

Project Title: Resilient Modelling of Disaster Impacts on Land Use and Mobility (REMoLD)

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1. Project Overview and Context

Climate change is increasing the frequency and intensity of extreme events such as flooding, leading to significant disruptions in land use systems and human mobility patterns. These impacts are not only environmental but also socio-economic, affecting infrastructure, accessibility, and long-term urban resilience.

The REMoLD project aims to develop an integrated, data-driven framework to model and predict the impacts of climate-induced disasters (particularly floods) on land-use change (LUC) and mobility systems. By combining geospatial analysis, remote sensing, and advanced machine learning methods, the project will generate actionable insights for climate adaptation and resilient spatial planning.

2. Objectives

The project has four main objectives:

1. Quantify the impacts of flood events on land-use change at high spatial resolution.
2. Analyse post-disaster mobility disruptions and recovery patterns.
3. Develop causal machine learning models to identify key drivers of resilience and vulnerability.
4. Provide decision-support tools for stakeholders to improve climate adaptation strategies.

3. Methodology

The project integrates multiple data sources and analytical approaches:

- Remote sensing (Sentinel, Copernicus) for flood extent and land-cover mapping
- Geospatial datasets (e.g., building footprints, transport networks, census data)
- Mobility data (aggregated and anonymised sources such as transport flows and digital mobility datasets)
- Machine learning methods (Random Forest, causal forest, clustering techniques)
- Spatial and causal analysis frameworks to identify relationships between environmental exposure and socio-economic outcomes

A case study in Ireland (e.g., Athlone–Shannon region) will serve as a calibration and validation site, with potential for scaling the methodology to broader European contexts.

4. Expected Outcomes and Impact

The project will deliver:

- High-resolution maps of land-use change and mobility disruption
- Predictive models for disaster impact assessment

- A transferable framework for resilience analysis across regions
- Policy-relevant insights for urban planning, infrastructure management, and climate adaptation

The results will support public authorities, infrastructure providers, and private sector stakeholders in making informed decisions under climate uncertainty.

5. Role of Industry Partner

We are seeking an industry partner to collaborate in one or more of the following areas:

- Provision of relevant datasets (e.g., mobility, infrastructure, utilities, insurance)
- Co-development of applied use cases and pilot studies
- Validation of models in real-world operational contexts
- Contribution to impact pathways and commercialisation potential

Relevant sectors include:

- Transport and mobility providers
- Insurance and risk assessment companies
- Utility and infrastructure operators
- Geospatial and data analytics firms

6. Benefits for Industry Partner

- Access to advanced modelling tools and analytics
- Early insights into climate risk and resilience strategies
- Co-authorship in high-impact research outputs
- Opportunity to shape practical, policy-relevant solutions
- Strengthened innovation capacity in climate adaptation

7. Alignment with SUSTAIN-FIT

The project aligns strongly with the SUSTAIN-FIT programme by:

- Addressing climate resilience and sustainability challenges
- Bridging academic research and industry application
- Supporting innovation through data-driven methodologies
- Contributing to Ireland's climate adaptation and digital transformation agenda

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