AI and machine learning for assessing coastal vulnerability to climate change

PhD Opportunity
Co-Centre for Climate + Biodiversity + Water

We invite applications to doctoral research on the use of Artificial Intelligence (AI) and Machine Learning (ML) for assessing coastal vulnerability to climate change, funded through the tri-jurisdictional Co-Centre for Climate + Biodiversity + Water (Climate + Co-Centre) funded by Research Ireland, Department of Agriculture, Environment and Rural Affairs (DAERA), and UK Research and Innovation (UKRI) across Ireland, Northern Ireland and Great Britain.

The project addresses in particular the threats of sea level rise, storm surges and flooding for the island of Ireland. Ireland has some of the highest rates of sea-level rise in Europe and is particularly exposed to storms and associated storm surges that are projected to increase in frequency and in intensity, heightening substantially the risks of coastal flooding and erosion. Annual erosion rates for soft sedimentary coasts, where the greatest population densities reside, are on the increase. The main aim of the project is thus to build a safer and more sustainable future in the context of sea level rise and extreme events on the coast of the island of Ireland by harnessing the capabilities of AI/ML for coastal vulnerability assessments.

The project aims to apply AI and/or ML to large coastal geospatial data sets to improve assessment and prediction of coastal biophysical and human vulnerability to climate change. In the process of doing so, the project will use projections of sea level rise and extreme event occurrence to explore potential coastal management futures. It will produce novel integrated data products and images to illustrate likely scenarios of future coastal change that affect existing homes, infrastructure, and ecosystem benefits (including those of coastal protection, carbon sequestration, biodiversity provision, and health and well-being benefits).

Geo-spatial AI time series modelling will be used to identify coastal changes linked to the multi-faceted spatial data sets relating to factors driving such change. This will provide a framework whereby image and ground-truth data can be combined and analysed using the latest in AI systems with a clear, open-source and repeatable data pipeline drawing on both pre-existing and de novo Climate+ generated data.

The project will use this modelling to assist in the development of coastal management and conservation strategies that are tailored to the specific needs of different coastal regions where the project will identify key attributes and human interventions and their relationship to coastal vulnerability. Much of the work will be relevant and applied to a Climate + Co-Centre industry partner AiDash.

Supervision, stipend, and start date

The student will be part of the Climate + Co-Centre but based in the Discipline of Geography, School of Natural Sciences, Trinity College Dublin, The University of Dublin. They will be jointly supervised by Prof Iris Möller, Discipline of Geography in Trinity, and Prof Tim McCarthy and Prof Rowan Fealy in National Centre for Geocomputation, Maynooth University.

The Award includes a €25k per annum tax-free stipend for 4 years and a tuition fee write-down. This excludes the once-off Application fee (€55) for Admission and the annual Student Levies & Charges (SLC) (approx. €200 p.a.) charged to students at registration.

The successful applicant must be registered and ready to commence by March 2026.

Candidate background

A degree in computer science, engineering, and/or natural science (with a strong focus on quantitative methods and computer programming) is essential. Knowledge / experience of applying Artificial Intelligence and Machine Learning methods to environmental and/or societal data is highly desirable. Candidates will also need to demonstrate an aptitude for and, ideally, experience of the application of remote sensing (image processing) and GIS analysis techniques and, ideally, demonstrate some knowledge of climate adaptation / coastal vulnerability.

Details of Application

Please send a CV, Cover Letter, and two-page Research Proposal Outline to Prof Iris Möller (moelleri@tcd.ie) by 5pm on Friday 5th December 2025.
Shortlisted applicants will be interviewed soon thereafter.

The successful applicant will then have to apply directly to the School of Natural Sciences following the Trinity College PhD application process.