Foras na Mara
Marine Institute

Cullen Scholarship: Development of a Cumulative Effects Assessment Framework for Ireland's Marine Planning Process

(PhD Award)

Background

In 2014, the European Union adopted Directive 2014/89/EU, establishing a framework for Marine Spatial Planning. The Directive was initially transposed into national legislation by way of regulations made in 2016 (SI 352 of 2016). In October 2018, regulations were repealed and replaced by Part 5 of the Planning and Development (Amendment) Act 2018. This re-transposed the Directive into primary legislation. This led to development of Ireland's draft National Marine Planning Framework (DHPLG, 2019). The purpose of marine spatial planning (MSP) is to ensure the sustainable use and protection of the marine environment. Marine planning decisions (e.g. development of offshore energy infrastructure) need careful consideration to minimize the negative impacts on the ecosystem and ecosystem services. When making planning decisions, numerous anthropogenic pressures such as fishing, shipping, farming, and tourism must be accounted for, as well as indirect stressors including climate change, species loss, and changes in habitat and biodiversity. All of these stressors can have individual effects on the environment, but their combined effect also needs to be identified and measured. Many policy documents on MSP refer to cumulative effects in some way, however there is a need to consider in further detail, how CEA can be integrated into the MSP process. The MSP Directive (2014/89/EU) states that an Ecosystem-Based Approach should be applied to the implementation of the Directive. Part of this is to manage spatial uses and conflicts in marine areas, therefore, addressing Cumulative Effects is an essential part of this process. Additionally, the Environmental Impact Assessment (EIA) Directive (2014/52/EU), requires projects to assess potential cumulative effects. In broad terms, CEA can be defined as "a systematic procedure for identifying and evaluating the significance of effects from multiple human activities" (OSPAR).

Studies on the environmental impacts caused by specific, singular, human activity variables are widespread. For example, impact of wind farms on birds is well researched (Langston & Pullan, 2004; Drewitt & Langston, 2006; Fox et al. 2006; Farfán et al. 2009). Another highly researched topic is the effects of shipping noise on marine mammals (Richardson et al. 2013; Erbe et al. 2018). Furthermore, there is considerable research in the realm of Irish environmental policy and planning, including but not limited to, wind farms (Hallan & González, 2020), CEA (Lally & Gonzales, 2019), and online planning tools (González et al. 2020). There has also been valuable research into the theory of CEA (Bergström et al. 2019; Hodgson et al. 2019), but fit for purpose tools for industry and decision makers have yet to materialize. Additionally, despite the legally required CEA for maritime planning projects, research and guidance on a quantitative assessment of CEA is limited.

The future of Ireland's offshore energy sector is steadily progressing. Ireland's Climate Action Plan (2019), outlines a goal to increase renewable energy capacity in Ireland from 30 to 70% by 2030. Furthermore, the plan outlines a specific aim to develop offshore wind capacity to 3.5 GW by 2030 (at present, Ireland's offshore wind capacity is 25MW) (Cronin et al. 2020; Government of Ireland, 2019).

To date, several Irish offshore wind energy site applications have developed EIA reports, which include descriptions on their specific project's approach to assessing cumulative effects (see for example, Dublin Array EIAR[1]; Codling Wind Park EIAR[2]). However, a standardised approach for a quantitative CEA methodology remains elusive. The need for an interim standardised framework methodology for offshore wind that captures the cumulative nature of projects and their additive and/or synergistic effects on the marine environment is becoming increasingly urgent.

Proposal

We propose **a structured four year PhD project** on a full-time basis to develop and trial approaches to account for cumulative impact within the Marine Spatial Planning process. It will include (but is not limited to) Offshore Renewable Energy (ORE), Marine Protected Areas (MPAs), Strategic Environmental Assessment (SEA), Appropriate Assessment (AA) and Environmental Impact Assessment (EIA). It will include an analysis of suitable Cumulative Effects Assessment methodologies at policy, planning and project scales. It is proposed that a risk-based framework for a GIS Cumulative Effects Assessment methodology for offshore windfarm sites and MPAs in Ireland could be piloted. The MI is a steward for Ireland's MSP digital evidence base (to date, approximately 140 datasets). The number of datasets is expected to indefinitely increase, and the quality is expected to continuously improve. This provides a unique opportunity for a student to develop a CEA methodology that taps into these datasets and information to support real world planning decisions. Additionally, the student will develop and strengthen networking opportunities to build relationships with relevant stakeholders in environmental science and the offshore wind energy sector that would be of value to multiple agencies, including; Department of Communications, Climate and the Environment; Sustainable Energy Authority of Ireland; Wind Energy Ireland; Department of Housing, Planning, and Local Government; and the Marine Institute.

The overarching aim of the project is to identify how decision-makers can account for cumulative impact within Ireland's Marine Spatial Planning process and develop a CEA methodology that supports evidence-based decision-making. It will include ORE, MPAs, SEA, AA and EIA and will produce a suitable Cumulative Effects Assessment framework and methodology (including GIS and risk assessment).

The **deliverables are in bold**. Specifically, the project will aim to:

- Conduct a **literature review** for cumulative effects assessments for ORE, MPAs, SEA, AA and EIA. Review existing approaches for cumulative effects assessments for marine spatial planning.
- Understand infrastructure development processes and ecological/ecosystem processes through engagement with stakeholders (scientists, authorities, & developers). Build on previous research (statistics, surveys, etc.) and projects to **identify cumulative effects**. Incorporate a risk-based approach for unknown CE.
- Develop and validate a framework for Cumulative Effects Assessment for the NMPF and the marine planning process in Ireland. For example, a **risk-based framework or a GIS Cumulative Effects Impact Assessment methodology**.
- Apply the above mentioned framework to develop a **decision-support process** that will serve as the basis for future CE assessment of offshore developments, as well as inform future marine spatial plans.

Outcome

A PhD thesis, comprising at least three chapters (preferably published in peer review journals). The expected outcome of this project is a fit for purpose framework and methodology for a quantitative cumulative effects assessment for marine developments in Ireland. It is envisioned the framework and decision support process will be a useful tool for decision-makers and the offshore sector, and make use of Ireland's current MSP dataset evidence-base.

Links to MI Strategy

This proposal is in alignment with the driver, *Integrated Maritime policy & Blue Growth*. Specifically, this proposal falls within *Strategic Focus Area 1 – Scientific Advice and Services*, specifically within the initiative, *Meeting the Needs of Decision makers.*

Specific Requirements

The applicant should have a primary degree in either:

- Geography, Planning or Environmental Sciences, and a Masters in GIS or related subject with strong GIS skills.
- A numerate subject (e.g. maths, actuarial science, statistics, physics etc.), and a Masters in GIS or related subject with strong GIS skills.

The applicant will ideally have additional expertise or experience in ecology, geology, environmental policy, or environmental planning.

Financial Details

Scholarships will be up to €27,500 per annum (maximum funding of €110,000 over four years). This amount comprises a maintenance award of €18,500 (Irish Research Council rate effective 1-Jan-21) to the student as well as payment of fees to the host higher education institution (HEI). The maximum fees payable to the HEI will be €6,000 per annum. The scholarship award also includes a budget of up to €3,000 per annum for eligible research costs (travel & subsistence, publication costs, consumables and other costs e.g. laptop) for the sole use of the student, and are payable on a reimbursement basis direct to the host institution where the postgraduate student (scholar) is registered. There are no overheads payable on the scholarship. Publication costs are intended to cover publications on which the scholar is listed as first author and are published under Open Access.

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Glossary of Terms

DHPLG: Department of Housing, Planning, and Local Government
MSP: Marine Spatial Planning
EIA: Environmental Impact Assessment
CEA: Cumulative Effects Assessment
OSPAR: The Convention for the Protection of the Marine Environment of the North-East Atlantic
ORE: Offshore Renewable Energy
MPAs: Marine Protected Areas
SEA: Strategic Environmental Assessment

References

- Bergström, L. et al., 2019. Cumulative Impact Assessment for Maritime Spatial Planning in the Baltic Sea Region. Pan Baltic Scope
- Cronin, Y., Wolsztynski, E., Cummins, V., 2020. Public Perception of Offshore Wind Farms Report Part 2, EirWind Project Deliverable D4.7 Report, MaREI Centre, ERI, University College Cork, Ireland. DOI: http://doi.org/10.5281/zenodo.3948450
- Department of Housing Planning, and Local Government, (DHPLG), 2020. National Marine Planning Framework Consultation Draft. Ireland
- Drewitt, A. L., & Langston, R. H., 2006. Assessing the impacts of wind farms on birds. Ibis, 148, 29-42. https://doi.org/10.1111/j.1474-919X.2006.00516.x
- Erbe C., Dunlop R., Dolman S., 2018. Effects of Noise on Marine Mammals. In: Slabbekoorn H., Dooling R., Popper A., Fay R. (eds) Effects of Anthropogenic Noise on Animals. Springer Handbook of Auditory Research, vol 66. Springer, New York, NY. https://doi.org/10.1007/978-1-4939-8574-6_10.
- Farfán, M. A., Vargas, J. M., Duarte, J., & Real, R. (2009). What is the impact of wind farms on birds? A case study in southern Spain. Biodiversity and Conservation, 18(14), 3743-3758. https://doi.org/10.1007/s10531-009-9677-4.
- Fox, A. D., Desholm, M., Kahlert, J., Christensen, T. K., & Krag Petersen, I. B., 2006. Information needs to support environmental impact assessment of the effects of European marine offshore wind farms on birds. Ibis, 148, 129-144. https://doi.org/10.1111/j.1474-919X.2006.00510.x.
- González, A., Kelly, C., & Rymszewicz, A., 2020. Advancements in web-mapping tools for land use and marine spatial planning. Transactions in GIS, 24(2), 253-267. https://doi.org/10.1111/tgis.12603.
- Government of Ireland, 2019. Climate Action Plan.pdf, 2019. https://www.gov.ie/pdf/?file=https://assets.gov.ie/25419/c97cdecddf8c49ab976e773d4e11e515.pdf#page=null
- Hodgson, E. E., Halpern, B. S., & Essington, T. E., 2019. Moving beyond silos in cumulative effects assessment. Frontiers in Ecology and Evolution, 7, 211. https://doi.org/10.3389/fevo.2019.00211.
- Richardson, W. J., Greene Jr, C. R., Malme, C. I., & Thomson, D. H., 2013. Marine mammals and noise. Academic press.
- Hallan, C., & González, A., 2020. Adaptive responses to landscape changes from onshore wind energy development in the Republic of Ireland. Land Use Policy, 97, 104751.
- Langston, R. H., & Pullan, J. D., 2004. Effects of wind farms on birds (No. 18-139). Council of Europe

1- https://dublinarray.com/wp-content/uploads/2020/10/Dublin-Array-EIAR-Scoping-Report-Part-1-of-2.pdf
2- https://codlingwindpark.ie/environmental-impact-assessment-published/