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Infrastructure Climate Change Risk Considering Interdependencies and Cascading Hazards

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Identifying pressures

Extreme weather events such as storms, landslides, river floods and coastal phenomena have threatened and damaged many different regions across Ireland. These events, while rare and often short-lived, can have a devastating impact on critical infrastructure systems. As a result of climate change, these events are becoming more frequent and more intense, affecting not only physical infrastructure but also the environment and society as a whole.

Using risk-based approaches in assessing the impacts of extreme weather events and climate change is a well-established method of identifying the most vulnerable infrastructure, assessing the risks posed to that infrastructure and developing strategies to minimise those risks.

Therefore, the objective of this project was to develop a design for a full-scale study to assess the risk posed to critical infrastructure in Ireland by climate change, with due consideration of interdependencies between different infrastructure types (i.e. cross-sectoral issues) and primary and cascading hazards, that was both achievable and beneficial to the infrastructure owners, society and the environment.

Informing policy

Several national documents are published in Ireland that identify not only the key infrastructure sectors, but also the weather events they are exposed to. These documents provide assistance to the infrastructure owners/managers within the key sectors to develop sectoral adaptation plans to minimise the risk posed by extreme weather events to the infrastructure. While risk assessment is a recommended means of evaluating the vulnerability of a particular infrastructure to a particular event, there are many different risk formulations and methodologies that can be used to undertake a risk assessment, the complexity of which is largely dependent on data and resource availability.

Given the various methodologies available to conduct risk assessments, this project provided an overview of them, outlining the various requirements and information needed to conduct risk assessments of various complexities. Furthermore, an overarching risk assessment methodology was proposed considering the methodologies currently used by relevant stakeholders in Ireland and the information available to them to conduct a meaningful risk assessment.

Developing solutions

This report presents an overarching risk assessment methodology for assessing risks posed to critical infrastructure by climate change. While the methodology proposed was developed through reviewing both national and international research and the authors' own experience in developing risk assessments, the key element in successfully achieving the objectives of the project was extensive engagement with key stakeholders across multiple infrastructure sectors. This engagement provided invaluable information on and insights into current practices and the challenges and barriers faced when implementing meaningful risk assessments. Equally, the presence of cross-sectoral stakeholders highlighted the opportunities and challenges of ensuring that a cross-sectoral approach to risk assessing infrastructure can be achieved. From these interactions, recommendations were made on key issues, such as data collection, data sharing, data security, resource requirements and monitoring regimes, that could be reasonably implemented in the Irish context.

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