

Post-Doctoral Fellowship: Proposal Outline

Topic	Ocean climate variability and phytoplankton in Irish coastal waters
Research Theme(s)	<ol style="list-style-type: none"> 1) Climate Change 2) Biodiversity 3) Marine Policy
Background and Rationale	<p>Microscopic plankton are an important component of marine ecosystems. As primary producers, phytoplankton are vital to marine food webs including food chains that connect to top apex predators, e.g., sharks and humans' dependent on marine resources. Phytoplankton are also an important element of the carbon cycle which includes carbon sequestration in the deep ocean.</p> <p>Plankton are sensitive indicators of short- and long-term change, and as such, are classed as an Essential Ocean / Climate Variable (EOV, ECV). Climate change consequences stemming (but not limiting) from elevated seawater temperatures, changes in pH, salinity, nutrients and weather patterns (such as winter storms) are expected to influence plankton dynamics. There is also the potential for changes in planktonic diversity due the threat of the occurrence of non-native/invasive species.</p> <p>From an Irish perspective, research carried out through the CoClIME project (pilot decadal predictions) and international activities with colleagues in IOC-UNESCO (global assessment) point to large knowledge gaps in this research area. While the Irish Ocean Climate and Ecosystem Status Report (<i>In Prep</i>) presents recent decadal changes of phytoplankton abundance, distributions and seasonal patterns in Irish waters, only a low number of taxa were investigated. The report highlights the importance and requirement for further investigation, the publication of further case studies in Irish waters with an aim to inform policy, planning and approach to incorporate into climate change adaption plans. To help industry plan there is a need to improve environmental management tools, e.g., phytoplankton community predictions at seasonal and decadal scales.</p> <p>This fellowship fully identifies with the current Marine Institute Strategy (Strategic Focus Area 2, Forecasting Ocean and Climate Change and its strategic initiatives in advancing Ocean and Climate Observation and Monitoring). This is also fulfilling the requirements identified in the National Marine Research & Innovation strategy (MRIS) falling under the theme of Healthy Marine Ecosystems (Climate Change and Biodiversity, Ecosystems and Food-webs).</p>

<p>Scope of Research (Scientific/ Technical Challenge)</p>	<p>The principal objective of this fellowship is to investigate and publish case studies on present and potential future changes of phytoplankton abundance, diversity, and distribution in Irish coastal waters with respect to climate change.</p> <p>These case studies will explore the key areas below, building upon existing knowledge and investigate new methodologies to recommend and implement strategies to inform our understanding of climate change impacts on this key EOY – phytoplankton in Irish waters.</p> <p>The fellow will also work to investigate and advance key research themes in the areas of biodiversity, climate change, and data statistics and modelling) and:</p> <ul style="list-style-type: none"> • Carry out and publish literature review on the impacts of climate change on Phytoplankton. • Carry out robust statistical analyses of available <i>in-situ</i> datasets to examine long-term changes of phytoplankton diversity and abundance in Irish coastal waters. Build capacity in the area of statistical modelling and machine learning approaches to improve phytoplankton and oceanographic dataset analyses and predictions. • Assess the threat of the probability of future occurrence of non-native/invasive species which are hazardous to human health and implications on food safety (e.g. <i>Ostreopsis</i>). • Case study on the consequences of climate change on phytoplankton communities, physiology and abundance. • Investigating resilience of phytoplankton functional types to reveal insights into ecosystem stability in face of global climate change. • Explore the usefulness of satellite remote sensing products (e.g., CMEMS) to discriminate different plankton groups.
<p>Expected Impact(s)</p>	<p>This fellowship will help build national expertise in this research area, and identify strategies for implementation for monitoring plankton changes in the future.</p> <p>The fellow is expected to publish/disseminate their research findings in peer-reviewed scientific papers, through conference presentations, policy briefs, articles, etc. ensuring all data created is made publicly available and accessible.</p> <p>The fellow will engage with relevant national and international networks and forums, with an aim to exploring opportunities for collaboration and securing further research funding under funding mechanisms and bodies, e.g. Horizon Europe, INTERREG, JPI Climate etc.</p>

Outcomes	<ul style="list-style-type: none"> • Publications from research findings and investigations. • Integrating with and informing national policy, planning and approaches for climate change adaptation. • Implement strategies for monitoring plankton changes in the future.
Specific Collaboration	Marine Institute (Marine Environment and Food Safety Services, and Oceans, Climate and Information Services) Department of Agriculture, Food and Marine Climate Action Regional Offices
Location of Fellow	Higher Education Institute or Public Research Body (Republic of Ireland or Northern Ireland)
Duration and Funding Available	4 years €100,000 per annum (i.e. total €400,000 maximum for duration of four years)
References	<p>MI Foresight Report MI Baseline Report on Essential Ocean Variables Irish Ocean Climate and Ecosystem Status Report 2022 (in prep) Irish Ocean Climate and Ecosystem Status Report 2009 Agriculture, Forest & Seafood Climate Change Sectoral Adaptation Plan DAFM - (Phytoplankton included as one of six case studies) UK MCCIP reports on plankton Global harmful Algal Blooms Status Report (2021) Guidelines for the study of climate change effects on HABs (2021, Wells et. al. IOC Manuals and Guides no. 86) Phytoplankton Dynamics under Climate Change</p>