreement (2015), as well as the historical

alignment and disparities among both sectors. The first section also describes the concepts of resilience and vulnerability as they stand in international policies and frameworks.

Section two explores disaster risk management and reduction on a local and national level, outlining the various frameworks and policy instruments, such as the Irish Strategic Emergency Management (SEM) Framework (2017). Following on from this, it discusses climate change adaptation in greater detail, along with the various institutional frameworks and policies applicable in Ireland, such as the Climate Action Plan (2019) and the National Adaptation Framework (2018). Moreover, it addresses the concept of resilience that is present within CCA & DRM in Ireland, as well as the institutional and policy linkages and potential barriers to coordination and integration of disaster risk and climate change adaptation into emergency planning. Additionally, section two identifies the key stakeholders and actors in Ireland. An integral component of the present research relates to a mapping of stakeholders, and stakeholder engagements, to enrich the lessons learned from the research and inform the outputs of the project. Insights from various key actors and stakeholders on the case studies which will be undertaken during the project will ensure that lessons learned can be applied in practice.

Section three then explores the various challenges, gaps and opportunities of enhanced integration of CCA and DRM in Ireland. It does so by highlighting notable examples of integration, followed by identifying certain gaps and potential barriers. In an attempt to bridge those gaps, section four highlights various good practices and examples of integration in an international, EU and local context. This will better inform national/sub-national policy and identify key themes that could potentially strengthen the collaboration between the existing Climate Change Adaptation (CCA) and Disaster Risk Management (DRM) frameworks for Ireland. Section five provides an overall conclusion for the literature review, while outlining next steps for the project.

1. CCA & DRM – Making the Connections

The call for greater integration of Climate Change Adaptation (CCA) and Disaster Risk Management (DRM) frameworks has increased in recent years and is now considered a global priority, according to the UNDRR Global Assessment Report on Disaster Risk Reduction (2019). Efforts to reduce disaster risk while simultaneously adapting to climate change is of great importance in both an international and EU context (Government of Ireland, 2019). As highlighted by the European Environmental Agency:

> *"The impacts of weather- and climate-related hazards on the economy, human health and ecosystems are amplified by socio-economic changes and environmental changes. Efforts to reduce disaster risk and at the same time adapt to a changing climate have become a global and European priority."* EEA Report (No 15/2017)

Both approaches seek to reduce exposure, vulnerability and risk of people and assets to a range of hazards. Integrating the approaches in legal and policy frameworks, coordination and implementation structures, financing arrangements, capacity development efforts and accountability mechanisms, among other settings, will have greatest impact on the reduction of loss and damage from disasters and climate change while increasing efficiency in use of resources.

1.1 Historical alignment and disparities between CCA and DRM

The historical development of CCA and DRM has had an impact on how both areas communicate and collaborate with one another. The two approaches have partially diverging backgrounds, methodologies and scopes of action (Natoli, 2019; 11). With the development and publication of the IPCC Special Report on Managing the Risk of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX Report, 2012), as well as with the activation of the special programme on loss and damage of the UN Framework for the Convention on Climate Change (UNFCCC, 2012), greater emphasis has been placed on fostering coherence and alignment between DRM and CCA at an international level. Although in recent years there has been an attempt to bring both frameworks closer together, fragmentation persists, with some notable examples of a lack of coherence.

1.2 Disaster Risk Management (DRM) and Disaster Risk Reduction (DRR)

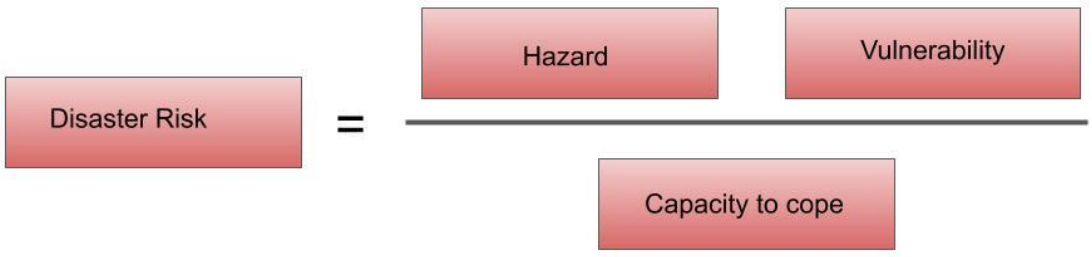
The two dominant trends that are present in contemporary disaster risk management (DRM) are increasing the resilience of individuals, families and communities in regard to their exposure and vulnerability to hazards, and concurrently strengthening the local, regional and national disaster

prevention, preparation and response systems. The first has emphasised the importance of disaster risk reduction, with the concept of risk as central to disaster management. The latter, seeking to strengthen DRM systems, focuses on establishing various normative frameworks to underpin disaster management, adopting a risk management focus rather than disaster response approach (McDermott & Gibbons, 2015).

Disaster risk reduction (DRR) has become an established component of DRM, as efforts to increase long-term resilience while responding to short-term risk increases, thus incorporating climate change and natural hazards. For the purpose of this review, the term DRM will be employed, acknowledging the importance of DRR as a global agreed policy to effective disaster risk management (UNDRR, 2020). At a global and European level, a high priority is now placed on implementing an integrated risk approach by taking into account the full disaster management continuum (prevention/mitigation, preparedness, response and recovery) which further considers climate change as a driver of risk (EEA Report, no.15/2017; 16). This is reflected at the national level, with the Irish Strategic Emergency Management Framework adopting a five-phase systems approach (hazard, mitigation, planning and preparedness, response, and recovery) based on a continuous cycle of activity (DoD, 2017).

Disaster risk refers to the potential loss of life or injury, or the destruction or damage caused to assets in a system, society or community during a specific period of time, determined probabilistically as a function of hazard, exposure, and vulnerability (EEA no.15/2017). Risk is determined as the consequence of the interplay between a hazard and certain factors that may leave people and places exposed and vulnerable (UNISDR, 2015).

Figure 1: Disaster risk equation (UNISDR, 2015)



2. CCA & DRM in Ireland – An Overview

2.1 An Overview of Relevant Legal & Policy Frameworks in Ireland

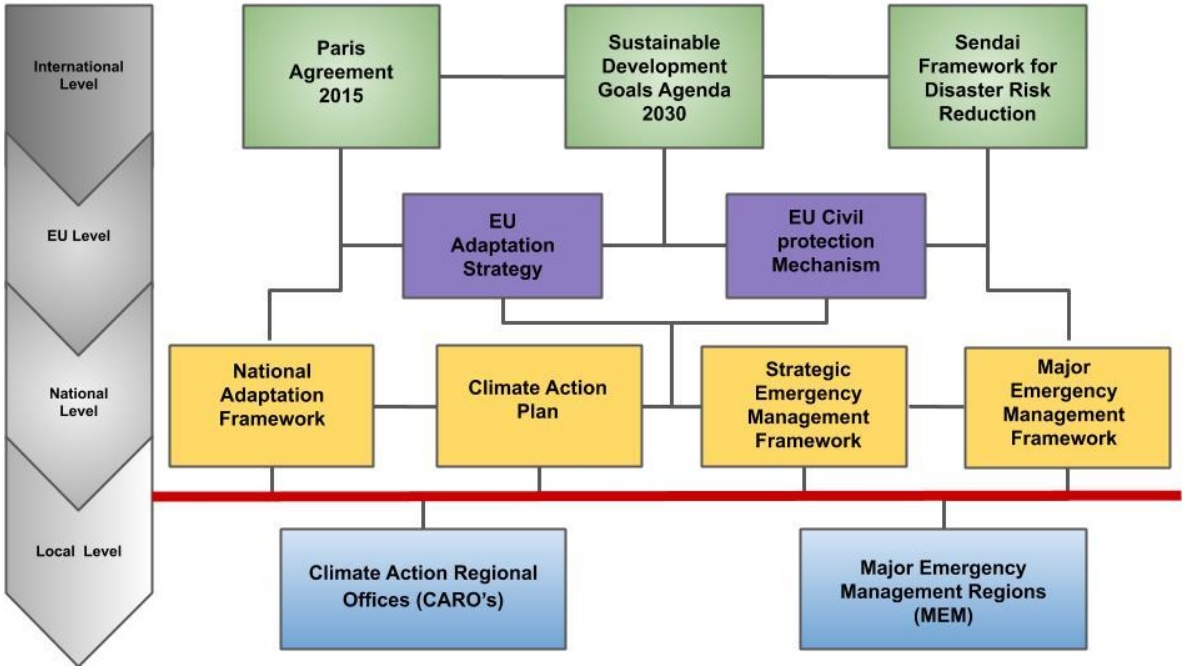
Ireland's national laws, policies and practices for disaster management and climate change adaptation draw from and are aligned with three key international frameworks, as set out below.

Table 1: Overview of key international and national legal and policy frameworks

	Risk Management	**Climate Change**	**Sustainable Development**
International	*Sendai Framework on DRR (2015-2030)*	*UNFCCC / Paris Agreement*	*UN Agenda 2030 & the SDGs*
National	National Risk Assessment 2019: Overview of Strategic Risks (2019) and National Risk Assessment (2017)	Climate Action Plan 2019 To Tackle Climate Breakdown (2019)	A Better World: Ireland's Policy for International Development (2019)
	Strategic Emergency Management Framework (2017)	National Adaptation Framework: Planning for a Climate Resilient Ireland (2018)	Ireland: Voluntary National Review (2018)
	Major Emergency Management Framework (2006)	Local Authority Climate Change Adaptation Guidelines (2018)	Our Sustainable Future: A Framework for Sustainable Development in Ireland – Progress Report (2015)
		National Mitigation Plan (2017)	Our Sustainable Future: A Framework for Sustainable Development in Ireland (2012)

The need for coherence between the different legal and policy frameworks at the international level, in particular covering the three topics of disaster risk, climate change and sustainable development, is well recognised (Sandholz, 2020), and can be augmented by the vertical alignment between the international, regional, national and local levels (Cubie & Natoli, forthcoming). This allows for the sharing of knowledge and expertise regarding legal principles and operational experience, and promotes a coordinated approach to risk management, as visualised in Figure 3 below.

Figure 2: Coherence and alignment of key frameworks.



2.2 Disaster Risk Management

National Context

In its approach to disaster risk management, Ireland incorporates a 'whole of government approach', encompassing emerging issues or trends which may be best addressed elsewhere, and considering expert opinion and *"formulating and agreeing national practices"* (DoD, 2017; 26). Legal provision for disaster management in Ireland can be found across a wide range of legislative domains. Various policy documents, such as the Strategic Emergency Management Framework and the Framework for Major Emergency Management, provide a shared understanding of roles and responsibilities from the national level, to a local and regional level (McDermott & Gibbons, 2015; 367).



Figure 3: Five stage systems approach (DoD, 2017)

The three principles which underpin all levels of emergency planning are: i) an 'all-hazards' approach; ii) subsidiarity, with initial emergency response at the nearest, local level; and iii) effective coordination at the local, national and regional level (DoD, 2017; 3). Responsibility for disaster management on a national level lies with Lead Government Departments (LGD's), which are identified in the SEM Framework for 50 different types of emergency situation. The LGD role includes risk assessment, planning and preparedness, prevention, mitigation, response, and recovery.

Response and Risk Management Authorities in Ireland

The National Directorate for Fire and Emergency Management (NDFEM) was created within the Department of Housing, Planning and Local Government in 2009 and it has the designated agency responsible for leading and supporting development of the full range of emergency management functions for which the Department is responsible. For example, the NDFEM is tasked with receiving and assessing weather warnings and reports on weather events around the country (DHPLG, 2019).

Local Level Coordination

On a local level, the responsibilities for identified emergencies are set out in the Major Emergency Management Framework (2006). The Framework specifies the arrangements to organise responses to emergencies in a coordinated manner, including on a local and regional level, and designates local authorities as the lead agencies in government response. It includes mechanisms for linking the Principal Response Agencies (PRAs) and other stakeholders in the management of emergencies (Soldi, 2016).

The three Principal Response Agencies (An Garda Síochána, Health Service Executive and the Local Authorities) are responsible for ensuring procedures for preparing for and responding to an emergency are detailed in the relevant emergency plans. The Framework declares itself as an overall response measure *"as soon as a major emergency is declared"*, thus affirming its position as predominantly a response mechanism to emergencies (DHPLG, 2006; 14). In line with the Framework, PRA's are mandated to adopt Major Emergency Plans, updated every year, to plan for and respond to events. The country is divided into eight regions for civil protection purposes; referred to as 'Major Emergency Management Regions'. For each region, there is an inter-agency Regional Steering Group (RSG) and a Regional Working Group (RWG), including managerial and operational staff of the PRA's. Once an emergency is declared, each PRA is required to inform its parental central government department of the emergency (McDermott & Gibbons, 2015). County Councils and City Councils are among the Principal Response Agencies appointed to manage emergencies (Soldi, 2016).



Figure 4: Regional Major Emergency Management map (MEM, 2006)

The SEM Framework identifies Lead Government Departments (LGD) with the mandate for risk assessment, planning and preparedness, prevention, mitigation, in addition to response and recovery roles. In addition, other government departments and agencies are designated to provide either principal or other support to the LGD across each of the 50 major hazards identified in the SEM Framework. DHPLG is the LGD for the major climate-induced hazards facing Ireland, specifically severe weather, flooding and fires, with each hazard requiring contributions from different supporting departments and agencies.

European Context

The EU Civil Protection Mechanism (2013) addresses significant issues relating to disaster risk management. It explicitly tackles these issues through mapping key risks, undertaking prevention and preparedness missions, supporting research and knowledge sharing, peer reviews and enhancing international cooperation (EU Civil Protection Mechanism, 2013). The mechanism requires countries to conduct comprehensive multi-hazard risk assessments (EEA Report, no.15/2017). Ireland, along with 32 other countries, encompassing both EU Member States and other participating states, engage within the Civil Protection Mechanism. Ireland conducts a national risk assessment every five years in compliance with the mechanism (DoD, 2017). The EU approach to DRM is formed by a number of thematic instruments, central to which, is the EU Civil Protection Mechanism (EU, 2017; 29). Additionally, the EU Action Plan on the Sendai Framework for DRR 2015-2030 recognises the Sendai Framework as an opportunity to bolster EU resilience to shocks and disruption in the context of EU development. It highlights that translating the Sendai Framework into tangible actions should be done in accordance with other international agreements, including the 2030 Agenda for Sustainable Development and the 2015 Paris Agreement (EC, 2015).

International Context

There are a number of key international frameworks which have informed the development and implementation of national and regional DRM approaches. For example, the EU Civil Protection Mechanism draws heavily on principles set out at an international level, in particular the Hyogo Framework for Action 2005-2015 and its successor, the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030. The Sendai Framework was adopted at the third United Nations World Conference on Disaster Risk Reduction, with a primary aim to *"prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience"* (SFDRR, 2015; 12).

Although the Sendai Framework is not legally binding, several countries have highlighted the need for strengthening DRM worldwide (UNDRR, 2015), and Ireland was an active participant in the final negotiations of the Framework. At the Third World Conference on Disaster Risk Reduction in March 2015 – where the Sendai Framework was adopted – Ireland stated its support for a comprehensive global plan on disaster risk reduction and management that *"prioritises the most vulnerable, delivers results at country, regional and global levels, is complementary to other global processes with similar aims, is appropriately resourced, is accountable and will, overall, have the capability to guide the global response to disaster risk for the coming years*" (Government of Ireland, 2015). Although the SFDRR is not referenced by the Strategic Emergency Management Framework, the Irish structures do encompass various elements of the four priorities for action which form the central feature of the international framework.

Ireland's Integration of SFDRR in the SEM Framework

The table below provides a summary of the inclusion of the Sendai Priorities for Action into the Irish SEM Framework, many of which will be discussed in more detail in the rest of this literature review.

Table 2: Summary of Sendai Priorities for Action in Irish SEM Framework

Sendai Framework Priorities for Action	**Strategic Emergency Management Framework**
1. Understanding disaster risk	• Clear definition of risk and hazard, with a process for national risk assessment. • Identifies and communicates emergency scenarios that could occur at a national and local level – as a result of natural, human-induced and climate hazards. • Risk exposure and vulnerability of persons not specifically applied.
2. Strengthening disaster risk governance to manage disaster risk	• Clear outline of roles and responsibilities to enable effective management of risk. • Clear outline of arrangements and processes in place to enable delivery of national and regional level emergency management (DoD, 2017; 6).
3. Investing in disaster risk reduction for resilience	• Resilience and community resilience a key component in SEM Framework. • Investing and funding predominantly in relation to response and recovery. • Expenditure requirements include immediate expense, long-term large-scale infrastructure, longer term assistance, longer term additional resilience measures (DoD, 2017; 29).

4. Enhancing disaster preparedness for effective responses and to 'Build Back Better' in recovery, rehabilitation and reconstruction	• Proposals for funding projects to rehabilitate, restore, or provide 'additional resilience' will be *"considered by the relevant funding department"* (DoD, 2017; 29).

To promote accountability of governments and other relevant stakeholders, the SFDRR sets out seven specific targets (SFDRR, 2015). Some of these guiding targets are contained within the Irish SEM Framework, although explicit reference is not made to the SFDRR. In 2018, the OECD released a country profile on Ireland's policy integration. It reported on a seminar held by the Government Task Force, Department of Foreign Affairs and Trade and UNISDR on introducing the SFDRR as Ireland determined its institutional roles and responsibilities as a signatory to the Framework and determined how effectively the SFDRR corresponded with the Irish National Adaptation Framework (OECD, 2019). In its Policy for International Development (2019), the Government affirmed that it intended to *"strengthen [our] approach to disaster risk reduction in line with the 2015 Sendai Framework and continue to track our spending"* (Government of Ireland, 2019; 17). However, there is no express institutional or policy linkage between Ireland's international development policy and its domestic disaster management policy.

2.3 Climate Change Adaptation

Climate change is contributing to an increase in disaster risk, with the impacts – rising sea-levels and extreme weather – being observed first-hand in Ireland (Government of Ireland, 2019). Temperatures in Ireland have increased by about 0.8℃ since 1900 (Nolan, 2015). Moreover, the mean annual sea surface temperature – as measured in Malin Head, Co. Donegal – is now more than 1℃ higher than the long-term average (National Adaptation Framework, 2018; 26), with changes expected to continue and increase over the coming years. A report by Met Éireann published in 2013 succinctly outlined future projections for Irish weather in the coming years using global climate model simulations. Among the key estimations was an increase of 1.5℃ by mid-century, an increase in storm wave heights, and up to 20% increase in frequency of heavy precipitation events – which will have an effect on river catchment hydrology (Gleeson, 2013; 7).

The impacts of climate change on sectors and regions across Ireland are dependent not only on climate-related hazards, but on current and future exposure and vulnerability of a diverse range of human, natural and socio-economic systems. It is therefore recognised that it is necessary to reduce and manage climate change risks through a combination of mitigation and adaptation focused responses (National Adaptation Framework, 2018; 32). In 2018, Ireland was ranked as the worst EU Member State based on its climate action (Burck et al, 2019), and had the highest national proportion of agriculture emissions (EPA, 2019). Although this is largely due to its role in supplying meat and

dairy products across Europe, Ireland also has a higher carbon footprint per head of the population in the electricity, transport and waste management sectors (Government of Ireland, 2019; 9).

National Context

The country's first National Mitigation Plan was published in 2017 and works in tandem with the National Adaptation Framework for managing greenhouse gas emissions and achieving the 2050 target of a decarbonised economy (DCCAE, 2017; 9). The National Adaptation Framework, published in 2018, sets out current progress and provides guidelines for adaptation on a national level. Its subtitle: *'Building resilience to climate change'* illustrates the role of adaptation in reducing vulnerability and enhancing resilience. It complements the required mitigation actions by addressing the resilience challenge and specifies strategies for adaptive measures in various sectors and local authorities. Furthermore, it intends to *"reduce the vulnerability of the state to the negative effects of climate change and to avail of any positive effects that might occur"* (DCCAE, 2018; 9). At the local level, as part of the country's National Adaptation Framework, all local authorities are required to produce a Climate Adaptation Strategy in line with the framework. Additionally, the Framework identifies 12 sectors across seven government departments and agencies for the development of climate adaptation strategies – including actions to be implemented at a local government level (Cork County Council, 2019). Support for the drafting of these adaptation plans exists via the *Sectoral Planning Guidelines for Climate Change Adaptation* (2018) and the *Local Authority Adaptation Sectoral Development Guidelines* (2018).

Table 3: Sectoral responsibilities (Cork County Council, 2019)

Sector	**Parent Department**
Seafood	Department of Agriculture, Food & the Marine
Agriculture	Department of Agriculture, Food & the Marine
Forestry	Department of Agriculture, Food & the Marine
Biodiversity	Department of Culture, Heritage & the Gaeltacht
Built & Archaeological Heritage	Department of Culture, Heritage & the Gaeltacht
Transport Infrastructure	Department of Transport, Tourism & Sport
Electricity and Gas Networks	Department of Communications, Climate Action & Environment
Communications Networks	Department of Communications, Climate Action & Environment
Flood Risk Management	Office of Public Works
Water Quality	Department of Housing, Planning & Local Government
Water Services Infrastructure	Department of Housing, Planning & Local Government
Health	Department of Health

The Irish government has undertaken a progressive step on climate action in Ireland and plans to move toward decarbonisation with the Climate Action Plan to Tackle Climate Breakdown (2019). The Plan emerged after the Irish Government became the second country – following the United Kingdom – to declare a climate emergency (House of the Oireachtas, 2019). The Plan comprises a comprehensive proposal to reduce greenhouse gas emissions and foster climate resilience and provides a roadmap for all stakeholders to work together in creating a *"resilient, vibrant and sustainable country"* (Government of Ireland, 2019; 8). The Plan acknowledges that the potential impacts and costs of inaction to the effects of climate change are significant, and thus requires robust adaptation measures in all areas of governance. Moreover, it recognises both the Paris Agreement and the UN's 2030 Agenda for Sustainable Development as integral in climate action. The Plan also commits to bring forward a new Climate Action (Amendment) Bill to amend the Climate Action and Low Carbon Development Act (2015). The new Bill aims to act as a strengthened statutory framework for long-term planning in placing Ireland on a trajectory to be net zero in emissions by 2050 (DCCAE, 2019).

Ireland's targets are binding at an EU level, under the EU Efforts Sharing Decision (ESD). The ESD forms part of the EU's climate and energy policy framework for 2020, where national emission targets for 2020 are set, expressed as percentage changes from 2005 levels (EC, 2020). As per its 2020 targets, Ireland was legally bound to deliver 16% of its final energy requirements from renewable sources, 10% renewable energy in transport, and a 20% decrease in its emissions from its 2005 figure, stated in the National Mitigation Plan (DCCAE, 2017; 36). Although it did not meet this target, the Climate Action Plan (2019) with its decarbonisation pathway to 2030, is in line with the aim of envisioning a net zero target in Ireland by 2050 (Government of Ireland, 2019).

Local Level Coordination

As mentioned above, the National Adaptation Framework calls for the implementation of local adaptation strategies. For many authorities, this strategy was the first of its kind so the Local Authorities Adaptation Guidelines were developed to help counties and regions draft their own strategy. The guidelines highlight the necessity for adaptation strategies to be mainstreamed into local authority plans and policies to 'climate-proof' existing plans and policies (DCCAE, 2018). A network of four Climate Action Regional Offices (CARO's) have been set up to support this requirement, facilitating collaboration on a regional partnership approach to adaptation strategies, to coordinate and advise local authorities on adaptation strategies and contribute to national dialogue on climate action on a regional and local level. Additionally, the guidelines suggest that CARO's and local authorities *"explore synergies and collaboration that may be mutually beneficial"* (DCCAE, 2018; 20). The grouping of regions is as follows:

Table 4: Overview of Climate Action Regional Offices

Climate Action Regional Office	Local Authorities in CARO Region	CARO Lead Authority
Atlantic Seaboard North	Donegal, Sligo, Mayo, Galway City & County	Mayo County Council
Atlantic Seaboard South	Clare, Limerick, Kerry, Cork City & County	Cork County Council
Eastern & Midlands	Carlow, Cavan, Kildare, Kilkenny, Laois, Leitrim, Longford, Louth, Meath, Monaghan, Offaly, Roscommon, Tipperary, Waterford, Westmeath, Wexford, Wicklow	Kildare County Council
Dublin Metropolitan	South Dublin, Fingal, Dun-Laoghaire-Rathdown, Dublin City	Dublin City Council

Local authorities are at the intersection of emergency response and climate adaptation efforts, with the ability to prepare for and respond quickly and efficiently to disasters and potential risks, combined with local knowledge. From building flood defences to coordination of first responses, city and county councils are on the frontline of the climate crisis (LGMA, 2020). These experiences and knowledge mean that local government are in a position to act as a *"catalyst for much wider change"* in responding to short-term challenges while building long-term resilience (Clarke & O'Donoghue-Hynes, 2020; 8). The Climate Action Plan (2019) additionally acknowledges the instrumental role of local authorities, stating that: *"local authorities occupy a pivotal role in their respective communities and can act to demonstrate public sector leadership on climate action in their areas as well as key mobilisers of action at a local and community level"* (Government of Ireland, 2019; 127). In this respect, local authorities are in a unique position to engage with relevant stakeholders. An example of this is the detailed Mayo County Council Adaptation Strategy, where a monitoring and implementation mechanism to keep track of progress includes a structured and substantive programme for the engagement of local authorities, local community, relevant non-governmental organisations and state sector bodies, particularly those who will be expected to play a role in implementation of actions set out in the strategy (Mayo County Council, 2019; 106-110). The role of local authorities in emergency response is equally as critical. For example, with extreme weather events expected to continue, local authorities have begun to invest more in flood defences in recent years to help offset the future impact of these events (LGMA, 2020).

European Context

In 2013, the European Commission adopted an EU Strategy on Adaptation to Climate Change. The strategy has three main objectives:

1. **Promoting action by Member States:** Encouraging all Member States to adopt comprehensive adaptation strategies, with the EU providing guidance and funding for countries achieving this aim. The creation of the Irish National Adaptation Framework (2018) is in accordance with this objective set out by the European Commission.
2. **Promoting better informed decision-making:** By addressing gaps in knowledge about adaptation, and further developing the climate-ADAPT platform, the *'one-stop shop'* for information on climate adaptation in Europe. The Climate Ireland website plays a similar role in providing climate adaptation information, data, projections and support to local authorities, organisations, businesses and the general public (Climate Ireland, 2020).
3. **Promoting adaptation in key vulnerable sectors:** Through fisheries, agriculture and cohesion policy – ensuring infrastructure is made more resilient against disasters. Under the National Adaptation Framework, seafood, agriculture, biodiversity and forestry – along with other vulnerable sectors – are mandated to develop their own climate adaptation strategies.

International Context

Adopted in 2015 under the UN Framework Convention on Climate Change, the Paris Agreement on Climate Change is a binding international legal agreement which seeks to hold the increase in global average temperature to well below 2℃ above the pre-industrial level, while recognising that keeping the temperature increase to below 1.5℃ would significantly reduce the risks and impacts of climate change. The overall objective of the Agreement is to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

> *"Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production"* (Article 2(1)(b)).

As a signatory to the Paris Agreement, Ireland has stated that it is committed in its efforts toward meeting the Paris Agreement Objectives (DCCAE, 2019). National progress on adaptation is reviewed and reported at the international level via meetings of the Conference of the Parties, submission of adaptation commitments under the Paris Agreement, and a review of national climate plans every five years.

At a European level, reporting to the Commission every four years is required on national adaptation plans and strategies to facilitate adaptation on climate change and the EU Adaptation Preparedness Scoreboard (DCCAE, 2018). The EU Preparedness Scoreboard includes an assessment of each Member State's adaptation strategies, as well as a horizontal assessment of the 28 country reports (European Commission, 2018). Meanwhile, at the national level, oversight of progress is provided by the completion of a review on the National Adaptation Framework every five years by DCCAE, and the submission of annual and periodic review reports by the Climate Change Advisory Council which was established under s.8 of the *Climate Action and Low Carbon Development Act 2015* (DCCAE, 2018).

To promote the sharing of good practices, the EU financed two relevant projects through the Horizon 2020 research framework:

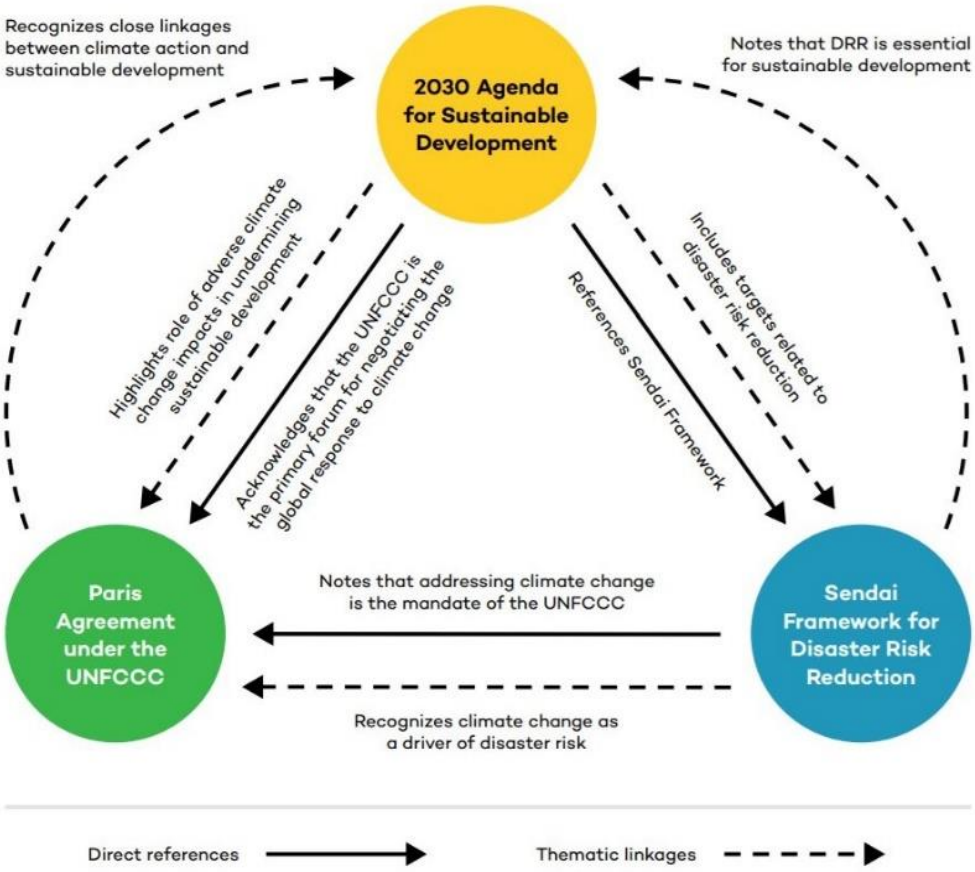
- The **ESPREssO Project** (Enhancing Synergies for disaster PRevention in the EurOpean Union) which ran between 2015-2019 aimed to promote new ideas on what should act as a future roadmap for hazard research and policymaking (Zuccarro et al, 2018b; 11); and
- The **PLACARD Interchange** (PLAtform for Climate Adaptation and Risk reDuction), which concluded in 2020, which aimed to facilitate a space for connection between those who are working in climate change adaptation and disaster risk reduction areas (PLACARD Interchange; 2020).

Publications arising from these projects provide insightful knowledge and practical guidance for Ireland on integrating national structures and policies addressing CCA and DRM, and reflect the need to "*improve the exchange of good practice"* between those responsible for the design of monitoring, reporting and evaluating of CCA and DRM measures (EEA, 2017; 141).

2.4 Ireland and the UN 2030 Agenda for Sustainable Development

The UN 2030 Agenda for Sustainable Development places both CCA and DRM at the heart of sustainable development, as set out in the 17 Sustainable Development Goals (SDGs) (EEA, 2017a). The adoption of three key international agreements in 2015 (i.e. Sendai, Paris and the SDGs) underpinned the need to strengthen coherence at the international level between development, climate change and DRM which had often remained in distinct disciplinary silos. The clear interlinkages between the three agreements are set out in Figure 5 below.

Figure 5: Linkages between international frameworks (NAP Global Network Webinar 2020)



Crucially, all three agreements depend on each other's successful implementation – referencing each other and, according to the PLACARD Report, *"incentivising coherent implementation"* (Leitner et al, 2020; 29). It is therefore important to note that at the national level, the SDGs are a key focal point in both the National Adaptation Framework (2018) and the Climate Action Plan (2019).

Ireland, in its commitment to the SDG's, acknowledges Goal 13, which calls on countries to take urgent action to combat climate change and its impacts (UN, 2015). Ireland supports sustainable development at the domestic level through its 'Our Sustainable Future' framework, launched in 2012, with the most recent progress report published in 2015 (Government of Ireland, 2015). Disaster risk reduction touches on around 25 specific targets and are a key focus in 10 of the 17 Sustainable Development Goals – firmly highlighting the role of disaster risk management as a *"core development strategy"* (Leitner et al, 2020; 29). In particular, SDG Goal 11(b) aims to substantially increase the number of human settlements and cities adopting and implementing integrated policies, including *"adaptation to climate change, resilience to disasters, and to develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster management at all levels"* (UN, 2015). The Strategic Emergency Management Framework, however, does not

reference sustainable development at any point, despite the key role that it plays in enhancing resilience.

2.5 Mapping of Key Actors and Stakeholders in Ireland

> *"Decision-making that increases resilience to climate change impacts is not made in a vacuum, but rather, is set within a diverse social, economic and cultural landscape. It is, therefore, critical to engage the stakeholders that have an interest in both the decision-making process and outcomes in order that all needs are recognised"* (Leitner et al, 2020; 46).

As outlined in the Introduction, stakeholder engagement is an integral component of fostering coordination and coherence within the CCA & DRM sphere (Amaratuga et al, 2017; 45). There are many benefits from participatory stakeholder engagements, such as sparking new ideas or gaining insight into perspectives on solutions that may have previously been overlooked. Engaging with stakeholders can bring forth local knowledge – which could be vital for identifying areas of vulnerability and possible strategies to manage risk effectively, as well as providing legitimacy to research (Leitner et al, 2020; 46). Due to the similar challenges and barriers CCA & DRM both face, an integrated and participatory approach may even be more effective. A multiple lens perspective is arguably more helpful than a single lens perspective, which may provide a narrow or one-dimensional solution (Leitner, 2020; 46). It has been emphasised by the ESPREssO Project that the major challenge is not identifying who key stakeholders are, but the allocation of tasks and responsibilities between these stakeholders, as roles and responsibilities may not be clearly defined (Amaratunga, 2017; 45). This, in turn, may lead to miscommunication among stakeholders when specific roles and liabilities become unclear. Therefore, unravelling the complexity of both areas is one of the first steps in enhancing integration between the two fields. To achieve this aim, Bojovic et al (2020) highlight that it is important to identify key actors within both areas, understand the interactions between them, analyse how they are connected to one another and what level of interaction they have, if any (ibid, 2020).

The National Adaptation Framework (2018) acknowledges the pivotal role that stakeholders play in contributing toward climate action and provides an extensive list of the key stakeholders contributing to climate adaptation in Ireland, including local authorities, civil society and the private sector. The Climate Change Advisory Council (CCAC) was established by Ministerial Order in 2016 under section 8 of the Climate Action and Low Carbon Development Act 2015, to aid in Ireland's transition to a low carbon, climate resilient and sustainable economy (Government of Ireland, 2015). Additionally, the Government made a commitment to establish a National Dialogue on Climate

Action (NDCA) to create community awareness, engagement and motivation to act, foster a flow of information, establish appropriate networks and providing for regular input (DCCAE, 2018). In addition to the NDCA, the Citizens' Assembly provides another avenue for stakeholder engagement (EC, 2015). However, in the European Commission's Adaptation Preparedness Scoreboard (2015), it was found that Ireland has made inadequate progress in terms of stakeholder involvement in the development of adaptation policy (DCCAE, 2015).

The SEM Framework identifies the key intergovernmental and interorganisational relationships, defining stakeholder relationship roles and responsibilities and outlining recovery phases and timelines. The Government Task Force (GTF) on Emergency Planning coordinates and oversees the emergency management policy and activities of all Government Departments and Agencies under their aegis and facilitates coordination of emergency management between Departments and Agencies (DoD, 2017). The GTF is chaired by the Minister for Defence and consists of senior representatives of all Departments, the Health Service Executive, An Garda Síochána, the Defence Forces, the Health and Safety Authority, the Revenue Commissioners, Met Éireann, the Environmental Protection Agency, the Office of the Government Chief Information Officer, Civil Defence, the Office of Public Works, the Irish Coast Guard and other Agencies as appropriate. The GTF Sub-Groups address emergency matters to minimise potential consequences of emergencies (DoD, 2017). The LGD is the mandated department responsible to coordinate all national level activity for its assigned emergency (DoD, 2017), along with supporting departments and agencies. By way of example, the following table outlines the stakeholders involved in four of the 50 emergency management scenarios which pose a high level of risk in Ireland:

Table 5: Key stakeholders in selected emergency management scenarios (SEM, 2017)

Emergency type	**Lead Government Department (LGD)**	**Principal Support** and other support roles[1]	**Remarks**
Severe weather Storms/High Winds Thunder/Lighting Flooding/Snow/Ice Low/High Temperatures Drought Coastal Erosion	Department of Housing, Planning & Local Government (DHPLG)	• **Local Authorities** • **Dept of Housing, Planning & Local Government** • **An Garda Síochána (Dept of Justice & Equality)** • **HSE (Dept of Health)** • **Met Éireann** • **Civil Defence (Dept of Defence)** Other Support Roles: • Defence Forces (DoD), DCCAE, Environmental Protection Agency (DCCAE) • Transport Infrastructure Ireland (Dept of Transport, Tourism & Sport) • Dept of Agriculture, Food & the Marine • Irish Coast Guard (DTTS) • Office of Public Works (Dept of Public Expenditure & Reform) • Dept of Employment Affairs & Social Protection • Dept of Rural & Community Development	**Local Authority:** Lead Agency as per Framework for Major Emergency Management. **IRCG** also has statutory powers re movement of shipping in and out of harbours & anchorages during severe weather. **DEASP** has a Support Role under Humanitarian Assistance Scheme.
Flooding	Department of Housing, Planning & Local	• **Local Authorities** • **HSE (Dept of Health)** • **An Garda Síochána (Dept of Justice & Equality)**	**Local Authority:** Lead Agency as per Framework for Major Emergency Management.

[1] A Principal Support Role is one that is explicitly mentioned in a Department's emergency plans. Other support roles include non-specific assistance, which may be requested from any Department or Agency in an emergency (SEM Framework, P. 6)

	Government (DHPLG)	• **Office of Public Works (DPER)** • **Met Éireann (DHPLG)** • **Environmental Protection Agency (DCCAE)** • **Dept of Agriculture, Food & the Marine** • **Civil Defence (Dept of Defence)** • **Dept of Employment Affairs & Social Protection** • **Dept of Finance** • **ESB** Other Support Roles: • Coillte (DAFM) Waterways Ireland Irish Water DF (DoD) • Irish Coast Guard (DTTS)	**OPW** is responsible per Government Decision (September 2004) in respect of flood risk identification, mitigation and awareness. (Ref Govt Decision S180/20/10/0996). Note: OPW agreed to transfer the functions and responsibilities in relation to coastal protection and coastal flooding on 1 January 2009 from DAFM. **DEASP** Support Role under Humanitarian Assistance Scheme.
Pandemic Influenza and Other Public Health Emergencies	Department of Health (DoH)	• **HSE (All members of the Health Threats Coordination Committee)** Other Support Roles: • Local Authorities (DHPLG) CD (DoD) • Revenue Commissioners FSAI19 (DAFM)	Potentially all Government Departments/Agencies may be affected and involved, because of the potential widespread impact of a pandemic or other Public Health Emergencies.
Environmental Pollution	Department of Housing, Planning & Local Government (DHPLG) or Department of Transport, Tourism and Sport (DTTS) if at sea	• **Local Authority (DHPLG** • **Environmental Protection Agency (DCCAE)** • **Dept of Agriculture, Food & the Marine** • **Health Service Executive (Dept of Health)** • **Office of Public Works (Dept of Public Expenditure & Reform)** • **Irish Coast Guard (DTTS) (Marine incidents)** Other support roles: • OPW (DPER) DF (DoD)	**Local Authority:** Lead Agency as per Framework for Major Emergency Management. Should the incident occur at sea, the lead may pass to DTTS and IRCG.

The involvement of both governmental and non-governmental stakeholders is deemed integral to emergency planning under the Sendai Framework. The Sendai Framework in Guiding Principle (d) states that DRR requires an all of society engagement, with *"inclusive, accessible and non-discriminatory participation, paying special attention to people disproportionately impacted by disasters"* (UNDRR, 2015; 8). In the UNDRR guide on implementing the Framework, it highlights that the designing and implementation of disaster preparedness plans cannot be done without women and girls, men and boys, people with disabilities, older persons, indigenous peoples, migrants or others with access and functional needs and vital capacities, their organisations and networks. Emergencies of any kind in Ireland are likely to have a cross-sectoral and cascading impact, with ties in agriculture, infrastructure, business, and flood risk management. By mapping stakeholders across all phases of DRM (prevention, preparation, response and recovery), it will be easier to ascertain ownership gaps.

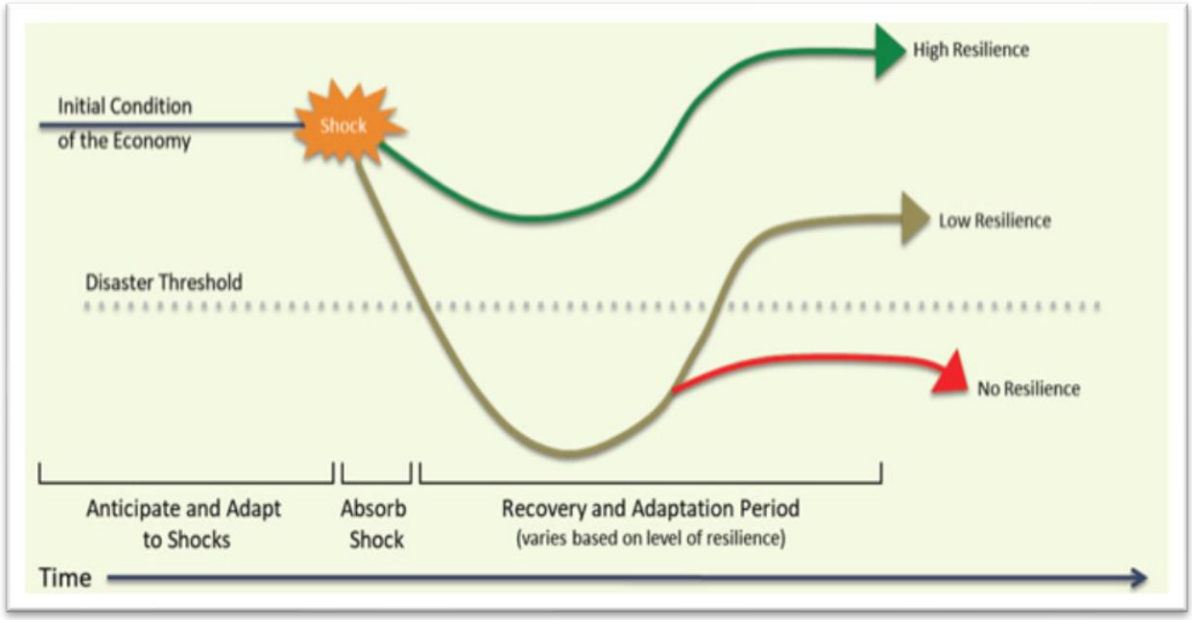
The SEM Framework is clear in the identification of stakeholders in hazard-focused vertical silos. However, it does not reference important horizontally linked stakeholders in different, but related sectors, or non-governmental stakeholder organisations and groups. When decisions are made without understanding the effects in different sectors, there is a possibility of unintended consequences and counterproductive measures being implemented (Leitner et al, 2020). Therefore cross-sectoral communication is critical to foster solutions and enhance knowledge and understanding in various sectors to create more coordinated and coherent policy. Examples of good practice within Ireland include Donegal County Council which, in its adaptation plan, recognises the significance of sectoral adaptation plans to local adaptation, and vice versa. To ensure the necessary sectoral input is obtained, coordination between sectoral and local scale adaptation efforts are facilitated through CARO's (Donegal County Council, 2019; 15). Likewise, Cork County Council's Adaptation Plan aims to build and strengthen partnerships, by promoting inter-departmental communications and cooperation (Cork County Council, 2019; 46).

2.6 Resilience and Vulnerability in CCA & DRM in an International Context

Both the climate change adaptation and disaster risk management sectors address prevention and reduction of risks of disasters by reducing vulnerability and increasing resilience. As visualised in Figure 6 below, resilience in the context of disasters is defined as:

> *"the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of essential basic structures and functions through risk management"* (UNDRR Terminology, 2017).

Figure 6: initial economic conditions impact on resilience and recovery (http://www.oedd.org/economic-resilience.htm)



The SFDRR necessitates a more people-centred preventative approach to disaster risk, with practices focusing on being *"multi-hazard and multisectoral, inclusive and accessible in order to be efficient and effective"* (SFDRR, 2015, 10). This is particularly important as vulnerability is the result of a range of economic, social, cultural, institutional and political factors that shape people's lives and their direct environment (Twigg, 2015). Those who are marginalised in society will face the steepest hill to climb toward recovery in the event of a disaster.

The collaborative objective of the Sendai Framework for building resilience and reducing risk coincides with *"a renewed sense of urgency within the context of sustainable development and poverty eradication",* and to integrate both DRR and the building of resilience into policies, programmes and budgets at all levels (SFDRR, 2015). Moreover, it intends to guide the efforts of stakeholders at all levels: global, regional, national and local. Commenting on the impact that the COVID-19 pandemic will have on resilience, Djalante et al highlight the importance of early recovery planning that is centred around inclusivity. Moreover, the authors emphasize the benefit of DRM and CCA integration on reducing the health burden resulting from climate change and disasters (Djalante et al 2020; 5). This recognition is not a new realisation amidst the current global backdrop but has been highlighted in recent years. According to Banwell et al (2018), an increase in well-planned, effective and appropriate adaptation and risk-reduction is necessary over the short-, medium- and long-term to address climate change and climate-sensitive disaster risks, once again placing disaster preparedness as integral in disaster risk management.

2.7 Resilience and Vulnerability in CCA & DRM in Irish Frameworks

The Emergency Management Structures and climate change adaptation measures in Ireland often use the concept of 'resilience' interchangeably throughout policy formation. In the National Adaptation Framework (2018), it is acknowledged that the concept of resilience is present within both policy areas, and that the concept could assist in integration by providing *"common ground upon which more coherent policies and actions might be built"* (NAF, 2018; 34). Despite not specifically referencing the Sendai Framework, Ireland does highlight resilience as a key element of risk management, and "*achieving the optimal outcomes from the response effort when an emergency occurs"* (SEM, 2017).

The concepts of resilience and "community spirit" are referenced throughout the SEM Framework. However, writing from an international perspective, Siders (2020) raises an important question, namely what exactly does the concept of resilience mean, and how can ambiguous understandings of resilience increase the effectiveness of efforts to build a better future. As a key concept at the intersection of both fields, it is important to note that – if not clearly defined – the word can even have negative implications in disaster risk management.

3. Challenges, Gaps and Opportunities in Ireland

3.1 Examples of Good Practices

Ireland's progress in both CCA and DRM has greatly strengthened in recent years, with the adoption and implementation of the various institutional and policy frameworks discussed, as well as linking increasingly detailed extreme weather projections into sectoral adaptation planning. However, there is much to be gained from improving the alignment and integration of DRM and CCA, reducing risk and increasing resilience. Venton and La Trobe (2008) have observed that DRM measures will lessen climate impacts, and adaptation measures will reduce disaster risk. Moreover, the similar aims and agenda of DRM and CCA highlight the complementarity of both areas, and the benefits of increasing awareness and knowledge development across both topics. The following section will highlight integrated CCA and DRM measures currently in place in Ireland that address important climate-induced hazards on a sectoral level.

Figure 7: Flood risk management bodies (OPW, 2018)



Flooding

Flooding remains the primary focus within national frameworks and plans. Sea level rise, coupled with more frequent and extreme storm events will see as many as 70,000 Irish addresses exposed to damage from coastal flooding, according to a recently published White Paper by the Gamma Location

Intelligence data company (Cantwell, 2020). Flood risks are no longer only considered a concern in 'hot spots' along rivers and coastlines, with surface water flooding now a growing concern in many areas (Mehryar & Surminski, 2020). In the face of such threats, forward looking risk reduction is important in building resilience of individuals, business and governments (ibid). An increase in more intensive rainfall patterns have meant that local authorities, as the lead state body in preparation and response to flood risk, are required to undertake more rigorous flood resilience planning while also considering a range of adaptation efforts (Clarke & O'Donoghue-Hynes, 2020; 45). Figure 7 above presents the relevant bodies involved in flood risk management in Ireland.

The Climate Change Sectoral Adaptation Plan for Flood Risk Management was produced in 2019 under the National Adaptation Framework (2018). It outlines the potential impact of climate change on flooding and risk management in Ireland and identifies key objectives and sustainable approaches to adaptation as part of flood risk management (OPW, 2019). The long-term goal adopted by the Plan is *"Promoting sustainable communities and supporting our environment though the effective management of the potential impacts of climate change on flooding and flood risk"* (OPW, 2019; 2). The OPW has identified 3 objectives to achieve this aim outlined in Box 1 below:

Box 1: OPW Objectives on climate change and flood risk (OPW, 2019; 2)

Objective 1: Enhancing our knowledge and understanding of the potential impacts of climate change for flooding and flood risk management through research and assessment.
Objective 2: Adapting flood risk management practice to effectively manage the potential impact of climate change on future flood risk.
Objective 3: Objectives to pursue aligning adaptation to the impact of climate change on flood risk and flood risk management across sectors and wider Government policy.

The cross-sectoral impact of emergencies, referenced in the previous section, is reflected in Objective 3 of the Climate Change Sectoral Adaptation Plan. The interdependency of all sectors is strengthening and growing more important given that these extreme weather events can result in a cascade of impacts on energy, transport and health infrastructure (Leitner, 2020). Aligning adaptation plans with other sectors and across Government policy can significantly help to foster collaboration to prevent and prepare for potential disasters, meet the challenges of the current century and a noteworthy practice for potential replication in other sectors. However, it is important to note that the plan itself does not specify how other sectors should provide for potential climate-related changes in flood hazard and risk, "as it is relevant to their assets and/or areas of interest" (OPW, 2019; 23).

The CFRAM Programme

As set out in EEA Report (no.15/2017), in many instances, CCA and DRM are dealt with jointly, but may not be labelled as such. An example of this is Ireland's Catchment-based Flood Risk Assessment and Management (CFRAM) Programme. The CFRAM Programme conducted an extensive and detailed analysis to fully assess the risk of flooding in urban and coastal areas. Completed in 2018, the objectives of the programme were to:

1. Identify and map existing and potential flood hazard and flood risk in areas at significant risk from flooding and calling Areas for Further Assessment (AFA).
2. Identify feasible measures to effectively manage risk in the AFA's.
3. Prepare a set of flood risk management plans that set out feasible measures and actions to manage flood risk in these areas (OPW, 2019; 16).

Through the CFRAM Programme, the Office of Public Works (OPW) has assessed and mapped the flood hazards and risk for communities from frequent, minor flood events up to very rare and extreme flooding – providing insightful information for the OPW, local authorities and other sectors in effective adaptation planning against increased flooding risks (OPW, 2019). Moreover, the programme coordinates Ireland's 'whole of Government' approach, informing future planning and helping communities plan for and respond to a flood event. The Flood Risk Management Adaptation Plan expresses that the work undertaken by the OPW – through the CFRAM Programme – "*contributes towards a number of priorities identified under the Disaster Risk Reduction Framework"* (OPW, 2019; 18-19), namely Priority 1, 'Understanding disaster risk', Priority 3, 'Investing in disaster risk reduction for resilience', and Priority 4, 'Enhancing disaster preparedness for effective response, and to 'Build Back Better' in recovery, rehabilitation and reconstruction (UNDRR, 2015).

Nature-Based Flood Relief Scheme

Nature-based solutions have been identified as another potential avenue to enhance integration of CCA and DRM while simultaneously boosting community resilience (Natoli, 2019). Dublin City Council implemented its Environmental Improvement Scheme – consisting of realignment of footpaths and road surfacing works – while also taking into account flood risk. The design included the management of surface water runoff in a sustainable way, rather than the conventional piped system. This is intended to increase the capacity to deal with extreme rainfall events in an urban setting, whilst contributing to flood resilience by removing surface water discharges from the combined system. A nature-based 'engineered' solution to manage surface water from the preliminary design stage was a cost-effective and climate resilient development, providing better flood management and climate resilience (Clarke & O'Donoghue-Hynes, 2020; 103).

Infrastructure and Transport

The transport sector in Ireland is an example of sectoral climate adaptation, which incorporates strategies for various weather-related events that will have an impact on the national road and light rail network. Transport is used by the majority of the public and is therefore fundamental to the functioning of society. Under a changing climate, meteorological and climate parameters can develop in uncertain ways, and make consequences for transport networks much more difficult to predict (ITF, 2016). The Irish road network is particularly vulnerable to both direct and indirect impacts of climate change. Flooding directly impacts the land transportation service, while degradation of the road service and loss in structural integrity indirectly induces higher maintenance and repair costs. Similarly, for the rail network, inundation of rail sections or damage to railway stations is a high possibility with projected changes in rainfall patterns (Hawchar et al, 2019). An example of this is the Dundalk-Dublin rail line, which is forecasted to see a significant increase in rainfall by mid-century (ibid). Having a coherent framework for adaptation can ensure that risks are outlined, an allocation of responsibilities is undertaken, certain events are prioritised, and strategic decisions are not neglected or overlooked (ITF, 2016).

The Transport Climate Change Adaptation Sectoral Plan was implemented in 2019 under the NAF. In the strategy, the Sendai principle of 'Build Back Better' is integrated throughout. The report notes: *"When infrastructure is damaged during an extreme weather event, consideration should be given to not only restoring operations but also to whether newer technologies or amended capacity is required to future proof the asset"* (DTTS 2019; 14). Moreover, the role of the transport sector in emergency planning was highlighted, with the recognition of climate change adaptation as a co-benefit to response plans in minimising the impact of extreme weather events (ibid; 14). The implementation objectives set out in this plan are:

1. Improve understanding of the impacts of climate change on transport infrastructure, including cross-sectoral cascading impacts, and close knowledge gaps;
2. Assist transport stakeholders in identifying and prioritising climate risks to existing and planned infrastructural assets and enabling them to implement adaptation measures accordingly; and
3. Ensure that resilience to weather extremes and longer-term adaptation needs are considered in investment programmes for planned future transport infrastructure (DTTS, 2019; 84).

In order to achieve these aims, the plan additionally proposes a number of comprehensive adaptation actions, identifying lead departments and stakeholders, and clear linkages between sectors.

Future climatic factors have been factored into road schemes, according to Transport Infrastructure Ireland (2017). In its report on adapting to climate change, it provides an overview on the main challenges it faces, while conveying its strategy for managing, improving, preventing and cooperation with climate-related weather events that impede on transport infrastructure (TII, 2017). According to the report: *"Every effort is made during the planning phase to reduce the impact of flood events, and where feasible, the roads are raised above flood plains"* (TII, 2017; 5). A number of preventative measures have additionally been put in place to minimise the impact in the event of disruption, including identifying hot spots and preparing action plans, and ensuring that future schemes take climate change into account in planning and construction (TII, 2017; 13). Despite not referencing the Sendai Framework in the SEM Framework (2017), the Strategic Emergency Management Guideline 3 on Critical Infrastructure recognises the concept of 'Build Back Better' in regard to investment, and outlines "*It should be the aspiration of all owners/operators to use an opportunity, within financial constraints, to replace or expand CI with new/robust/technologies which have greater resilience to envisaged threats"* (DoD, 2019; 22). Moreover, it identifies that there is a cost-benefit analysis in adding robustness to critical infrastructure (ibid).

Health

Health risks related to climate change are of growing concern worldwide, with the impacts of climate change not only exacerbating existing health problems, but also the threat of new and emerging health issues (UNFCCC, 2017). A Synthesis Report conducted by the Secretariat of the UNFCCC found that certain groups will face disproportionate health impacts from climate change as a result of age, gender and marginalisation. Additionally, many vector-borne diseases are highly sensitive to climate conditions; for example, by lengthening the transmission season and expanding geographical range (UNFCCC, 2017). The importance of reducing climate vulnerability in the health sector in Ireland has been underpinned in the Department of Health's first Climate Change Sectoral Adaptation Plan (DoH, 2019). The plan was prepared under the National Adaptation Framework and pays special attention to particular health vulnerabilities and vulnerability of communities in Ireland. A detailed risk assessment on the health implications of climate change – informed by the MEM approach – considered the likelihood of a climate scenario or event based on climate projections, as well as the potential direct and indirect health impacts that may have on communities in Ireland (DoH, 2019). The Health Service Executive (HSE) operates within across all four Major Emergency Management Regions, each region with its own Emergency Management Plan (HSE, 2020). In 2016, a study was conducted on Irish nurses' preparedness for an influenza pandemic. The study indicated that preparation and planning were *"crucial in maintaining essential services and the integrity of the healthcare system during an Influenza pandemic"* (McMullan & Brown, 2016; 11). This is an example of the necessity of planning and preparedness in disaster risk management, acting as the threshold between mild and severe emergencies. Health is considered an important endpoint for both

climate change and disasters, with reducing vulnerability incremental to addressing the health impacts of CCA and DRM (Banwell et al, 2018; 2). Health sector preparedness has been thoroughly tested by the COVID-19 pandemic and will no doubt be the subject of considerable research attention and lessons learnt in the coming months.

3.2 Challenges and Barriers in Integration

The National Adaptation Framework (NAF, 2018) highlights the growing need for integration of emergency planning, in particular disaster risk reduction, and climate change adaptation. The Framework recognises the positive ramifications of responding to short-term challenges while building long-term resilience. Moreover, the NAF acknowledges the importance of integration between DRM & CCA policies so that *"potential co-benefits are identified and exploited"* (NAF, 2018). Despite originating from different knowledge backgrounds, the converging aims of CCA and DRM should allow for greater impacts through law and policies; more efficient use of available resources; and more effective action in reducing vulnerabilities (Natoli, 2019).

In Ireland's Adaptation Preparedness Scoreboard for the European Commission, it was stated that mechanisms to integrate and coordinate CCA and DRM approaches were *"in progress",* and that Ireland would shortly publish National Framework for Emergency Planning – which will "*include a guideline on climate change adaptation"* (EEA, 2017; 15). The SEM Framework (2017) contains no explicit reference to climate change adaptation at any point, despite Government recognition of the common interests both paradigms share. Additionally, the Sendai Monitor – similar to the EU Adaptation Preparedness Scoreboard – monitors and reports achievements in global targets for the SFDRR. In the years 2015 and 2016, the Government reported on all seven of its' Sendai targets. In 2017 and 2018, Ireland only reported on some of the Sendai targets. Last year, the Sendai Monitor did not receive any update from Ireland (UNDRR, 2020). A set of 38 indicators were established to monitor progress on the Sendai Global Targets. Indicator E1 advises that *"policy coherence relevant to DRR such as sustainable development, poverty eradication and climate change, notably with the SDG's and the Paris Agreement"* (UNDRR, 2019; 253). Despite Ireland's recognition in the National Adaptation Framework (2018) that complementarity between the Sendai Framework and other international instruments such as the SDGs and the Paris Agreement is necessary, the lack of cross-references to these respective international frameworks in the relevant Irish policy documents may be a missed opportunity.

There is much to be gained from improving the alignment and integration of DRM and CCA, as a means of reducing risk and increasing resilience. Venton & La Trobe (2008) have observed that DRM measures will lessen climate impacts, and adaptation measures will reduce disaster risk. Moreover,

the similar aims and agenda of DRM and CCA would benefit both areas, increasing awareness and knowledge development in both paradigms. According to the OECD's most recent Development Co-operation Peer Review (2020), Ireland places a great focus on climate change adaptation in its international development co-operation through Irish Aid. However, the review notes that *"Ireland also needs to improve the mechanisms it uses to identify potential areas of incoherence between its domestic policies and development objectives and to systematically assess and monitor progress in addressing these"* (OECD, 2020; 18). The following section will aim to highlight the various barriers and challenges identified in relevant literature that prevent integration of DRM and CCA. Moreover, it will identify the gaps and opportunities that can promote integration of both paradigms.

Institutional Arrangements

The ESPREssO Project observed that in many instances, on an institutional level, decision-making and policies materialise from different sectors (Amaratunga, 2017; 40).

> *"Institutional barriers are identified as a key challenge that hinders the process of successful integration of CCA into DRR … In most of the countries climate change related policies and decisions are made by the ministries and organisations related to the environment, whereas disaster management and reduction decisions are made by ministries related to infrastructure development. This institutional structure* ***disturbs the communication process*** *which generates an information barrier among the institutions"* (Amaratunga et al, 2017; 40).

The institutions that deal with disaster response and recovery, disaster risk reduction and climate change adaptation are typically separate. In Ireland, the principal body in charge of adaptation policy-making lies within the Department of Communications, Climate Action and the Environment (DCCAE), with CARO regions coordinating climate change adaptation at a local level. In disaster response, responsibilities and arrangements vary across a range of stakeholders, with PRA's assuming the majority of responsibilities in emergencies, alongside varying LGD's, depending on the particular emergency. Monitoring and reporting are completed internally by LGD's.

In terms of vertical alignment between the international and national levels, the Sendai Framework, the key global instrument on disaster risk reduction, is not referenced within the SEM Framework, and although the SEM Framework integrates the four priority actions of the Sendai guidelines, express references to international instruments would allow for more coherent and integrated policies. Likewise, the Strategic Emergency Management Framework (2017) has a comprehensive approach to response and recovery at its core. However, its strategy for focusing on planning, preparation and capacity for adaptation may be not as extensive, despite a dominant focus on risk reduction at an international and EU level, limiting the potential scope of integrating DRM and CCA. A statement by

Ireland at the Third World Conference on Disaster Risk Reduction: "*A common international approach is more effective than separate national approaches. Disasters do not respect borders"* (Government of Ireland, 2015). It follows that a vertically aligned approach would likely be more effective with a clear linking of emergency management and disaster response measures from an international – to national – to local level.

Unequal Funding

Funding has been considered a major barrier in the alignment of CCA and DRM strategies. While integrated approaches are largely recognised as mutually beneficial, a challenge remains in integrating both approaches. Sandholz et al (2020) indicate that little is known about the actual types and magnitude of the cost of policy incoherence. Moreover, according to the PLACARD Project, finance and funding of CCA and DRM may come from separate funding systems, thus creating difficulty in integrating the two sectors.

In relation to disaster management, Ireland, as per the SEM Framework, predominantly addresses response and recovery, with a focus on *"restoring normal functioning"* (DoD, 2017; 28). This is perhaps due to the fact that adaptation measures for critical infrastructure are typically associated with high costs. In many instances, the best (or most cost-effective) option may be not to implement adaptation measures (DTTS, 2019). Since 2009, the DHPLG has made financial support available to assist local authorities in meeting the cost of response and recovery in severe weather events (DHPLG, 2019). This assistance is provided on an ad-hoc basis from savings identified elsewhere in the department budget. The LGD of the particular emergency is to collate costs associated with emergency events (DHPLG, 2019); however it is not specified whether additional funding is provided for increasing the resilience of infrastructure or services against future climate-induced disasters as per Sendai priority 4 to 'build back better'.

However, there is emerging literature to suggest that a lack of integration of the two areas could lead to great financial repercussions (IFRC, 2019). In Ireland, severe flooding that occurred in Galway during Storm Desmond in 2015 generated an estimated cost of €3.8 million for the road network alone (Clarke, 2019; 2). Moreover, it has been estimated that the road networks in Ireland and in the UK could experience cost increases from €59-€89 million per year over the period 2070-2100 (ibid), highlighting that in order to develop adequate emergency planning and response measures, it is integral to quantify the impact of climate change. This is reflected in the latest National Risk Assessment overview, where it is acknowledged that "*the cost of inaction exceeds the cost of action, and that this differential will rise steeply with time"* (Government of Ireland, 2019; 15).

The transport sector, in its adaptation plan, noted the absence of a standardised framework to associate climate or adaptation specific actions with financial investment. The plan identified this as a major knowledge gap, and a barrier in understanding climate resilience within organisations and structures across all sectors in Ireland (DTTS, 2019; 80). Effective disaster risk reduction measures are considered a particularly effective way to limit damage and fatalities when compared to response and recovery, according to a study conducted on the cost-efficient nature of DRR (Hugenbusch & Neumann, 2016).

Misaligned Time Scales

Another point of friction when attempting to integrate CCA and DRM priorities at the national level is the conflicting time scales. Climate change adaptation efforts tend to focus on long-term projections and predicted effects, thus with a heavy reliance on science-based perspectives, whereas members of the DRM sector predominantly work in the humanitarian sector, and focus more on learning from past experience, with more of an emphasis on localised needs (Natoli, 2019; 11).This variation in timescale presents a situation where the immediate impacts tend to overwhelm the capabilities of the affected population and rapid responses are required (Thomalla, 2006). Nonetheless, these inconsistencies in timescales have reduced over the last number of years, through the efforts of CCA and DRM communities in aligning perspectives and actions. Ireland's National Overview of Strategic Risks provides an overview each year of risks considering the *"next twelve months"* (Government of Ireland, 2019; 8). The plan highlights the threat of climate change, with the most *"immediate risks"* considered to be changes in extremes, floods, precipitation and storms (Government of Ireland, 2019; 51). In the National Risk Assessment, completed every five years under the EU Civil Protection Mechanism (2013), it stipulates that consideration was given to the *"potential impact of climate change"* (DoD, 2017; 24); however these potential impacts were not specified in the context of each risk, or throughout the assessment. A time horizon of 12 months for an overview of strategic risks, and a 5-year time span for the National Risk Assessment – according to the EEA – is *"too short"* to inform long term investments in climate risks (EEA, no.15/2017; 126).

Knowledge Gap

The resilience of a community is inextricably linked to the condition of one's physical, social and natural environment. With a growing emphasis on disaster resilience – there has emerged a better understanding of the concept of vulnerability, with a collective realisation of the concepts of resilience and vulnerability being closely related, each contributing to the understanding of disaster impacts and consequences (Tierney, 2014; 165). The ESPREssO Project noted a significant lack of priority dedicated to vulnerability assessments at a national, regional and local level within Europe. According

to Zuccarro et al (2018; 872), there is an obligation for complex and multidimensional risk assessments that consider social and economic vulnerabilities.

On a national level, Ireland's international development and cooperation policy, *A Better World,* largely focuses on *"the furthest behind first",* calling for greater investment in conflict prevention and tackling root causes of vulnerabilities (Government of Ireland, 2019; 2). Ireland has pledged at least €10 million per year for the next three years to the UN Emergency Response Fund (Government of Ireland, 2019b; 17), as well as to *"build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters"* (Government of Ireland, 2018, 222). However, there is scope for domestic progress, with the National Adaptation Framework (2018) acknowledging that further research is needed on vulnerabilities in Ireland.

Ireland's risk assessments, the National Risk Assessment (2017) and Overview of Strategic Risk (2019), both refer to vulnerability in the context of infrastructure, without acknowledging in-depth the human implications of vulnerability and risk. Likewise in the SEM Framework, in reference to critical infrastructure, it is expected that any disruptions caused *"will, as far as possible, be managed in an equitable manner to minimise the impact on society as a whole and in particular vulnerable people"* (DoD, 2017; 19). Similarly, the National Adaptation Framework explicitly references the concept of vulnerability throughout, noting that *"climate change is likely to disproportionately impact on the lowest socio-economic groups in society",* and that these groups are also the *"worst positioned to adapt to the changing climate"* (NAF, 2018; 20). However, it is not specified in any framework *who* is acknowledged as a vulnerable group, and whose needs should be prioritised in the event of a disaster. Natural hazard impacts are unevenly distributed, and Thomalla (2006) notes that in order to reduce vulnerability, there must be a clear understanding of who is vulnerable to the impacts, and how the interactions between nature and society shape the fundamental processes that contribute to vulnerability. Despite the Major Emergency Management Framework highlighting the needs of vulnerable groups in communities when assessing risk, the SEM Framework appears to be one-dimensional in its approach, with no evaluation on the human impact of climate change on vulnerable or at-risk groups. Considering the MEM Framework dates back to 2006, the context of risk and vulnerability it refers to may be outdated, particularly in the context of the increasing risks posed by climate change.

As stipulated by Albris et al (2020), disasters have social roots, and are equally related to societal conditions as they are to hazard exposure and geographical location. While disasters take place at a point in time, it is the societal and economic losses that elongate these repercussions (Tierney, 2014; 125). There are various groups in Ireland that have been and will be disproportionately impacted as a

result of a disaster. If this is not highlighted within risk assessments and implementation plans, Ireland may be susceptible of overlooking the needs of many vulnerable groups. Despite EU Member States making efforts to improve the coherence and transparency of risk assessments at a national level, Zuccaro (2018) suggests there is an absence of a common methodology and differing risk/impact variables (hazard, exposure, vulnerability and impact on communities) (Zuccaro, 2018; 12).

Language Barrier

As discussed by Siders (2020), if there are inconsistencies in terminology or fragmented information, this can lead to potential differences in understandings, further separating both communities working on DRM and CCA. The National Adaptation Framework identifies the term 'resilience' as a common ground to build more integrated policies and actions upon (DCCAE, 2018). However, it is only an opportunity for integration if the definitions used in both frameworks are cognisant of one another. Although differences in terminologies are often valid, separate understandings of the concept of resilience may indicate discrepancies in the way both communities consider vulnerability (Barrott & Bharwani, 2017).

The MEM Framework (2006) provides guidelines on carrying out risk assessments in which it outlines a four-stage approach to determining risk at a local and regional level: i) establishing the context; ii) hazard identification; iii) risk assessment; and iv) recording hazards in a risk matrix (DHPLG, 2006). Each of these approaches require measurement of a societal impact of an emergency. In a disaster risk context on a national level, the term resilience in the MEM Framework (2006) is defined as *"the term used to describe the inherent capacity of communities, services and structures to withstand the consequences of an incident, and to recover/restore normality"* (OPW, 2006; 29). In the SEM Framework, although the term resilience is not defined, *community resilience* is considered as "*the sustained ability of a community to mobilise available resources to respond to, cope with, and then recover from adverse situations, such as emergencies"* (DoD, 2017; 18). Both definitions describe resilience as a way of returning to normal, or the ability to withstand an incident, or 'bounce back' (Siders, 2020; 117). In contrast, the concept used in the National Adaptation Framework is of 'climate resilience' which is defined as *"the capacity of a socio-ecological system to absorb stresses and maintain function in the face of external stresses imposed by climate change and adapt, reorganise and evolve into configurations that improve the sustainability of the system, leaving it better prepared for future climate change impacts"* (DCCAE, 2018; 61). With this definition, there is more of an emphasis on evolving, progression and 'bouncing forward' (Siders; 2020; 119), rather than returning to pre-disaster conditions. When practitioners do not consider their actions outside the scope of their field, they fail to consider the concept may have an entirely different meaning. Both CCA and DRM originate from different backgrounds, with decision-makers in separate sectors arriving at different solutions and – as Siders (2020) highlights – with many of the consequences unknown.

Moreover, in many cases, it is often not an issue of *whether* there are integrative practices, but *where* and *how* these are located within the relevant frameworks. As the EEA (2017) highlights, these good practices are often not explicitly referenced as integrative practices, but due to the nature of the practice/policy, there is both a climate change adaptation and disaster risk element. This will be discussed further in the following section.

Strengthening Participation

From this initial review of the literature, there is a potential challenge in Ireland regarding the systematic incorporation of community perspectives from vulnerable persons or sectors into risk management planning and risk reduction. There is already a great level of community engagement and public consultation in raising awareness on climate change and the increase of frequency and magnitude of severe weather events, as conveyed in the level of detail and community engagement which preceded the development of many of the Local Authority Climate Action / Adaptation Strategies. Having said that, a stronger focus on vulnerabilities would enable a more inclusive risk planning process. Mayo County Council in its Adaptation Strategy notes the need to identify communities which are vulnerable to the impacts of climate change and extreme events, and the need to develop resilience plans, but flags that these activities are not budgeted (Mayo County Council, 2019; 102). Similarly, Cork County Council acknowledges plans to develop a programme to enhance capacity to respond and recover from extreme weather events: *"with specific aims to help the vulnerable community to develop a stronger facilitating role"* (Cork County Council, 2020; 56); however this particular action it is not included within the budget. The OECD – in its most recent Development Cooperation Peer Review – noted that Ireland still lacks a clearly articulated approach to private sector engagement, particularly in the agri-food sector (OECD, 2020). The report notes that the private sector strategy that is currently being created should *"have a clear focus on the development impact of Ireland's private sector engagement on marginalised populations"* (OECD, 2020; 19). The concept of 'just transition' and a 'just recovery' have taken on a new meaning in recent months. As the completion of this literature review takes place against the sombre backdrop of a global pandemic, the relevance of emergency planning and preparedness is reflected globally. As Ireland recovers socially and economically from the COVID-19 period, the promotion of a 'just recovery' – that is inclusive and prioritises the vulnerable, as well as recognising the needs of all (Djalante, 2020) – is at the very core of why CCA & DRM integration is so relevant. Both are equally important processes on managing future risks and galvanising cooperation between communities, across sectors and beyond borders (Stockholm Environmental Institute, 2020). Focusing on building long-term resilience while responding to short-term concerns is paramount.

4. CCA & DRM – Bridging the Gaps

The present research has noted many examples of integrated good practices located within the literature, as described in the previous section. These examples, although not explicitly referenced as such, have the potential to act as a benchmark for more integrated and cohesive policies. The following section will explore further potential pathways for enhancing integration.

4.1 Risk and Adaptation Financing

Investment in disaster risk reduction and prevention is essential to enhance economic, social, health and cultural resilience of persons. Resources for integrated funding could derive from budgets, international actors and private donors. In the 2020 Budget, the Minister for Finance identified climate change as one of the greatest long-term challenges facing Ireland and announced an increase in the price of carbon from €20 per tonne to €80 per tonne by the year 2030 (Oireachtas TV, 2019). This measure is aimed to raise €90 million in 2020 – which will be ringfenced to fund new climate measures. Moreover, a dedicated 'just transition fund' will be created to address priorities, determined by local communities (Oireachtas TV, 2019). The National Development Plan (NDP) 2018-2027 sets out investment priorities that underpin implementation of the National Planning Framework: Project Ireland 2040 (2018). Speaking on the plan, then Minister for Climate Action and Environment Denis Naughten said: "Project Ireland 2040 represents a significant step-change in our approach, both in scale of our ambition and funding that we're making available to meet the challenges. Well over €1 in every €5 is to be spent under the NDP on climate mitigation and adaptation" (O'Sullivan, 2018), with adaptation measures financed in the agri-food sector, land use, forestry and flood risk management (Government of Ireland, 2018). In response to weather emergencies, councils spent a total of €101 million between 2014 and 2018 on areas such as clean-up, road repair and disaster recovery (LGMA, 2020).

Ensuring risks are understood as part of investment decisions, and financing for disaster preparation and recovery takes place in an equitable way, will encourage the integration of CCA and DRM into emergency planning. A potential avenue for integration is to allocate funding where resources are better leveraged to achieve the twin objectives of both sectors. For example, investing in Pre-Disaster Recovery Planning (PDRP) enables effective coordination and decision-making structures, facilitating swift and informed actions. Moreover, it increases the likelihood that planning processes are more inclusive of all stakeholders, including vulnerable groups that perhaps would not have the capacity to participate amidst a disaster (UNDRR, 2017). Additional resilience could be strengthened through appropriate social protection and schemes aimed at reducing vulnerability (Natoli, 2019).

Improved risk data, according to UNDRR (2017), will lead to more efficient and stable financial markets, thus contributing to more effective investment. Promoting consistent use of accurate and appropriate disaster risk and climate risk scenarios by governments, public institutions and financial regulators, as well as private sector firms will explore how existing data can be used to support investors and citizens (UNDRR, 2017). Forecast-based financing is an example of targeted disaster risk financing, which includes anticipating extreme weather events to implement actions before the impact is experienced. Therefore, the focus is more on mitigation, preparedness and emergency response. Forecast-based financing provides assistance for the most vulnerable and at-risk groups before a potential disaster (Leitner et al, 2020).

The transport sector acknowledges the importance of Building Back Better in their climate change adaptation sectoral plan (DTTS, 2019). However, as these principles require a whole of Government approach, for instance, in transport-appropriate land use, building and planning regulations are employed to reduce the possibility of building infrastructure in high risk areas. Consequently, it may be difficult to ensure all sectors are employing these principles if they are not explicitly within national policies and frameworks. Employing 'Build Back Better' priorities will ensure that recovery process can be leveraged to increase resilience of infrastructure at the point of (re)construction. When infrastructure is damaged during an extreme weather event, consideration should not only be given to restoring infrastructure, but considering whether future technologies or more robust groundwork is required to future-proof the asset from eventual climate-related weather events.

4.2 Cross-sectoral Communication, Coordination & Collaboration

In a recently published PLACARD report on strengthening the two approaches, it was identified that in ensuring sound governance in integrating CCA into disaster risk management, there were often challenges faced, such as separate user and stakeholder engagement processes, particularly when many targets of the two spheres were similar (Leitner et al, 2020; 8). According to the ESPREssO Report, a strengthening the interconnectedness of policy response to CCA and DRM, such as better collaboration among stakeholders on a multilateral level, coupled with shared indicators, monitoring protocols and concepts would foster a synergy between both areas, leading to greater social, economic and environmental outcomes (Zuccaro, 2018). A challenge identified by Torney (2020) on the sectoral and local climate change adaptation plans relates to their *"relative newness"* (ibid, 1). Although there is a stronger governance structure than previously existed, requiring sectors to develop CCA plans in isolation does not encourage the collaboration and coordination needed for effective climate adaptation. The author suggests a potential designated entity to "*facilitate collaboration across sectors to develop one national adaptation plan"* (Torney, 2020; 2).

Although CCA and DRM both pursue complimentary aims, they have different structures and policies, thus possessing different norms and value systems. Such differences will not be connected by legislation and financial incentives alone. Communication, coordination and collaboration is key in overcoming the incongruity that lies between both climate change adaptation and disaster risk management. Approaches aimed at strengthening horizontal coordination and identifying roles and liabilities of key stakeholders across all levels, as well as "*streamlining 'top down' and 'bottom up' policies towards participatory models that go beyond mere risk awareness and communication issues, to be focused on community engagement mechanisms able to operationalize knowledge-sharing across relevant sectors"* (Zuccaro, 2018a; 12). In preparation for the Flood Risk Management Climate Adaptation Plan, a consultation workshop was held for stakeholder groups, including local authorities, government departments, members of academia, and operators of critical infrastructure, with findings from the workshop informing the preparation of the Adaptation Plan (OPW, 2019). Moreover, in the drafting of the flood risk management sectoral adaptation strategy, a meeting was held between the OPW and CARO representatives, resulting in a comprehensive adaptation policy that assessed risk.

The series of extreme weather events which hit Ireland during the period 2016-18, including ex-hurricane Ophelia, Storm Emma and the heat wave and drought of 2018, led to a detailed analysis and lessons learnt report conducted by the National Directorate for Fire and Emergency Management in the Department of Housing, Planning and Local Government (2019). The report identified a strength in the communication between local government and the DHPLG, with well-established relationships and effective communication resulting in a clear identification of what needed to be addressed, and coordinating arrangements based on those needs (DHPLG, 2019).

Local Level Integration

Integrated approaches at a local level, would identify various vulnerability factors, contributing to successful implementation, according to Cutter and Osman-Elasha (2018). Under the Local Authority Adaptation Strategy Development Guidelines, local authorities are expected to identify, monitor and assess climate hazards, impact and consequences to increase capacity to plan accordingly for adaptation (DCCAE, 2018). A questionnaire conducted by Clarke & O'Donoghue-Hynes revealed that *all* local authorities had identified or were in the process of identifying the full range of weather events likely to affect their areas, with significant progress in identifying key actors involved. Moreover, almost all local authorities had made significant progress in assessing and documenting the potential future risks posed by extreme weather and climate variability (Clarke & O'Donoghue-Hynes, 2020). Local infrastructure greatly varies among communities, and when plans are tailored to a specific municipality – with the community contributing to the plan – that local knowledge will be of great benefit in identifying risk and resilience factors. This community-based approach is considered an integral element in identifying priorities and objectives when considering climate-smart

disaster management, with particular regard to vulnerable and marginalised groups. Moreover, it would aid in the development of inclusive and sustainable solutions and community resilience potential (Natoli, 2019). Cork County Council, in its adaptation plan, identifies specific targets to support the successful and practiced implementation of adaptation planning, such as mainstreaming CCA into plans, programmes and policies, including the severe weather plan (Cork County Council, 2019). Clarke & O'Donoghue-Hynes (2020) highlight that continuous and comprehensive planning could facilitate local authorities to access and coordinate responses to extreme weather events and climate variability in a "*systematic, evidence informed and consistent manner"* (ibid, 2020; 26).

However, it must also be highlighted that the availability of local data may in fact be limited. Moreover, as illustrated by Leitner et al (2019), there is a lack of Sendai-aligned strategies at a national level, impeding comprehensive CCA and DRM integration at a local level. As previously mentioned, Ireland's SEM Framework, although an integral plan for building resilience of communities in response to disasters, it is not explicitly Sendai-focused, which limits its scope in terms of vertical alignment. Moreover, in a report conducted by Clarke & O'Donoghue-Hynes (2020), it was established that many projects conducted by local authorities run independently of one another in addressing certain issues, thus *"losing out on the opportunity to share their learning or partner and create synergies around projects that were relevant to other local authorities"* (ibid, 8). Sharing knowledge and expertise in the paradigms of CCA and DRM can be greatly beneficial, not only from an international to local level, but from the local to the global, with a reciprocal exchange monitoring actions taken at each level (Cubie & Natoli, forthcoming). As Zuccaro (2018b) suggests, further reflection should examine how to develop harmonised protocols and procedures, and a standardisation of assessments among countries to enhance coherence. While acknowledging that it should not be a one-size fits all model and that effective integration is often country and context specific (Natoli, 2019; 12), it is important to provide a basis for sharing experiences, implementation of common risk strategies and cross-national validation (Zuccaro, 2018b; 17).

A potential point of connection could exist between the CARO and MEM Regions. CARO's are based on regions which face similar risks to climate change (Cork County Council, 2019), such as sea level rise, coastal flooding, storms, ground water flooding and rural pluvial flooding. These risks require effective emergency management. The MEM Regions are grouped into eight regions which have been created for major emergency purposes (Cork County Council, 2019). Looking at the SEM and MEM structures through a climate change adaptation lens could mean more effective and stringent policies, through more effective use of resources, and improved prevention and preparedness to climate risk. Likewise, the viewing of the National Adaptation Framework and Climate Action Plan through a disaster risk reduction lens would allow both paradigms to work in tandem, reinforcing one another. An adaptation plan consisting of actions that foster collaboration across departments and with

other stakeholders, will require tools to support synergistic development. Well-designed workshops could be an opportunity to discuss issues of concern and possible resolutions (Torney, 2020).

4.3 Envisioning a Harmonised Language for CCA & DRM in Ireland

DRM & CCA are both cross-cutting sectoral issues, and thus it is integral that there is a broad involvement of stakeholders for sufficient cooperation. However, when a number of stakeholders are present, it may become difficult to find commonalities in language and terms used, creating diversified knowledge of what constitutes risk, resilience and vulnerability; all major issues within both DRM & CCA frameworks. Integration of both paradigms leads to better access to knowledge, resources and skills, leading to more coherent and harmonised policies in both sectors, and reducing potential for maladaptation.

As previously discussed, the concept of resilience remains incohesive throughout Irish and international frameworks. Without a clear definition, ambition to integrate both CCA and DRM may lead to further incoherence, due to the contrasting definitions in both paradigms. Further clarity on terminology in both frameworks – such as the concepts of resilience and vulnerability – would increase coherence and align goals; achieving mutual benefits for both fields (Siders, 2020). A concept discussed by the UNDRR within their Guide to Assessment of Integrated Research on Disaster Risk (AIRDR), is transformative disaster risk management. The AIRDR report considers vulnerability reduction, effective adaptation and higher resilience as pathways toward transformation (UNISDR, 2015). Gotham & Campanella (2010) use the term 'transformative resilience' in the context of an urban ecosystem, and how *"indicators, properties and drivers of post trauma urban eco-system transformation"* (Gotham & Campanella, 2010; 12). This, in turn, informs how different urban ecosystems can transform and innovate in times of trauma. In this respect, urban ecosystems do not just automatically respond or adjust to trauma but learn from past experiences to reorganise and reinvent themselves in progressive ways. The concept of 'transformative resilience' could be an area of substantial merit from further research, however it falls outwith the scope of the present review. Using language more effectively with shared terminology can be crucial in moving forward toward more integrative practices (Barrott & Bharwani, 2018). Similarly, Ireland would benefit from a ubiquitous definition of vulnerability in all frameworks, ensuring that all stakeholders and relevant key actors are accurately informed. It is worth recognising, in both CCA and DRM fields, that terms can harbour different meanings, so it can be beneficial to search for ways to enhance understandings of how these different terms are used, thereby strengthening knowledge management and increasing opportunities for integration (Barrot & Bharwani, 2018). Placing a dialogue of resilience/vulnerability at the intersection of disaster risk and climate adaptation would provide for a more focused approach in integration of both paradigms.

4.4 Enhancing Knowledge Bases at the Intersection of CCA & DRM in Ireland

The ESPREssO Project identified a lack of platforms for the sharing of knowledge among stakeholders that would enable the progressive application of knowledge in policies concerning DDR and CCA (Amaratunga et al 2017). Based on the research conducted, the Project noted that the limited convergence of science and policy efforts to align CCA and DRM remains a significant barrier (Albris et al, 2020), despite the identified co-benefits for each sector.

Weather-related disasters – including storms, floods and heatwaves – have revealed how vulnerable many Irish sectors, including transport and energy infrastructure, housing stock, agriculture and health, are to climate change (Shine, 2018). A range of vulnerability assessments have been carried out in recent years on the transport, energy and water sectors. However, as stated by Hawchar et al (2019), it is likely that adaptation challenges and opportunities that such sectors face will intersect due to their interdependence on one another. As societies become more complex, in order to effectively manage disaster risk, it is not enough to solely focus on having the means to respond to a particular hazard or event. As expressed by the ESPREssO Project in their Guidelines for Enhancing Risk Management Capabilities: *"An advanced understanding of all aspects of a modern, technological society, from electricity systems, urban planning, public risk awareness and their attitudes to such risks, and governmental structures is needed"* (Zuccaro et al, 2018; 11). Hawcher et al (2019) suggests that in order to ensure a coherent approach to resilience, a broad vulnerability assessment that considers *all* sectors is necessary (Hawchar et al, 2019). Therefore, responding effectively requires a multitude of stakeholders, and involvement of all parts of society. The recently published PLACARD report recommended the engagement of various stakeholders at different scales, stimulating positive effects in both the decision-making process and the outcomes of fostering coherence between CCA and DRM. The report iterates that the engagement of all concerned actors is critical, *"in order to recognise the needs of all"* (Leitner et al, 2020; 9).

National risk assessments can play an integral role in developing CCA plans and act as a joint knowledge base for CCA and DRM (EEA, no.15/2017). However, this integration, at a minimum, requires a common understanding and use of relevant risk metrics. Hazard mapping and risk assessment is an area where integration of DRR and CCA is well advanced and recognised as a priority area. According to the EEA (2017), there is still scope for improving coherence between climate change impacts and vulnerability assessment, and the assessment of disaster risk. There is an opportunity to learn from one another, advancing state-of-the-art knowledge that benefits both communities.

5. Insights from the literature

The benefits of integrating CCA into disaster risk management in Ireland have been acknowledged by both Governmental and non-Governmental stakeholders. The main policy instruments for climate change adaptation and emergency management incorporate clear language to this effect, and integration is pursued on a local level through adaptation plans, in line with the Local Authority Adaptation Strategic Development Guidelines (2018). On a sectoral level, there is an element of cross-sectoral communication, as highlighted by the OPW (2019). However, the literature suggests that there may be potential for greater vertical alignment with international legal and policy frameworks, such as the Sendai Framework for Disaster Risk Reduction, Paris Agreement and the SDGs. As stated by the Government, a common and unified approach at the global level is much preferred than disparate national approaches (Government of Ireland, 2015). Likewise, at the domestic level, there is a need to ensure the horizontal integration of national laws and policies that impact on climate change and risk reduction. While there is evidence that this is beginning to occur, as seen in the CFRAM Programme, the aim of this research project is to explore examples of good practices across the country as well as working with local and national stakeholders to identify what else needs to be done to promote resilience and reduce vulnerability to the predicted negative impacts of increasing frequency and variability of extreme weather events in Ireland. Issues identified for further exploration include:

1. Integration of the concept of build back better during disaster response and recovery, an important aspect of the Sendai Framework, and more explicit linking of Ireland's SEM Framework with the SFDRR priorities for action.
2. Unmitigated climate risk may prompt major financial repercussions (Department of Finance, 2018; 28). As noted by the Irish Government, the cost of doing nothing may surmount the cost of action (Government of Ireland, 2019; 15). Mobilisation of financial and economic systems to simultaneously support CCA and DRM efforts would lead to more efficient use of resources (EEA, 2017).
3. Mainstreaming integrated DRR and CCA approaches in all sectors, drawing from Irish examples of good practice such as the OPW's commitment to a multi-sectoral approach to flood risk management (OPW, 2018).
4. Universal clarity on terminology, fundamental concepts and appropriate risk data in the Irish context across all sectors to ensure coherence and harmonisation in actions and policies.
5. Identification of the most vulnerable groups and communities whose interests and needs should be prioritized to support their resilience to future shocks and participation in planning and decision-making.

6. Strengthening of local and national coordination and information-sharing mechanisms for the horizontal integration of DRM and CCA at national and sub-national level.

As highlighted in UNDRR's Global Assessment Report in 2019 – and more recently with the COVID-19 pandemic – non-linear change in climate is a novel reality, and threatens all three pillars of sustainable development, disaster management and climate action, increasing the propensity of system reverberations (UNDRR, 2019; 4). When certain communities, such as the DRM and CCA sectors, have an opportunity to align in their practices, that interconnectedness and collaboration will create synergistic responses and solutions for both, as well as the potential for cost-effective utilisation of resources in the medium- to long-term. The tighter knit they are, the less room there is for knowledge, information – and most importantly – *people,* to slip through the cracks. A harmonised approach, with all key stakeholders in concordance with one another, would make it easier to cover all bases required for integration. With an integrated CCA and DRM framework that centres increasing resilience and reducing vulnerability in Ireland, the outcomes can only be positive.

5.1 The Next Steps

As mentioned in the project outline, the present review has been drafted as an inauguration in setting the scene for the future project deliverables in enhancing integration of climate change adaptation and disaster risk in Irish emergency planning. The following two deliverables – informed by key findings in the literature review – will not venture to identify specific technical solutions, but instead, determine successful practices and potential barriers for integration, by drawing on various strategies such as the ESPREssO and PLACARD Projects, and more significantly, the three case studies, to assist as benchmarks for successful integration at a national level. These case studies, informed by the stakeholder mapping in Work Package 2, will provide an opportunity for communities and key stakeholders to meaningfully contribute to the research by providing examples of good practices and challenges faced in the integration of CCA and DRM in Irish emergency planning, ideally leading to potential strengthening of resilience capacities and reduction of vulnerabilities.

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