Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

PhD Title

Unlocking the effects of multiple stressors on native oysters to design effective restoration methods.

Introduction

This studentship forms part of the Marine Institute-funded BRICONS project: Building **R**esilient **I**rish **C**oasts through **O**yster Restoration: A **N**ature-Based **S**olution for Enhancing Marine Biodiversity and Ecosystems. This project will advance knowledge on the potential for restoration of native oyster reefs in harbour environments. In particular, the project aims to evaluate how native oysters can act as a nature-based solution to benefit harbours and ports through increased sediment stabilisation, and enhance and improve biodiversity and ecosystem services.

Project Description

Healthy and diverse marine and coastal habitats are recognised as crucial in society's adaptation to and mitigation of climate change. Within policy, a range of marine and coastal habitats are recognised for their specific roles in carbon sequestration, coastal protection and in the maintenance and improvement of water quality – often termed "Nature-Based Solutions". Many coastal habitats are currently in a degraded state, or their areal extent has been reduced owing to human activity.

Native oysters (*Ostrea edulis*) were once widespread across the Island of Ireland, particularly in the sea loughs. These provided a range of ecosystem services that have subsequently been lost. Since industrialisation, many of these water bodies have become highly modified, often through land reclamation and dredging for shipping access, as well as reducing water quality owing to human population density and activities. Ports and harbours play a crucial role in the economy, but also face unique challenges from sea level rise and coastal erosion under climate change. Restoring marine habitats within and adjacent to such areas may provide notable benefits in reducing the impact of climate change as well as promoting biodiversity and wider ecosystem resilience.

This project will work closely with Dublin Port and other BRICON project researchers from partner universities to develop restoration options for the native oyster within and close to Dublin Bay. BRICONS will test techniques for promoting restoration, using best available knowledge and thorough physical and biological understanding of site characteristics. Native oysters will be introduced to trial sites, and appropriate metrics and indicators will be developed in

collaboration with researchers across the BRICONS project partnership to monitor the biodiversity and sediment stabilisation effects.

To predict where translocated juvenile oysters will thrive, we must first understand their optimum conditions for successful recruitment to re-create a self-sustaining oyster bed. This project includes monitoring the environmental conditions (e.g. temperature and salinity) at the host sites and linking them to rates of survival and functioning of transplanted oysters. To further understand how oysters respond to changes in their environment, and to future-proof the potential of restored oyster reefs as a nature-based solution, a series of experimental tests will be performed in the field and laboratory, where juvenile oysters are exposed to a range of conditions that mimic current and future Irish coastal conditions (Schertenleib et al. 2023). Using the experimental platform at Trinity (QIMS; Schertenleib et al. 2024a), experimental tests will be performed that manipulate water temperature, salinity, nutrient concentration and carbonate availability at multiple levels to identify their separate and cumulative effects on the survival and performance of oysters. Oyster performance will be quantified based on their survival, growth, biomass and key physiological performance indicators including condition indices and rates of functioning, such as water filtration capacity (Schertenleib et al. 2024b).

A range of techniques will be utilised throughout the project, including field-based surveys, lab-based experiments and strong data analytical skills.

This PhD will be supervised by Professor Nessa O'Connor, School of Natural Sciences, Trinity College Dublin, the University of Dublin and co-supervised by Dr Annika Clements, School of Biological Sciences, Queen's University Belfast.

NOTE: The deadline for receipt of 1st phase applicants is 18th April 2025 . This PhD is expected to start in September 2025.

This award include:

- EU Fees for a PhD in Science at TCD
- Annual stipend: €25,000 for 4 years
- Access to experimental infrastructure at Trinity College including a mesocosm-based platform - Quantifying the Impacts of Multiple Stressors (QIMS), a suite of state-of-the-art environmental monitoring equipment and access to experimental field sites.

Application Procedure

You are applying for a highly competitive 4-year fully funded PhD project.

You must have a full, clean driving license, be able to work independently, be hard working and solution-oriented and willing to participate fully within a dynamic research team. The successful candidate will hold an Honours Degree (2.1 or higher) in a cognate discipline (e.g. Zoology, Environmental Science, Marine Biology). An MSc or equivalent research experience would be an advantage. Other highly desirable skills include previous experience of field-based skills in aquatic ecosystems and/or with mesocosm systems, a good knowledge of R, and a demonstrated ability to communicate research findings.

Phase 1:

Send preliminary applications to: Prof. O'Connor (n.oconnor@tcd.ie). Please place *'BRICONS PhD APPLICATION'* in the subject line of the email.

Attach a single PDF Document that contains the following:

- A cover letter: Your letter should clearly set out your suitability and motivation for this PhD with reference to your past relevant experience and achievements.
- A CV that includes your relevant experience, undergraduate results, postgraduate results (if applicable), any relevant publications and contact information for 2 academic referees.

Phase 2:

Successful Phase 1 candidates will proceed to Interview. It is expected that that interviews will take place in May. The successful candidate will then be invited to submit a full application to Trinity College Dublin, the University of Dublin.

Funding Notes

Candidates from outside the EU are eligible to apply but must provide evidence of sources of additional funds to cover excesses associated with Non-EU fees.

If English is not the applicant's first language, a certificate of language ability is required. Further details can be found on the TCD Postgraduate webpage.

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Foras na Mara
Marine Institute

BRICONS
Building Resilient Irish Coasts through Oyster Restoration