ZERO WASTE ALLIANCE IRELAND

Towards Sustainable Resource Management

Submission by Zero Waste Alliance Ireland in Response to the European Commission's Call for Evidence on the proposed European Oceans Pact (2025)

17 February 2025

Zero Waste Alliance Ireland is funded by the Department of the Environment, Climate and Communications through the Irish Environmental Network, and is a member of

EEB European Environmental Bureau and IEN Irish Environmental Network

An Tinteán Nua, Ballymanus, Castlepollard, County Westmeath, Ireland
An Tinteán Nua, Baile Mhánais, Baile na gCros, Co. an Iarmhí, Éire, N91 PP76.
Telephone: +353 44 966 2222 Mobile: +353 85 215 5289 Email: admin@zwai.ie

ZERO WASTE ALLIANCE IRELAND

Towards Sustainable Resource Management

Observations and Feedback by Zero Waste Alliance Ireland in Response to the European Commission's Call for Evidence on the proposed European Oceans Pact

17 February 2025

CONTENTS

Contd.

CONTENTS, CONTD

Contd

CONTENTS, CONTD

FIGURES

APPENDICES

ZERO WASTE ALLIANCE IRELAND

Towards Sustainable Resource Management

Observations and Feedback by Zero Waste Alliance Ireland in Response to the European Commission's Call for Evidence on the proposed European Oceans Pact

17 February 2025

1. INTRODUCTION

Healthy seas and oceans are central to life on Earth, maintaining and regulating the climate, producing over half of the oxygen in the atmosphere, supporting an extraordinarily wide range of human activities and essential requirements, and allowing human societies to pursue various forms of environmentally and socially sustainable development.

Covering almost three quarters of the Earth's surface, the seas and oceans contain 97% of the Earth's water, and they support directly or indirectly every life form which inhabits the planet, including all forms of terrestrial life.

Human societies' combined impacts on the seas and ocean are immense and almost entirely destructive. In order to limit such destruction, and to sustainably manage and protect the planet's seas and oceans, we need to better understand the marine environment, the physical, chemical and biological components of marine systems, the interactions between oceans and atmosphere, and the interactions between land and seas, including coastal waters. Reaching a good level of such understanding – let's call it ocean literacy – is essential for the overall future of the planet, given the widespread nature and extent of human activities, a significant proportion of which must be considered as ecologically damaging or destructive.

James Lovelock, writing in "*Gaia – A New Look At Life On Earth"*,[1] quotes from Arthur C Clarke who observed that "*how inappropriate [it is] to call this planet Earth when clearly it is Ocean".* James Lovelock reminds us of the "*magnificent photographs taken from space showing our planet as a sapphire blue globe flecked with soft wisps of cloud and capped by brilliant white fields of polar ice. The beauty of our home contrasts sharply with the drab uniformity of our lifeless neighbours Mars and Venus which both lack that abundant covering of water".*[2]

Lovelock expands on the importance of the oceans, stating that …

> *"They are vital parts of the global steam engine that transforms the radiant energy from the sun into the motions of air and water which in turn distribute this energy over all regions of the world. Collectively, the oceans form a reservoir of dissolved gases which helps to regulate the composition of the air we breathe and to provide a stable environment for marine life – about half of all living matter".*[3]

Even though James Lovelock wrote this description of the importance of the world's ocean in 1979, the statement is no less true today. Thirty years later, writing in 2009, James Lovelock referred to an observed "*progressive decline in the population of ocean algae, causing the barren area of the ocean to have increased by 15% in the past nine years. This is a consequence of global heating that has made the surface waters warmer and less well mixed with nutrient rich waters below"*.[4]

Even before James Lovelock had made the important connection between ocean and atmosphere, The "*World Commission On Environment And Development – Our Common Future"* published in 1987, stated that …

> "*The oceans provide the ultimate sink for the byproducts of human activities. Huge, closed septic tanks, they receive wastes from cities, farms and industries via sewage outfalls, dumping them from barges and ships, coastal run-off, river discharges, and even atmospheric transport. In the last few decades, the growth of the world economy, the burgeoning*

---

[1] Gaia – A New Look At Life On Earth; James Lovelock, 1979. Oxford University Press, 1979.

[2] *Gaia – A New Look At Life On Earth*; James Lovelock, 1979. Chapter 6, The Sea, Page 84.

[3] And it might be of interest to Irish readers that James Lovelock states in his preface to the book that he began writing it when he was in Ireland in 1975, and that most of it came to his mind when he was walking or sitting on the warm red sandstone slabs of Hungry Hill, with an "*unusually pleasing view of Bere Island and the end of Bantry Bay as it merged into the broad Atlantic".* Hungry Hill, Bere Island and Bantry Bay are in the coastal area of West Cork, in the south-western corner of Ireland.

[4] *The Vanishing Face Of Gaia – A Final Warning*; James Lovelock, 2009. Allen Lane, Penguin Books, page 29.

demand for food and fuel, and accumulating discharges of wastes have begun to press against the bountiful limits of the oceans.

The oceans are marked by a fundamental unity from which there is no escape. Interconnective cycles of energy, climate, marine living resources and human activities move through coastal waters, regional seas and the closed oceans".[5]

1.1 Global Awareness Of The Importance Of The Oceans

The important work of raising awareness of the importance of the oceans, started by The "*World Commission On Environment And Development – Our Common Future"*, and by James Lovelock and many others, continues to the present time.

For example, the "World Ocean Review",[6] published every two or three years by *Maribus gGmbH*, a non-profit limited liability company founded in 2008 by publisher Nikolaus Gelpke of Mare Verlag, based in Hamburg, provides up-to-date information on the state of the world's oceans. Maribus was founded for the specific purpose of raising public awareness of marine science and thus contributing to more effective marine protection.

Another organisation "*The High Level Panel for a Sustainable Ocean Economy"* (Ocean Panel) is a global initiative to build a momentum towards a socially and environmentally sustainable ocean economy in which effective environmental protection, sustainable production and equitable prosperity go together. By improving humanity's relationship with the ocean, linking ocean health and economic benefits, working with diverse stakeholders and harnessing the latest knowledge, the Ocean Panel aims to facilitate a better and more resilient future for the oceans and the planet.[7]

The Ocean Panel produces regular well-researched reports and calls to action which advocate raising awareness of human societies' collective opportunity and responsibility to protect and restore the health of our ocean. These reports describe the Ocean Panel's detailed vision for protection of the world's oceans,[8] and a unique report on the importance of utilising indigenous and traditional

[5] *Our Common Future – Report by the World Commission on Environment and Development*; chaired by Gro Harlem Brundtland, Oslo, March 1987. Oxford University Press 1987. Chapter 10, Page 262.

[6] https://worldoceanreview.com/en/

[7] https://oceanpanel.org/about-ocean-panel/

[8] *Transformations for a Sustainable Ocean Economy – A Vision for Protection, Production and Prosperity. https://oceanpanel.org/wp-content/uploads/2022/06/HLP_Transformations_2023_v5.pdf*

knowledge in ocean management.[9] The report on traditional and indigenous knowledge explores the critical importance of co-producing Sustainable Ocean Plans (SOPs) with indigenous and traditional knowledge (ITK) holders, marking a paradigm shift in how we approach ocean governance and conservation.

Traditionally, ocean management strategies have often overlooked or undervalued the rich accumulation of knowledge and practical experience of indigenous peoples and traditional communities. This oversight has not only led to less effective conservation efforts but has also perpetuated historical injustices and power imbalances. This Ocean Panel report, which we would suggest is of special relevance to the European Union and to coastal communities in EU Member States, seeks to address these deficiencies, and it proposes a transformative approach that places equity, inclusion, and restorative justice at the heart of ocean planning.

It is our submission that this is one of the few reports and ocean policy documents which recognises the knowledge and experience of coastal dwellers, whether they are located on remote Irish islands, or on the margins of other EU coastal states.

While the EU Conference of Peripheral Maritime Regions (CPMR),[10] which is headquartered in Rennes, Brittany, focuses on social, economic and territorial cohesion, maritime policies, energy, transportation, fisheries, climate mitigation and adaptation, and many other relevant and significant issues, the CPMR does not give the impression of learning from the traditional coastal communities, many of whom feel isolated and remote, in a Europe that is becoming more centralised. Nevertheless, the CPMR undertakes a range of policy and communications work which has increased our understanding of the needs of the 150 maritime and coastal regions within the EU which are represented on the CPMR, and therefore we would submit that this organisation should be a key stakeholder in the proposed Ocean Pact.

The United Nations Sustainable Development Goal number 14, *Life Below Water*, also emphasises that healthy oceans and seas are essential to human existence and life on Earth. Oceans and seas provide key natural resources including food, medicines, biofuels and other products; help with the breakdown and removal of

[9] *Strand, M., G. Retter, M. Khan, A. Frid, M.Hudson, K. Leonard, K. Paul, C. Baron-Aguilar, R. Boswell, A. Cisneros-Montemayor, A. E. Copenhaver, Y. Costa, L. Hiwasaki, N. J. R. Jones, B. P. Kelly, J. Kosgei, V. K. Metcalf, A. Moshani, G. Y. Oduro, C. P. Scott, and V. Rakotondrazafy. 2024. Co-producing Sustainable Ocean Plans with Indigenous and traditional knowledge holders. Washington, DC: World Resources Institute. Available online at https:// doi.org/10.69902/8f1075e8.*

[10] https://cpmr.org/who-we-are/

waste and pollution; and their coastal ecosystems act as buffers to reduce damage from storms. They also act as the planet's greatest carbon sink.[11]

The UN has expressed serious concern that marine pollution is reaching extreme levels, with over 17 million metric tonnes clogging the ocean in 2021, a figure set to double or triple by 2040. Plastic is the most harmful type of ocean pollution.

A further problem is that the ocean's average pH is 8.1 which is about 30% more acidic than in the pre-industrial era. This degree of ocean acidification threatens the survival of marine life, disrupts the food web, and undermines vital services provided by the ocean and our own food security. Careful and better management of this essential global resource is therefore a key feature, essential for a sustainable future. Better management includes increasing funding for ocean science, intensifying conservation efforts, and urgently turning the tide on climate change to safeguard the planet's largest ecosystem.

An additional concern is that current efforts to protect the world's seas and oceans are not yet meeting the urgent need to safeguard this vast, yet fragile, resource. The UN reports that while there has been some progress in expanding marine protected areas, combating illegal, unreported and unregulated fishing, banning fishing subsidies and supporting small-scale fishers, action is not advancing at the speed or scale required to meet Goal 14. The European Union has also expressed concern that its ocean-related policies are fragmented, and do not contribute significantly to the achievement of Sustainable Development Goal 14 (section 1.2 below).

To counter these trends, swift and coordinated global action is imperative. This requires increasing funding for ocean science, intensifying conservation efforts, advancing nature-based and ecosystem-based solutions, addressing the interconnections and impacts of human-induced pressures, and urgently turning the tide on climate change to safeguard the planet's largest ecosystem.

It is against this background that the European Union is actively promoting an "ocean policy", described as an Ocean Pact, the subject of this call for evidence.

1.2 The Role Of The European Union and Proposal for an Ocean Pact

The Commission's introduction to this "*Call for Evidence"* on a draft European Ocean Pact states that the EU has the largest Exclusive Economic Zone (EEZ) in the world and is the world's second largest market of fishery and aquaculture products. Next to the traditional fisheries sector, the "*blue economy"* of the EU

[11] https://www.un.org/sustainabledevelopment/oceans/

has some of the most dynamic economic sectors – renewable energy; aquaculture; marine science and technology; marine biotechnology; shipping, coastal and maritime tourism, and ports and maritime transport.

The Commission's introduction encourages us –

> "*to look at how we interact with the ocean – how we impact the ocean, how the ocean impacts us (resilience of the industry and of the coastal communities in the face of climate change), as well as at the opportunities we can harvest from the ocean, acknowledging its importance in terms of competitiveness, sustainability, and climate change mitigation/adaptation: all intrinsically linked to global welfare. This is crucial, given the recent geopolitical and geoeconomic changes, the effects of pollution, climate change, the loss of biodiversity (triple planetary crisis) and the EU's role as a global champion of sustainability, not only achieving its sustainability objectives, but in setting an example and accompanying and supporting its partners in their efforts to achieve theirs. It is also key in making sure the EU can seize all opportunities offered by the ocean".*[12]

The Commission's introduction further states that, despite the importance of the seas and ocean which surround EU Member States, and despite a move towards more coherence, the ocean-related policies of the EU remain fragmented, and do not contribute significantly to the achievement of Sustainable Development Goal 14.[13] There is a need to assess the way in which Member States, national organisations and civil society interact with the seas and the ocean, i.e., how we impact the ocean, how the ocean impacts us (for example, what is the resilience of coastal communities in the face of climate change). At the same time, European institutions should use the opportunities presented by the seas and ocean to develop the "blue economy".

A European Oceans Pact is therefore considered necessary to support coastal communities and rural communities which depend on the seas and ocean. The Pact will be crucial to address urgent issues such as the triple planetary crisis, competition for marine space, economic competitiveness, fisheries and aquaculture management, all requiring coordinated action across Member States.

The international aspect or aim of the European Oceans Pact will be to maintain and strengthen the EU's global leadership in protecting and restoring the marine environment, to ensure a level playing field, to uphold EU social standards, and

[12] European Commission document Ares (2025) 419841, 20-January-2025. https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14474-The-European-Oceans-Pact_en

[13] UN Sustainable Development Goal 14 advocates the conservation and use of the oceans, seas and marine resources for sustainable development.

to continue promoting an international ocean governance system based on international law, with the UN Convention on the Law of the Sea and its implementing agreements, in particular the BBNJ Agreement at its core.[14]

The European Oceans Pact will also aim to foster and set a vision for a holistic approach, integrating environmental, economic, and social dimensions, ensuring that all stakeholders – including local communities, regional and local authorities, industries and NGOs – are engaged in ocean governance.

One of the principal aims of the European Oceans Pact is to build on the foundations laid by the EU Fisheries and Oceans Package[15] and the EU Communication on the sustainable blue economy,[16] and to take a broader and more integrated approach to ocean governance across all sectors of society. This aim is to be achieved by developing a single reference framework for all ocean-related policy actions during the Commission's mandate; and, in order to achieve this aim, the Oceans Pact includes three equally important objectives, which are inter-related and should be pursued in parallel:

1) aim for the achievement of a healthy and productive ocean by implementing relevant EU legislation and championing the EU's international ocean governance agenda;

2) boost a competitive, resilient, and sustainable EU blue economy, including fisheries; and,

3) consolidate, simplify, and extend the EU's marine knowledge framework.

1.3 What is missing from the European Commission's Introduction to the Call for Evidence

While the European Commission's ***Call for Evidence*** sets out the regulatory context, emphasises the importance of seas and oceans in the political agenda of the EU, defines the problem of achieving better management of the continent's surrounding seas and ocean, and provides some appropriate aims and objectives for the European Oceans Pact, it fails to describe (or even to list) the multiple and

[14] Agreement under the United Nations Convention On The Law Of The Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction; United Nations, 2023 (64 pp).

[15] European Commission press release on fisheries, aquaculture and marine ecosystems – transition to clean energy and ecosystem protection, 21-Feb-2023. https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_23_828/IP_23_828_EN.pdf

[16] European Commission Communication on a New Approach for a Sustainable Blue Economy in the EU, 17-May-2021 COM(2021) 240 final

often conflicting ways in which Europe's coastline and the surrounding seas and ocean are managed and utilised.

Describing these uses, assessing current and potential conflicts, and showing how the reduction of these conflicts can be achieved, should be an integral aim of the European Oceans Pact. Competition for ocean space, and competition for resources, have become more contentious in recent years, as countries seek to gain commercial or other advantages over perceived rivals. The ethic of working together, of cooperating and exchanging information, is still strong, and needs to be encouraged; and the need to take greater care of the marine environment and its living organisms should be a higher priority than achieving a "*competitive economy"*.

As pointed out briefly in our introductory and background sections above, the Commission's approach seems to take a limited or restrictive view of the entire body of problems connected with the protection and ecologically beneficial management of coastal seas and the ocean. In our submission, we will expand on this preliminary observation; while recognising the difficulty of listing and describing all of the multiple ways in which nation states, national organisations, regional authorities, civil society, economies, communities and individual persons interact with the seas and ocean which surrounds us.

2. ZERO WASTE ALLIANCE IRELAND (ZWAI)

At this point we consider that it is appropriate to mention briefly the background, aims, activities, policies and strategy of ZWAI, and to mention some of our previous submissions to the European Commission and to Irish Government departments.

2.1 Origin and Early Activities of ZWAI

Zero Waste Alliance Ireland (ZWAI), established in 1999, and registered as a company limited by guarantee in 2004, is a Non-Government Environmental Organisation (eNGO) and a registered charity. ZWAI has prepared and submitted to the European Commission, the Irish Government and to Irish State Agencies many policy documents on waste management and waste elimination, and continues to lobby the Irish Government and the European Commission on using resources more sustainably, on promoting re-use, repair and recycling, and on development and implementation of the Circular Economy.

One of our basic guiding principles is that human societies must behave like natural ecosystems, living within the sustainable flow of energy from the sun and plants, producing no materials or objects which cannot be recycled back into the earth's systems, or reused or recycled into our technical systems, and should be guided by economic systems and practices which are in harmony with personal and ecological values.

Our principal objectives are:

i) sharing information, ideas and contacts,

ii) finding and recommending environmentally sustainable and practical solutions for domestic, municipal, industrial and agricultural waste management, and for more efficient and ecologically appropriate uses of natural resources such as scarce minerals, water and soil;

iii) lobbying Government and local authorities to implement environmentally sustainable waste management practices, including clean production, elimination of toxic substances from products, re-use, repairing, recycling, segregation of discarded materials at source, and other environmentally and socially beneficial practices;

iv) lobbying Government to follow the best international practice and EU recommendations by introducing fiscal and economic measures designed to penalise the manufacturers of products which cannot be re-used, recycled or composted at the end of their useful lives, and to financially support companies making products which can be re-used, repaired, recycled or are made from recycled materials;

v) raising public awareness about the long-term damaging human and animal health and economic consequences of landfilling and destruction by mass burning or incineration of potentially recyclable or re-usable materials;

vi) investigating, raising public awareness and lobbying Irish Government departments and agencies about our country's failure to take adequate care of vulnerable and essential natural resources, including clean water and air, biodiversity, and soil;

vii) advocating changes in domestic and EU legislation to provide for more ecologically appropriate, environmentally sustainable and efficient uses of natural resources; and,

viii) maintaining contact and exchanging information with similar NGOs and national networks in the European Union and in other countries, and with international zero waste organisations.

2.2 Our Basic Principles

Human communities must behave like natural ones, living comfortably within the natural flow of energy from the sun and plants, producing no wastes which cannot be recycled back into the earth's systems, and guided by new economic values which are in harmony with personal and ecological values.

In nature, the waste products of every living organism serve as raw materials to be transformed by other living creatures, or benefit the planet in other ways. Instead of organising systems that efficiently dispose of or recycle our waste, we need to design systems of production that have little or no waste to begin with.

There are no technical barriers to achieving a "*zero waste society"*, only our habits, our greed as a society, and the current economic structures and policies which have led to the present multiple environmental, social and economic crises.

"*Zero Waste"* is a realistic whole-system approach to addressing the problem of society's unsustainable resource flows – it encompasses waste elimination at source through product design and producer responsibility, together with waste reduction strategies further down the supply chain, such as cleaner production, product repairing, dismantling, recycling, re-use and composting.

ZWAI strongly believes that Ireland and other Member States, and the EU as a whole, should have a policy of not sending to other countries our discarded materials for further treatment or recycling, particularly to developing countries where local populations are being exposed to dioxins and other very toxic POPs. Relying on other countries' infrastructure to achieve our "recycling" targets is not acceptable from a global ecological and societal perspective.

2.3 What We are Doing

Our principal objective is to ensure that government agencies, local authorities and other organisations will develop and implement environmentally sustainable resources and waste management policies, especially resource efficiency, waste reduction and elimination, the promotion of re-use, repair and recycling, and the development and implementation of the Circular Economy.

As an environmental NGO, and a not-for-profit company with charitable status since 2005, ZWAI also campaigns for the implementation of the **UN Sustainable Development Goals**, including (but not limited to) Goal 12, Responsible Consumption and Production; Goal 6, Clean Water and Sanitation (having particular regard to the need to avoid wasting water, and to wasting nutrients contained in our wastewater); and Goal 15, to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, to halt and reverse land degradation and to halt biodiversity loss.

In responding to many public consultations, members of ZWAI have made submissions and given presentations on:

- How Ireland, the European Union and the Irish food industry should address the problems of single-use plastic packaging and plastic waste (March & Nov. 2019);
- Transforming the construction industry so that it could become climate-neutral (instead of being a major emitter of greenhouse gases & toxicants);
- Observations on the general scheme of the Irish Government's Circular Economy Bill (October 2021);
- Several observations and submissions addressing the need for recovery and reuse of the phosphorus and nitrogen content of wastewater (2019 to 2023);
- Observations to the European Commission on a proposed revision of the EU Regulation on Shipments of Waste (January 2022);
- Feedback to the European Commission on a proposed Directive on Soil Health – Protecting, Sustainably Managing and Restoring EU Soils (March 2022);[17]
- Submission in response to a public consultation on the review of Ireland's security of energy supplies (October 2022);[18]

[17] https://www.zwai.ie/resources/2022/protecting-sustainably-managing-and-restoring-eu-soils/

[18] Submission to the Department of the Environment, Climate and Communications in Response to the Public Consultation on a Review of the Security of Energy Supply of Ireland's Electricity and Natural Gas Systems; https://www.zwai.ie/resources/2022/public-consultation-on-a-review-of-the-security-of-energy-supply-of-irelands-electricity-and-natural-gas-systems/

- Submission in response to a public consultation on Ireland's Fourth National Biodiversity Action Plan (November 2022);[19]
- Submission in response to a public consultation on Ireland's National Bioeconomy Action Plan 2023-2025 (January 2023);[20]
- Submission in response to a public consultation on Ireland's draft Waste Management Plan for a Circular Economy (July 2023);[21]
- Submission in response to a public consultation on the problem of disposable vaping devices (July 2023);[22]
- Observations and recommendations on the rapidly increasing European and global problem of waste electronic & electric equipment (WEEE, Sept. 2023);[23]
- Observations to the European Commission on a Proposed EU Directive on Soil Monitoring and Resilience (November 2023);[24]
- Observations on the Irish Government's draft Green Public Procurement Strategy & Plan (November 2023);[25]
- Observations and feedback to the European Commission on the proposed revision of the EU Waste Framework Directive (November 2023);[26]

[19] https://www.zwai.ie/resources/2022/submission-to-the-department-of-housing-local-government-and-heritage-in-response-to-the-public-consultation-on-irelands-fourth-national-biodiversity-action-plan-nbap/

[20] https://www.zwai.ie/resources/2023/zwai-submission-on-irelands-national-bioeconomy-action-plan-2023-2025/

[21] Submission to the Regional Waste Management Planning Offices on the draft Waste Management Plan for a Circular Economy; ZWAI, 05 July 2023: https://www.zwai.ie/resources/2023/submission-on-the-draft-waste-management-plan-for-a-circular-economy/

[22] Submission to the Department of the Environment, Climate and Communications in Response to the Department's Public Consultation on Disposable Vaping Devices; ZWAI, 27 July 2023: https://www.zwai.ie/resources/2023/submission-to-the-decc-on-disposable-vapes-and-why-they-should-be-banned/

[23] Submission by ZWAI to the European Commission on Waste from Electrical and Electronic Equipment — Evaluating the EU Rules; ZWAI, 22 September 2023. https://www.zwai.ie/resources/2023/waste-from-electrical-and-electronic-equipment-weee-evaluating-eu-rules/

[24] Observations and Feedback to the European Commission on the Proposed EU Directive on Soil Monitoring and Resilience; ZWAI, 03 November 2023. https://www.zwai.ie/resources/2023/submission-on-the-proposed-eu-directive-on-soil-monitoring-and-resilience/

[25] https://www.zwai.ie/resources/2023/submission-to-the-decc-on-the-draft-green-public-procurement-strategy-and-action-plan/

[26] https://www.zwai.ie/resources/2023/observations-and-feedback-to-the-european-commission-on-the-proposed-revision-of-the-eu-waste-framework/

- Observations & feedback to the European Commission on revision of Directives 2000/53/EC & 2005/64/EC on End-of-Life Vehicles (December 2023);[27]
- Submission by ZWAI to the Department of the Environment, Climate and Communications in response to the Department's public consultation on proposed amendments to the Access to Information on the Environment (AIE) Regulations 2007-2018 (January 2024);[28]
- Response to the first Public Consultation by the Department of the Environment, Climate and Communications on Ireland's draft National Energy and Climate Plan (March 2024);[29]
- Submission by ZWAI to the European Commission in response to the Commission's public consultation on the evaluation of the Nitrates Directive (91 / 676 / EEC) on Protection of Waters against Pollution caused by Nitrates from Agricultural Sources (March 2024);[30]
- Response to the second Public Consultation by the Department of the Environment, Climate and Communications on Ireland's updated draft National Energy and Climate Plan (June 2024);[31]
- Submission by ZWAI to the European Commission in response to the Commission's public consultation on proposed ecodesign and ecolabelling requirements for computers (July 2024);[32]
- Submission by ZWAI and the Waterford Environmental Forum to the Department of Transport in response to the Department's Public Consultation: "*Moving Together – A Strategic Approach to Improving the Efficiency of the Transport System in Ireland"* (August 2024);[33] and,
- Submission by ZWAI to the Irish Department of Housing, Local Government and Heritage in response to the Department's Public Consultation on Draft

[27] https://www.zwai.ie/resources/2023/end-of-life-vehicles-observations-and-feedback-to-the-european-commission/

[28] https://www.zwai.ie/resources/2024/submission-to-the-decc-on-the-proposed-amendments-to-the-access-to-information-on-the-environment-aie-regulations-2007-2018/

[29] https://www.zwai.ie/resources/2024/submission-by-zwai-to-decc-on-irelands-national-energy-climate-plan-necp/

[30] https://www.zwai.ie/resources/2024/submission-by-zwai-to-the-eu-public-consultation-on-the-evaluation-of-the-nitrates-directive/

[31] https://www.zwai.ie/resources/2024/draft-update-of-irelands-national-energy-and-climateplan-necp-submission-by-zwai-to-decc/

[32] https://www.zwai.ie/resources/2024/ecodesign-and-ecolabelling-requirements-for-computers-zwai-submission-to-eu-commission-ecodesign-and-ecolabelling-requirements-for-computers/

[33] https://www.zwai.ie/resources/2024/moving-together-a-strategic-approach-to-improving-irelands-transport-system/

Proposed Additional Measures for Ireland's Fifth Nitrates Action Programme (December 2024).[34]

It will be clear that ZWAI is concerned with the very serious issues of discarded substances, materials, water and energy, whether from domestic, commercial or industrial sources, how these become "waste", and how such "waste" may be prevented by re-design along ecological principles. ZWAI is also very concerned about the effectiveness and appropriateness of Irish and EU policies, legislation and programmes which are the principal determinants of how these "wastes" are managed, controlled and monitored for environmental and societal benefits.

In-depth examination and analysis of EU and national policies have made us very aware of the multiple disconnections and conflicts between economic, social and environmental policies, frequently resulting in failure to implement changes which appear to be very necessary. While making the submissions listed above, we have welcomed many proposed policy changes; but at the same time we have also considered that it was very necessary to evaluate forensically all such proposals in the context of what is best for the environment and society.

ZWAI is represented on the Irish Government's Water Forum (An Fóram Uisce), is a member of the Irish Environmental Network and the Environmental Pillar, and is funded by the **Department of the Environment, Climate and Communications** through the **Irish Environmental Network**.

ZWAI has been listed since 2023 in the European Commission's "Transparency Register" (Registration Number **417362640092-95**) as an Environmental Non-Government Organisation (eNGO), based in Ireland.

ZWAI is also a not-for-profit company limited by guarantee (Company registration number **394205**), and a registered charity (CRN number **20057244**). Membership is less than 50 individuals, and the company's affairs and activities are supervised by a 6-person Board of Management (Directors), some of whom are regular contributors to submissions, or make presentations at conferences.

In 2019 ZWAI became a full member of the **European Environment Bureau** (EEB); and a member of the **Waste Working Group** of the EEB. Through the EEB, we contribute to the development of European Union policy on waste and the Circular Economy. In November 2021, the EEB established a **Task Force on the Built Environment**; ZWAI is a member of this group, and we contribute to continuing discussions on the sustainability of construction materials, buildings and on the built environment.

[34] https://www.zwai.ie/resources/2024/proposed-additional-measures-for-irelands-fifth-nitrates-action-programme-nap/

3. THE COMPLEXITY OF OCEAN-RELATED, SEA AND COASTAL ISSUES

At the end of section 3 above, we drew attention to the difficulty of listing and describing all of the multiple ways in which nation states, national organisations, regional authorities, civil society, economies, communities and individual persons interact with the seas and ocean which surrounds us. And we have to ask the question – is it a worthwhile exercise to embark on making such a list ?

In this section of our submission, we attempt to make such a list, while recognising that it is incomplete. But in the absence of any consideration of the numerous ways by which we interact with our seas and oceans, it is likely that any future policies or plans may be incomplete, or may contain some internal or external conflicts.

3.1 Physical and Chemical Resources

- Sand and gravel from the sea bed in coastal areas;
- Extraction of minerals (including salt and magnesium) from seawater;
- Deep sea-bed mining of the ocean floor for manganese nodules and other minerals;
- Use of coastal waters for cooling nuclear and thermal power plants;
- Extraction of oil and gas from beneath the sea bed (also included under the heading of energy).

3.2 Biological and Ecological Resources

- Wild stock fisheries (pelagic and demersal);
- Harvesting of small crustaceans (e.g., krill) for conversion to fish-food for commercially famed salmonids);
- Mulluscan shellfisheries, e.g., mussels, oysters, clams;
- Crustacean shellfisheries, e.g., crabs, lobsters, Dublin Bay Prawns or Scampi (Nephrops);
- Killing of sea mammals for food or oil whales, dolphins);
- Aquaculture of finfish (mainly salmonids) and shellfish;
- Harvesting of coastal seaweed, and aquaculture of seaweed for the production of food additives and medical products; and,
- Migration and introduction of marine alien invasive species by transportation on ships' hulls, in ballast water, or via other routes.

3.3 Addition of Materials or Substances to the Marine Environment

- Disposal of partially wastewater from towns, cities and industry;
- Dumping of solid industrial wastes (now almost entirely forbidden under the London Dumping Convention);
- Eutrophication of coastal waters as a result of nutrient-laden (nitrogen and phosphorus) run-off from land, especially intensely-farmed agricultural land, either directly or via streams and rivers;
- Loss of topsoil to the coastal seas and oceans from intensively farmed land, via agricultural run-off and rivers, especially in tropical areas, but increasingly in Europe as a consequence of increasing severity and frequency of storms involving high precipitation rates and flooding of land;
- Oil pollution of the sea, from onshore or offshore spillages, shipping accidents, pipelines, etc.; oil pollution from shipping accidents is a problem which appeared to be decreasing until recently, but has increased as a consequence of Russia's use of old and poorly maintained tankers with uncertified crews (the "shadow fleet") to circumvent sanctions against Russian oil;
- Pollution of the marine environment by plastics (synthetic polymers, macro size, micro-plastics and nano-plastics) from a variety of sources including rivers, wastewater discharges, refuse disposal on beaches, wash-off from the land, or dumping overboard by vessels;
- The associated problems of removing from the seas and oceans huge quantities of these materials and dealing with them safely; and,
- Loss overboard of cargoes from vessels in distress, or through collision or onboard fires, resulting in contamination of the sea bed and danger to other vessels.

3.4 Transportation

- Use of the world's oceans and seas for the transportation of almost all goods and products traded between nations, including unitised freight (containers), bulk carriers (for example coal, iron ore);
- Much of Ireland's waste is shipped to other countries for disposal, and a large proportion of Europe's waste is shipped to far eastern countries for "processing", an activity which usually means "disposal" and perhaps "energy recovery"; and international shipping plays an important role in this undesirable and generally illegal activity;
- Shipping and maritime transport in general is a huge industry and a global activity – but ships pollute the atmosphere when they burn fossil fuels (as

most of them do), and they pollute the oceans when containers and other cargoes are lost overboard;

- Specific on-shore and port-related problems caused by the "cruise liner" industry, employing very large passenger ships carrying thousands of passengers and crew; for example the damage caused to the unique lagoon of Venice;
- The need for maintenance of safety standards and reduction of maritime accidents by enforcement of international regulations.

3.5 Development and Expansion of Ports

- Along with major increases in the sizes of vessels (especially container ships), the quantities of cargoes and the number of ships engaged in trade, many ports have developed and expanded their facilities, often resulting in the loss of ecologically valuable and vulnerable areas in estuaries and on coastlines; and,
- Competition between ports, resulting in the unnecessary duplication of port facilities.

3.6 Energy From the Seas and Ocean

- Tidal energy, from the rise and fall of tides, and from the power of tidal currents adjacent to coastlines where the vertical rise and fall of tides is transformed into powerful horizontal movements of water;
- Wave energy, from the use of fixed structures on exposed coastlines, or floating wave energy devices at sea;
- Offshore wind energy, from wind turbines mounted on fixed platforms, or floating wind turbines; and,
- Fossil energy from gas and oil fields beneath the sea bed.

3.7 Use of the seas and Oceans for Warfare and Defence

- Naval battles between ships, from the earliest times, to the present day, especially the great naval battles in the 18th and 19th centuries and the first and second World Wars;
- A relatively unique and very recent form of warfare at sea, involving deliberate damage by Russian-owned or Russian-controlled vessels (the ownership and management of which are hidden by a network of companies registered in tax-avoidance regimes) to undersea pipelines and cables used for electricity transmission and communications, especially in the Baltic Sea; and,
- The important defensive role of seas and the ocean surrounding maritime states.

3.8 Governance and Regulation of Maritime Activities

- The role of the United Nations Convention on the Law of the Sea (UNCLOS);
- Regional conventions for the protection of seas, e.g., Baltic Sea (Helsinki Convention);
- International conventions for the protection of the marine environment from dumping at sea or discharges from land (Oslo and Paris Conventions);
- International conventions on shipping, for the protection of the marine environment (MARPOL) and for ensuring the safety of life on board vessels at sea (SOLAS); and,
- The value of marine conservation zones, in which industrial-scale fishing is prohibited or severely curtailed.

3.9 Tourism and Recreation

- Since the 19th century, the coastlines of Europe have become over-developed in many areas to provide for large numbers of hotels, apartments, shopping facilities and associated infrastructure, to cater for every-increasing numbers of "seaside tourists", with consequential damage to formerly pristine coastlines;
- Coastal recreation areas adjacent to European cities provide excellent and much needed opportunities for swimming, sea angling, rowing, sailing, sail-training for young people, bird watching, coastal walking and other amenities, the reasonable use of which does not generally cause much environmental damage; and,
- Undamaged coastlines and coastal nature reserves provide important and much needed safe areas for wild-life (for example, Natura 2000 sites); and, when appropriately and carefully managed, can provide locations where nature can be enjoyed and appreciated, an essential requirement in today's overcrowded and pressurised world.

3.10 Oceans and Climate

- The essential role of the world's oceans in absorbing excess carbon dioxide emitted by human activities, and helping to ameliorate climate change;
- Acidification of ocean surface waters, caused by the absorption of excess carbon dioxide emitted by human activities, with resulting damage to planktonic organisms and coral reefs; and,

- Changes in weather patterns, especially increased evaporation from warmer ocean surfaces, leading to increased precipitation events over land, and stronger storms and hurricanes, in which the ocean warming plays a significant role;

3.11 Marine Research

- Does Europe undertake enough marine science research, especially Ireland, where for many years we had virtually no marine scientific research, but the extent of such research now appears to be adequate, with Ireland at last becoming a centre of excellence; and,
- Should Europe (and Ireland in particular) be exploiting other forms of marine biotechnology and marine resources.

The scope and range of such a wide variety of these activities, and the interconnections and conflicts between them, necessarily leads us to examine a only relatively small number of them. These uses of the seas and oceans are examined in the next section of our submission.

4. SPECIFIC ISSUES ADDRESSED IN OUR SUBMISSION

4.1 Plastic Production, Waste Management and Ocean Impact

Plastic pollution remains one of the most pressing environmental challenges facing our oceans. While Europe has made progress in reducing fossil-based plastic production and increasing recycling rates, significant challenges remain.

A substantial portion of plastic waste is still incinerated or sent to landfill, and the dominance of fossil-based plastics continues to hinder the transition to a truly circular economy. Addressing these issues requires stronger commitments to sustainable production, improved waste management systems, and ambitious policies that align with the EU Ocean's Pact objectives to protect marine ecosystems from plastic pollution.

Plastic can be produced from a variety of natural resources including cellulose, coal, natural gas, salt, and crude oil[35], although the vast majority (over 90% in 2023) is fossil based[36]. Globally, there has been a minor increase in recycled and bio-based plastics since 2018, but the production of fossil-based plastic continues increasing as well. When looking at Europe (EU27+3), total plastic production since 2018 has been steadily reducing, with a steady increase in recycling rates. However, nearly 80% of plastic production in Europe remains fossil-based.

In relation to increased recycling rates, 2022 marked the first year that more plastic waste was recycled (26.9%) than put into landfill in Europe.[37] However, 25% of plastic waste still ended up in landfill that same year and the majority (nearly 50%) was incinerated.

4.1.1 Plastic Pollution

Landfills and wastewater are two prominent sources of plastic pollution and the pathways with which plastic can end up in the environment, although complex, include direct discharge, wind resuspension, surface- and groundwater migration,

[35] https://plasticseurope.org/plastics-explained/

[36] https://plasticseurope.org/wp-content/uploads/2024/11/PE_TheFacts_24_digital-1pager.pdf

[37] https://plasticseurope.org/wp-content/uploads/2024/05/Circular_Economy_report_Digital_EXEC_light_FINAL.pdf

and runoff.[38] [39] [40] [41] The majority of plastic pollution from landfills consists of large pieces of plastic (macroplastics), while wastewater discharge contains plastic pieces smaller than 5mm in size called microplastics.[42]

4.1.2 Microplastics

When talking about microplastics, it is useful to divide them into two categories based on their origin: primary and secondary. Primary microplastics are plastics produced in that size, like pre-production pellets and cosmetic microbeads. Secondary microplastics are fragments degraded from larger plastic objects (macroplastics).

The reason plastic pollution is such a persistent problem is that plastic never fully degrades because there is no natural process yet that breaks down synthetic polymers. Instead, macroplastics just keep falling apart into smaller and smaller pieces, and eventually will all become micro- (or even nano-) plastic.[43] [44] Microplastics are much harder to remove from the environment than macroplastics.[45] It is, therefore, imperative to put preventative measures in place that will reduce the amount of macroplastics turning into microplastics (secondary microplastics). According to a 2021 report from the OECD, two major sources of secondary microplastic pollution that require attention are vehicle tyres and synthetic clothing.[46]

---

[38] Alfonso, M. B., Arias, A. H., Ronda, A. C., & Piccolo, M. C. (2021). Continental microplastics: Presence, features, and environmental transport pathways. Science of The Total Environment, 799, 149447. https://doi.org/10.1016/j.scitotenv.2021.149447

[39] She, J., Christensen, A., Garaventa, F., Lips, U., & Murawski, J. (2023). Developing Realistic Models for Assessing Marine Plastic Pollution in Semi-Enclosed Seas. Oceanography, 36(1), 54–57. https://doi.org/10.5670/oceanog.2023.s1.17

[40] Su, L., Xiong, X., Zhang, Y., Wu, C., Xu, X., Sun, C., & Shi, H. (2022). Global transportation of plastics and microplastics: A critical review of pathways and influences. Science of The Total Environment, 831, 154884. https://doi.org/10.1016/j.scitotenv.2022.154884

[41] Watt, E., Picard, M., Maldonado, B., Abdelwahab, M. A., Mielewski, D. F., Drzal, L. T., Misra, M., & Mohanty, A. K. (2021). Ocean plastics: Environmental implications and potential routes for mitigation – a perspective. RSC Advances, 11(35), 21447–21462. https://doi.org/10.1039/D1RA00353D

[42] https://theoceancleanup.com/faq/what-are-microplastics-and-macroplastics-and-why-may-they-be-harmful/

[43] Enzymes to make plastics disappear. (2024). *C&EN Global Enterprise*, *102*(37), 23–25. https://doi.org/10.1021/cen-10237-cover5

[44] Abeysekera, A. (2025). Big molecules that do not go away. *Journal of the National Science Foundation of Sri Lanka*, *52*(4). https://doi.org/10.4038/jnsfsr.v52i4.12518

[45] https://theoceancleanup.com/ocean-plastic-pollution-explained/#how-does-plastic-enter-the-ocean

[46] https://www.oecd.org/content/dam/oecd/en/publications/support-materials/2021/10/policies-to-reduce-microplastics-pollution-in-water_3337bc78/policy-highlights-policies-to-reduce-microplastics-pollution-in-water-focus-textiles-and-tyres.pdf

Several studies have also found plastic recycling facilities to be a potential source of microplastic pollution.[47] [48] [49] With an increase in plastic recycling in Europe, this is a possible plastic pollution source that should be investigated further.

4.1.3 Are Our Oceans the Final Destination?

A study conducted by The Ocean Cleanup in 2021 found that nearly 80% of all plastic pollution in oceans originates from 1000 rivers (see Figure 1). Plastic that makes it to the open ocean gets led by oceanic currents to collect in one of five gyres, causing garbage patches to emerge (see Figure 2). The biggest being the Great Pacific Garbage Patch (GPGP), which is located in the North Pacific and is estimated to be triple the size of France and to contain 100 million kg of plastic. Although most plastic gets carried from land to waters through one of the 1000 rivers, about 80% of plastic in the GPGP originates from the fishing industry, as fishing equipment lost at sea is more likely to accumulate offshore.[50]

If it does not end up in the open ocean, where does all the plastic from those 1000 rivers go? Research has found that nearly half of the plastic entering the oceans sinks right away, and out of the other half, about 80% will beach within a month.[51] [52] This means that the open ocean is in fact not the final stop for most plastic pollution, but coastal waters and coastlines are.

[47] Brown, E., MacDonald, A., Allen, S., & Allen, D. (2023). The potential for a plastic recycling facility to release microplastic pollution and possible filtration remediation effectiveness. *Journal of Hazardous Materials Advances*, *10*, 100309. https://doi.org/10.1016/j.hazadv.2023.100309

[48] Suzuki, G., Uchida, N., Tuyen, L. H., Tanaka, K., Matsukami, H., Kunisue, T., Takahashi, S., Viet, P. H., Kuramochi, H., & Osako, M. (2022). Mechanical recycling of plastic waste as a point source of microplastic pollution. *Environmental Pollution*, *303*, 119114. https://doi.org/10.1016/j.envpol.2022.119114

[49] Kahlert, S., & Bening, C. R. (2024). Look before you leap: Are increased recycling efforts accelerating microplastic pollution? *Journal of Industrial Ecology*, *28*(6), 1926–1939. https://doi.org/10.1111/jiec.13578

[50] Lebreton, L., Royer, S.-J., Peytavin, A., Strietman, W. J., Smeding-Zuurendonk, I., & Egger, M. (2022). Industrialised fishing nations largely contribute to floating plastic pollution in the North Pacific subtropical gyre. *Scientific Reports*, *12*(1), 12666. https://doi.org/10.1038/s41598-022-16529-0

[51] Isobe, A., & Iwasaki, S. (2022). The fate of missing ocean plastics: Are they just a marine environmental problem? *Science of The Total Environment*, *825*, 153935. https://doi.org/10.1016/j.scitotenv.2022.153935

[52] Lebreton, L. (2022). The status and fate of oceanic garbage patches. *Nature Reviews Earth & Environment*, *3*(11), 730–732. https://doi.org/10.1038/s43017-022-00363-z

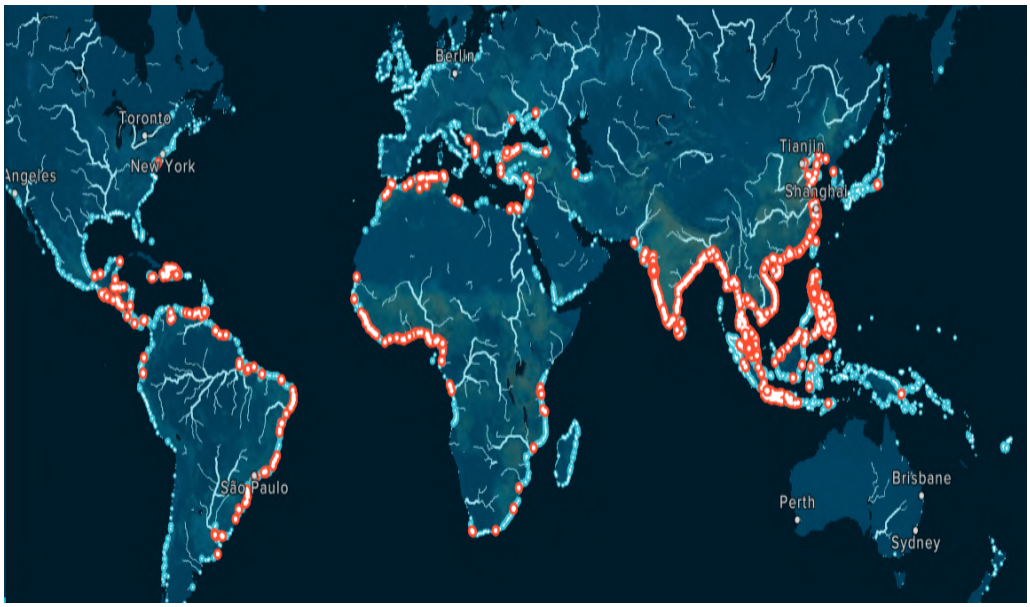


Figure 4.1: River plastic pollution sources map from The Ocean Cleanup [53]

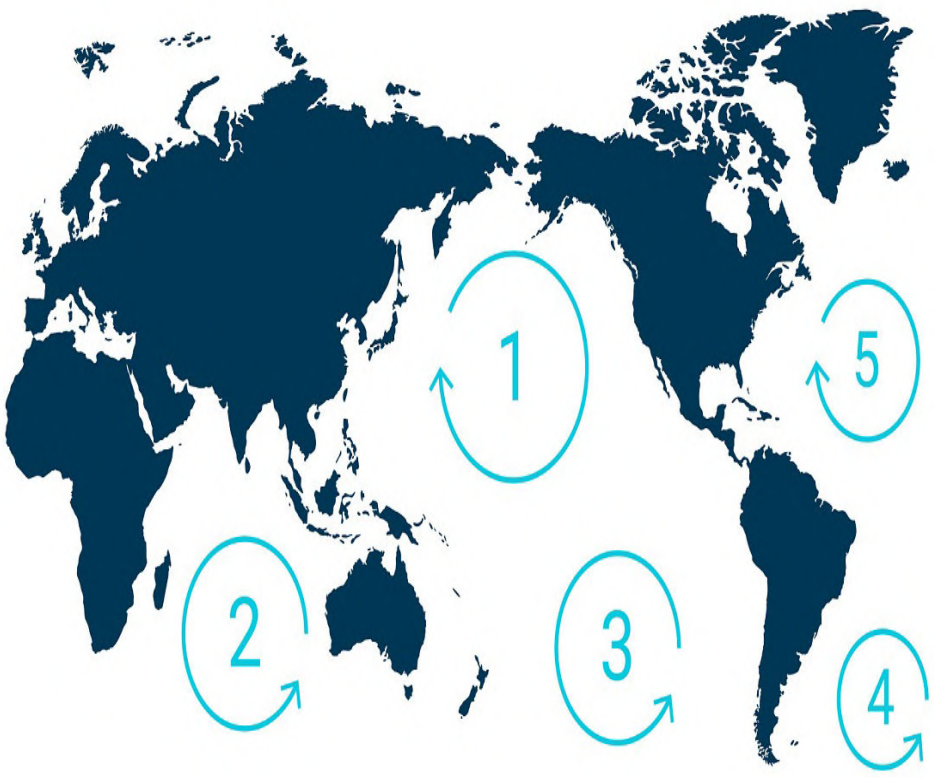


Figure 2: *Map of the five gyres of ocean plastic from The Ocean Cleanup* [54]

[53] https://theoceancleanup.com/sources/

[54] https://theoceancleanup.com/great-pacific-garbage-patch/

4.1.4 Impact of Plastic Pollution on Marine Environments

Key impacts of plastic pollution in marine environments include entanglement, ingestion (with potentially toxic effects), suffocation, starvation, dispersal, damage to habitats, and the introduction of invasive species.[55] [56] A review of 747 studies on the impact of plastic debris in marine environments found that 914 different species have been affected by entanglement and/or ingestion.[57] Another review assessed 340 studies on the effects of marine debris (of which 92% plastic) on marine organisms and found 693 species were affected in different ways. Out of those affected by entanglement and/or ingestion, 17% were listed on the IUCN Red list as threatened or near threatened.[58]

Plastic pollution causes direct and/or indirect interruption to aquatic ecosystem functions and their related services. For example, plastics have been found to negatively affect primary producers, zooplankton, and other microbial communities, leading to a decrease in oxygen production[59] and reducing the ocean's capacity as a carbon sink.[60] [61]

Plastics contain harmful chemicals that can be toxic. When ingested, it has been found that small plastic particles (<150 µm) can be absorbed by tissue, organs, and even cells.[62] Ingestion has been found to cause direct or indirect harm to

[55] Thushari, G. G. N., & Senevirathna, J. D. M. (2020). Plastic pollution in the marine environment. *Heliyon*, *6*(8). https://doi.org/10.1016/j.heliyon.2020.e04709

[56] Welden, N. A. (2020). Chapter 8—The environmental impacts of plastic pollution. In T. M. Letcher (Ed.), *Plastic Waste and Recycling* (pp. 195–222). Academic Press. https://doi.org/10.1016/B978-0-12-817880-5.00008-6

[57] Kühn, S., & van Franeker, J. A. (2020). Quantitative overview of marine debris ingested by marine megafauna. *Marine Pollution Bulletin*, *151*, 110858. https://doi.org/10.1016/j.marpolbul.2019.110858

[58] Gall, S. C., & Thompson, R. C. (2015). The impact of debris on marine life. *Marine Pollution Bulletin*, *92*(1), 170–179. https://doi.org/10.1016/j.marpolbul.2014.12.041

[59] Tetu, S. G., Sarker, I., Schrameyer, V., Pickford, R., Elbourne, L. D. H., Moore, L. R., & Paulsen, I. T. (2019). Plastic leachates impair growth and oxygen production in Prochlorococcus, the ocean's most abundant photosynthetic bacteria. *Communications Biology*, *2*(1), 1–9. https://doi.org/10.1038/s42003-019-0410-x

[60] Kvale, K., Hunt, C., James, A., & Koeve, W. (2023). Regionally disparate ecological responses to microplastic slowing of faecal pellets yields coherent carbon cycle response. *Frontiers in Marine Science*, *10*. https://doi.org/10.3389/fmars.2023.1111838

[61] Shen, M., Liu, S., Hu, T., Zheng, K., Wang, Y., & Long, H. (2023). Recent advances in the research on effects of micro/nanoplastics on carbon conversion and carbon cycle: A review. *Journal of Environmental Management*, *334*, 117529. https://doi.org/10.1016/j.jenvman.2023.117529

[62] Yuan, Z., Nag, R., & Cummins, E. (2022). Human health concerns regarding microplastics in the aquatic environment—From marine to food systems. *Science of The Total Environment*, *823*, 153730. https://doi.org/10.1016/j.scitotenv.2022.153730

marine life, such as physiological disruptions, developmental anomalies, and behavioural changes.[63]

4.1.5 Impact on Human Health

It is now a known fact that when marine organisms ingest (micro)plastics, these can be passed along the food chain to humans. Several studies have detected microplastics in various human tissues and fluids, including blood, placenta, lungs, liver, breast milk, and semen.[64] [65] [66] While the full extent of human health impacts remains unclear, potential risks include respiratory disorders, inflammatory bowel disease, and cellular toxicity.[67] It is important to continue research on how plastic affects human health to better understand the potential future implications of plastic pollution.

4.1.6 Emerging Solutions

Prevention and collection technologies for plastic pollution are being developed, with 59% focusing on collecting macroplastics from waterways.[68] Other emerging solutions look at exploiting biological and biochemical processes, including microbes that can biodegrade different plastics.[69] One such study specifically focused on utilising mussels in aquatic ecosystems as microplastic biofilters, with

[63] Tuuri, E. M., & Leterme, S. C. (2023). How plastic debris and associated chemicals impact the marine food web: A review. *Environmental Pollution*, *321*, 121156. https://doi.org/10.1016/j.envpol.2023.121156

[64] Barceló, D., Picó, Y., & Alfarhan, A. H. (2023). Microplastics: Detection in human samples, cell line studies, and health impacts. *Environmental Toxicology and Pharmacology*, *101*, 104204. https://doi.org/10.1016/j.etap.2023.104204

[65] Ragusa, A., Matta, M., Cristiano, L., Matassa, R., Battaglione, E., Svelato, A., De Luca, C., D'Avino, S., Gulotta, A., Rongioletti, M. C. A., Catalano, P., Santacroce, C., Notarstefano, V., Carnevali, O., Giorgini, E., Vizza, E., Familiari, G., & Nottola, S. A. (2022). Deeply in Plasticenta: Presence of Microplastics in the Intracellular Compartment of Human Placentas. *International Journal of Environmental Research and Public Health*, *19*(18), Article 18. https://doi.org/10.3390/ijerph191811593

[66] Leslie, H. A., van Velzen, M. J. M., Brandsma, S. H., Vethaak, A. D., Garcia-Vallejo, J. J., & Lamoree, M. H. (2022). Discovery and quantification of plastic particle pollution in human blood. *Environment International*, *163*, 107199. https://doi.org/10.1016/j.envint.2022.107199

[67] Winiarska, E., Jutel, M., & Zemelka-Wiacek, M. (2024). The potential impact of nano- and microplastics on human health: Understanding human health risks. *Environmental Research*, *251*, 118535. https://doi.org/10.1016/j.envres.2024.118535

[68] Schmaltz, E., Melvin, E. C., Diana, Z., Gunady, E. F., Rittschof, D., Somarelli, J. A., Virdin, J., & Dunphy-Daly, M. M. (2020). Plastic pollution solutions: Emerging technologies to prevent and collect marine plastic pollution. *Environment International*, *144*, 106067. https://doi.org/10.1016/j.envint.2020.106067

[69] Dunn, R. A., & Welden, N. A. (2023). Management of Environmental Plastic Pollution: A Comparison of Existing Strategies and Emerging Solutions from Nature. *Water, Air, & Soil Pollution*, *234*(3), 201. https://doi.org/10.1007/s11270-023-06190-2

mussels capturing the microplastics and subsequently being captured and removed from the ecosystem.[70]

Although further research into these types of solutions is required, these initial studies are an indication of the possibilities out there when it comes to tackling the global (micro)plastic pollution problem.

4.1.7 Europe's Responsibility in Tackling Global Ocean Plastic Pollution

Although the majority of ocean plastic pollution does not come directly from Europe, there are several ways (even beyond those mentioned here) in which Europe is connected to this issue. Europe is one of the biggest plastic consumers, meaning we are a driving factor behind the large amount of plastic produced. Additionally, there are European companies dealing with plastic that operate in places where plastic pollution happens. Therefore, Europe cannot negate its role in the global plastic pollution issue. Furthermore, oceans connect us all, so the impacts of plastic pollution will affect European marine ecosystems and the global marine ecosystems that we (and our economies) rely on.

For these reasons and backed up by the evidence provided above, we urge the EU Commission to include plastic pollution as a critical issue within the EU Oceans Pact. Specifically, we recommend that the Pact should include a commitment towards investments in further research on European (micro)plastic pollution sources, the impacts of (micro)plastics on human health, and potential solutions for removing the vast amount of already existing plastics in global marine ecosystems, with an emphasis on the lesser-understood microplastics.

[70] Cole, M., Artioli, Y., Coppock, R., Galli, G., Saad, R., Torres, R., Vance, T., Yunnie, A., & Lindeque, P. K. (2023). Mussel power: Scoping a nature-based solution to microplastic debris. *Journal of Hazardous Materials*, *453*, 131392. https://doi.org/10.1016/j.jhazmat.2023.131392

4.2 Phosphorus Pollution

Phosphorus is an essential macronutrient crucial for plant growth.[71] Phosphorus is also a necessary nutrient for humans that can only be taken in through food,[72] and there is no substitute for it.[73]

Phosphorus enters water bodies through the natural phosphorus cycle. However, anthropogenic causes have led to an increase in the amount of phosphorus entering marine ecosystems. For example, the use of phosphorus fertilisers leads to soil accumulation, increasing the risk of phosphorus reaching water via erosion, runoff, and leaching.[74] Additionally, as conventional wastewater treatment systems are ineffective at removing all nutrients from the water, phosphorus-containing human excreta end up in water bodies through wastewater discharge.[75] An accumulation of phosphorus in water bodies can lead to eutrophication, which is nutrient enrichment causing excessive algae growth, deoxygenation, and potential biodiversity loss in marine ecosystems.[76] Recent studies highlight the link between eutrophication and climate change, showing that these issues amplify each other's effects as eutrophic systems have been found to release more methane.[77] [78]

Phosphorus is a finite resource that is depleting while simultaneously existing in excess and causing water pollution. This phenomenon is also known as the

[71] Khan, F., Siddique, A. B., Shabala, S., Zhou, M., & Zhao, C. (2023). Phosphorus Plays Key Roles in Regulating Plants' Physiological Responses to Abiotic Stresses. *Plants*, *12*(15), Article 15. https://doi.org/10.3390/plants12152861

[72] Bird, R. P., & Eskin, N. A. M. (2021). Chapter Two—The emerging role of phosphorus in human health. In N. A. M. Eskin (Ed.), *Advances in Food and Nutrition Research* (Vol. 96, pp. 27–88). Academic Press. https://doi.org/10.1016/bs.afnr.2021.02.001

[73] Cordell, D., & White, S. (2014). Life's Bottleneck: Sustaining the World's Phosphorus for a Food Secure Future. *Annual Review of Environment and Resources*, *39*(Volume 39, 2014), 161–188. https://doi.org/10.1146/annurev-environ-010213-113300

[74] Haque, S. E. (2021). How Effective Are Existing Phosphorus Management Strategies in Mitigating Surface Water Quality Problems in the U.S.? *Sustainability*, *13*(12), Article 12. https://doi.org/10.3390/su13126565

[75] van Puijenbroek, P. J. T. M., Beusen, A. H. W., & Bouwman, A. F. (2019). Global nitrogen and phosphorus in urban waste water based on the Shared Socio-economic pathways. *Journal of Environmental Management*, *231*, 446–456. https://doi.org/10.1016/j.jenvman.2018.10.048

[76] Jwaideh, M. A. A., Sutanudjaja, E. H., & Dalin, C. (2022). Global impacts of nitrogen and phosphorus fertiliser use for major crops on aquatic biodiversity. *The International Journal of Life Cycle Assessment*, *27*(8), 1058–1080. https://doi.org/10.1007/s11367-022-02078-1

[77] Scholz, M. J., Obenour, D. R., Morrison, E. S., & Elser, J. J. (2025). A critical eutrophication–climate change link. *Nature Sustainability*, 1–2. https://doi.org/10.1038/s41893-024-01507-3

[78] Meerhoff, M., Audet, J., Davidson, T. A., De Meester, L., Hilt, S., Kosten, S., Liu, Z., Mazzeo, N., Paerl, H., Scheffer, M., & Jeppesen, E. (2022). Feedback between climate change and eutrophication: Revisiting the allied attack concept and how to strike back. *Inland Waters*, *12*(2), 187–204. https://doi.org/10.1080/20442041.2022.2029317

phosphorus paradox[79] and emphasises the need for sustainable resource management. EU legislation, including the Nitrates Directive, Water Framework Directive (WFD), and updated Urban Wastewater Treatment Directive (UWWTD), addresses phosphorus both as a resource and a pollutant. The revised UWWTD, effective 01 January 2025, introduces stricter phosphorus standards and establishes minimum recycling rates, acknowledging the phosphorus paradox and the need for effective recovery techniques.

Recovering and recycling phosphorus, or phosphorus recovery, presents a viable solution to the phosphorus paradox. As discussed previously, main phosphorus flows ''end'' in water bodies through wastewater and soil. Phosphorus recovery from wastewater or other phosphorus-containing waste sources will allow the phosphorus to cycle within the system longer before ending up in water bodies. Combined with other sustainable resource management practices that minimise phosphorus input and losses, this should reduce the speed and amount of phosphorus ending up in waters and minimise pollution and eutrophication[80]. Additionally, it addresses the issue of global P scarcity by reusing already mined P resources.

It is recommended that the EU Commission considers the effect of phosphorus pollution on marine ecosystems and phosphorus recovery, together with minimising phosphorus input and losses in agricultural systems, as potential solutions when drafting the EU Oceans Pact.

[79] Lougheed, T. (2011). Phosphorus Paradox Scarcityand Overabundance of a Key Nutrient. *Environmental Health Perspectives*, *119*(5), A208–A213. https://doi.org/10.1289/ehp.119-a208

[80] Withers, P. J. A., Doody, D. G., & Sylvester-Bradley, R. (2018). Achieving Sustainable Phosphorus Use in Food Systems through Circularisation. *Sustainability*, *10*(6), Article 6. https://doi.org/10.3390/su10061804

4.3 Seaweed Aquaculture & Seagrass Restoration

4.3.1 Seaweed Cultivation Practices and Potential Problems

While seaweed aquaculture has the potential to contribute positively to marine ecosystems and the blue economy, it is essential to acknowledge that past and poorly managed practices have led to negative environmental impacts. In some regions, intensive seaweed farming has resulted in habitat degradation, disruptions to local biodiversity, and altered nutrient dynamics in coastal waters.[81]

Additionally, large-scale monoculture farming can pose ecological risks, including disease outbreaks and the displacement of native species.[82] Recognising these challenges, we advocate for the adoption of sustainable seaweed cultivation methods that align with ecosystem-based management principles. These include site-specific planning, biodiversity preservation, and regulatory frameworks that ensure responsible aquaculture development.[83] Sustainable seaweed farming must be implemented with precautionary oversight to avoid repeating past mistakes and to fully realise its potential benefits for climate resilience, marine biodiversity, and the circular economy.

4.3.2 Seaweed Aquaculture

Seaweed aquaculture, also known as seaweed farming, involves the cultivation of marine algae in controlled environments. This practice involves various species of macroalgae, which are harvested for food, biofuels, pharmaceuticals, and other industrial applications. Seaweed aquaculture is recognised for its potential to contribute to sustainable food production, enhance marine biodiversity, and mitigate climate change through carbon sequestration.[84]

The cultivation methods typically include longline systems, rafts, and nets, which allow for efficient growth and harvesting of seaweed. The primary species cultivated in Europe include ***Saccharina latissima*** (sugar kelp), ***Laminaria digitata*** (oarweed), and ***Ulva spp.*** (sea lettuce.)[85] Seaweed farming is considered environmentally friendly (or at least benign compared to agriculture[86]) as it requires no fertilisers or freshwater and can improve water quality by

[81] Buschmann, A.H., Camus, C., Infante, J. et al. (2017). "Seaweed production: Overview of the global state of exploitation, farming and emerging research activity." European Journal of Phycology.

[82] Cottier-Cook, E.J., Nagabhatla, N., Badis, Y. et al. (2016). Safeguarding the Future of the Global Seaweed Aquaculture Industry. UN University – INWEH Policy Brief.

[83] European Commission (2021). "Guidance on Sustainable Aquaculture Development under the EU Green Deal." Directorate-General for Maritime Affairs and Fisheries.

[84] https://www.sciencedirect.com/science/article/pii/S0048969724006624

[85] https://pmc.ncbi.nlm.nih.gov/articles/PMC10921839/

[86] https://seaweed.ie/pdf/aquaculture%20sustainable%20seaweed%202021.pdf

absorbing excess nutrients like nitrogen and phosphorus, which can mitigate eutrophication in coastal areas.

4.3.3 History of Seaweed Aquaculture in the EU

Europeans have benefitted from seaweed harvesting for thousands of years. In fact, dental analysis suggests that seaweed was consumed as far back as 6,400 BC across Europe, with samples widespread from Spain to Lithuania.[87]

More advanced seaweed cultivation in Europe dates back many centuries from now, with historical records indicating its use as early as the 12th century.[88] Initially, seaweed was primarily harvested from wild sources and used as a natural fertiliser to enrich agricultural lands and as a supplementary feed for livestock. Coastal communities throughout Europe, particularly in regions like Brittany in France and parts of Ireland and Scotland, traditionally relied on seaweed for these purposes.

However, signs of the first commercial use of seaweed (such as glass production) in Europe don't appear until the 17th century. In 1681, France published the first text on seaweed harvesting regulation, which mentions strict rules on the seasonal collection of kelp and a fixed number of authorised harvesting days per year.[89]

Modern commercial seaweed aquaculture, however, emerged much later than this. The first significant attempts at cultivating seaweed on a commercial scale occurred in the 1970s and 1980s. France and Ireland were among the pioneers in this field, driven by a combination of factors, including a growing interest in sustainable resource management and the potential for diversifying aquaculture production.[90]

Over the past decade, seaweed aquaculture in Europe has experienced considerable growth. This expansion is driven by rising consumer demand for sustainable food options and growing awareness of the health benefits associated with seaweed consumption. In particular, the European seaweed food market has grown at a fast pace. A study by Mintel found that the number of food and drink items containing seaweed or seaweed flavours on the European market increased by 147% between 2011 to 2015.[91]

Despite this growth, Europe still relies heavily on seaweed imports to meet its consumption needs. While the exact percentage can fluctuate annually, data

[87] https://www.zmescience.com/science/archaeology/ancient-europeans-ate-seaweed/

[88] https://www.seaweed.ie/irish_seaweed_contacts/doc/Filieres_12p_UK.pdf

[89] https://www.seaweed.ie/irish_seaweed_contacts/doc/Filieres_12p_UK.pdf

[90] https://www.seaweed.ie/irish_seaweed_contacts/doc/Filieres_12p_UK.pdf

[91] https://www.mintel.com/press-centre/seaweed-flavoured-food-and-drink-launches-increased-by-147-in-europe-between-2011-and-2015/

indicates that approximately 80% of the seaweed consumed in Europe is imported.[92] This figure underscores the EU's reliance on external sources, primarily from Asia, to meet its demand for seaweed products. The bulk of the seaweed supplied worldwide is produced by four leading producers in Asia: China (60%); Indonesia (25%); the Republic of Korea (5%); and the Philippines (4%).[93]

4.3.4 Alignment with the Circular Economy

Seaweed aquaculture can align well with the principles of the circular economy by promoting resource efficiency, waste reduction, and the sustainable use of marine resources. Unlike traditional linear economic models that follow a "take-make-dispose" approach, the circular economy aims to minimise waste and maximise the value of resources by keeping them in use for as long as possible. Seaweed aquaculture follows this model in several key ways:

a) **Nutrient Recycling:** Seaweeds' ability to absorb excess nutrients from coastal waters directly links to circular economy principles. Aquaculture and agriculture often produce nutrient-rich runoff, which can cause eutrophication. Seaweed cultivation mitigates this by assimilating these nutrients, effectively recycling them into biomass. This reduces pollution and creates a valuable input for seaweed growth.[94]

b) **Valorisation of Seaweed Biomass into Diverse Products:** The use of seaweed biomass to create a range of products is a great example of the circular economy's aim to maximise resource value. Examples of this include aquafeed, bioplastics, cosmetics, medicines and natural fertilisers.

c) **Carbon Sequestration:** Seaweed aquaculture acts as a carbon sink, absorbing CO_2 from the atmosphere and storing it in its biomass. This carbon sequestration helps to mitigate climate change, while the harvested biomass can be used in products, effectively locking away the carbon.

[92] https://bim.ie/wp-content/uploads/2021/02/The,European,Market,for,Sea,Vegetables,2015.pdf

[93] https://openknowledge.fao.org/server/api/core/bitstreams/3ed17473-4b3f-4f8b-978a-09945412bdf0/content

[94] https://www.sciencedirect.com/science/article/pii/S2405844024042397

4.3.5 Alignment with the European Oceans Pact

Seaweed aquaculture is clearly important for Europe and should be an integral part of EU Oceans Pact:

a) **Sustainable Resource Management:** By cultivating seaweed in an environmentally friendly manner that does not damage ecosystems, seaweed farming can contribute to the responsible management of biodiversity in EU oceans**.**

b) **Biodiversity Enhancement:** Seaweed farms can enhance marine biodiversity by providing habitats for various marine organisms. These farms create complex structures that support fish, invertebrates, and other aquatic life, contributing to healthier marine ecosystems. By promoting biodiversity, seaweed aquaculture helps meet the objectives of the EU Oceans Pact to protect and restore marine ecosystems.

c) **Carbon Sequestration and Climate Mitigation:** Seaweed aquaculture can play an important role in carbon sequestration, as seaweed absorbs carbon dioxide in photosynthesis. Some studies suggest that large-scale seaweed farming could sequester significant amounts of CO_2 potentially up to 30 tonnes per hectare per year[95] - thereby contributing to climate mitigation efforts and supporting the EU's commitment to reducing greenhouse gas emissions.

d) **Support for the Blue Economy:** Seaweed aquaculture aligns with the vision of the blue economy by providing a renewable source of biomass that can be transformed into food products, biofuels, bioplastics, and medicines.

[95] https://www.ncbi.nlm.nih.gov/books/NBK580037/

4.4 Seagrass Restoration

Seagrass refers to a group of flowering plants that grow in marine environments. These underwater meadows are important ecosystems that provide many ecological benefits, including habitat for marine life, carbon sequestration, and coastal protection.

Seagrasses are distinct from algae; they are true plants that require sunlight for photosynthesis and have roots, stems, and leaves. The most common species in Europe include ***Zostera marina*** (eelgrass) and ***Zostera noltii*** (dwarf eelgrass), both of which are essential for maintaining healthy coastal environments.

4.4.1 Trends

Globally, seagrass meadows are experiencing a significant decline due to anthropogenic pressures. Approximately 30% of global seagrass habitats have been lost over the last century.[96] In Europe, seagrass meadows have also faced severe degradation; studies indicate that up to 49%[97] of these habitats have been lost in some regions due to factors such as nutrient pollution and habitat destruction.

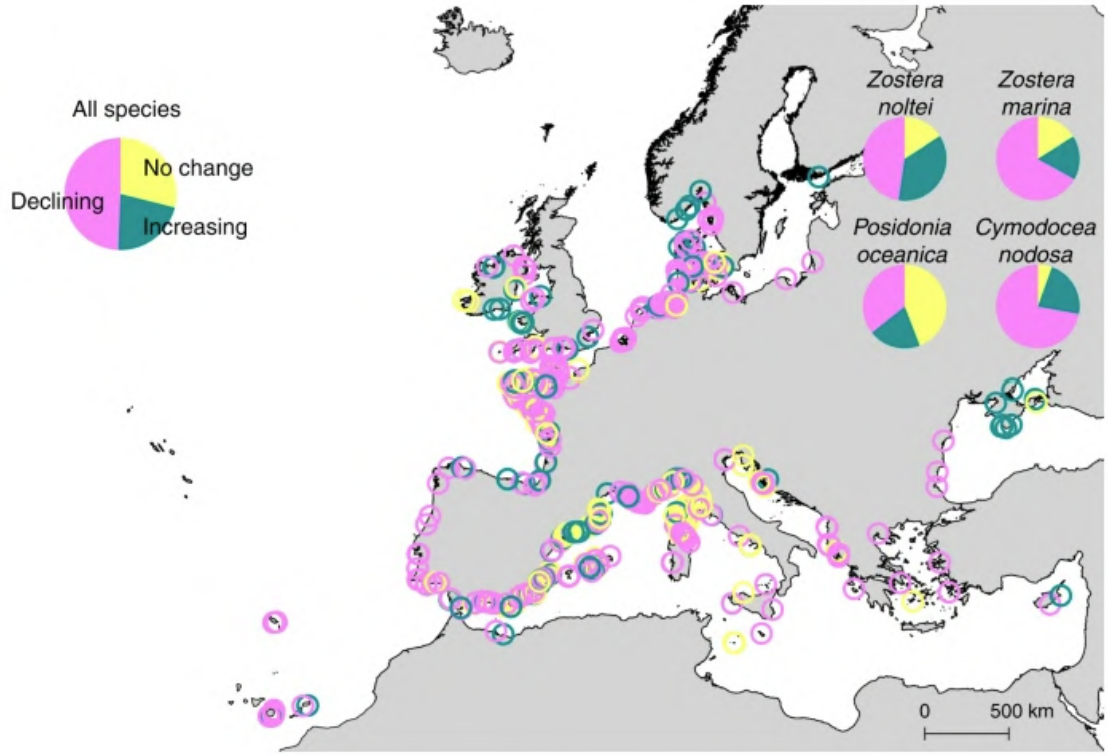


Figure 4.4.1 Distribution of compiled seagrass sites in Europe and their trajectories.

[96] https://www.unep.org/news-and-stories/press-release/protection-seagrasses-key-building-resilience-climate-change

[97] https://www.nature.com/articles/s41467-019-11340-4

Countries like Australia and New Zealand have implemented extensive seagrass restoration programmes with substantial funding and community involvement.[98]

It's estimated that only a fraction of degraded seagrass areas in Europe have been successfully restored compared to ongoing global initiatives.[99] This disparity underscores the need for enhanced collaboration among EU member states to develop comprehensive strategies for seagrass conservation and restoration.

4.4.2 Alignment with the Circular Economy

Seagrass restoration and the Circular Economy are closely linked.

Seagrasses absorb excess nutrients from coastal waters, such as nitrogen and phosphorus, often resulting from agricultural runoff and pollution. By taking part in nutrient recycling, restored seagrass meadows help to prevent eutrophication and improve water quality. This process reduces waste in marine environments and aligns with the circular economy when nutrients are reused rather than lost or wasted.

4.4.3 Alignment with the European Oceans Pact

Seagrass restoration directly supports several aims outlined in the European Oceans Pact:

a) **Biodiversity Protection:** Restoring seagrass meadows enhances marine biodiversity by providing critical habitat for many species, which aligns with the EU's commitment to protecting marine biodiversity.

b) **Climate Change Mitigation:** Seagrasses are extremely effective carbon sinks, aligning perfectly with the EU's goals of reducing greenhouse gas emissions.

4.4.4 Ireland's Unique Position for Seaweed Aquaculture and Seagrass Restoration

The Republic of Ireland is uniquely positioned to help the EU advance its goals in the European Oceans Pact. Its geography, climate and historical context position it as a potential leader in driving seaweed aquaculture and seagrass restoration in the EU.

a) **Vast Marine Territory:** Few people realise that when Ireland's seabed territory is taken into account, Ireland is one of the largest countries in Europe. The Real Map of Ireland (pictured below) clearly depicts the full extent of Ireland's marine territory of over 220 million acres (880,000

[98] https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2020.00617/full

[99] https://nph.onlinelibrary.wiley.com/doi/full/10.1002/ppp3.10486

km2),[100] which is ten times the size of the island of Ireland (Ireland's Exclusive Economic Zone). This disproportionately large marine territory provides extensive opportunities for developing seaweed aquaculture and seagrass restoration on a scale unmatched by any other EU member state.

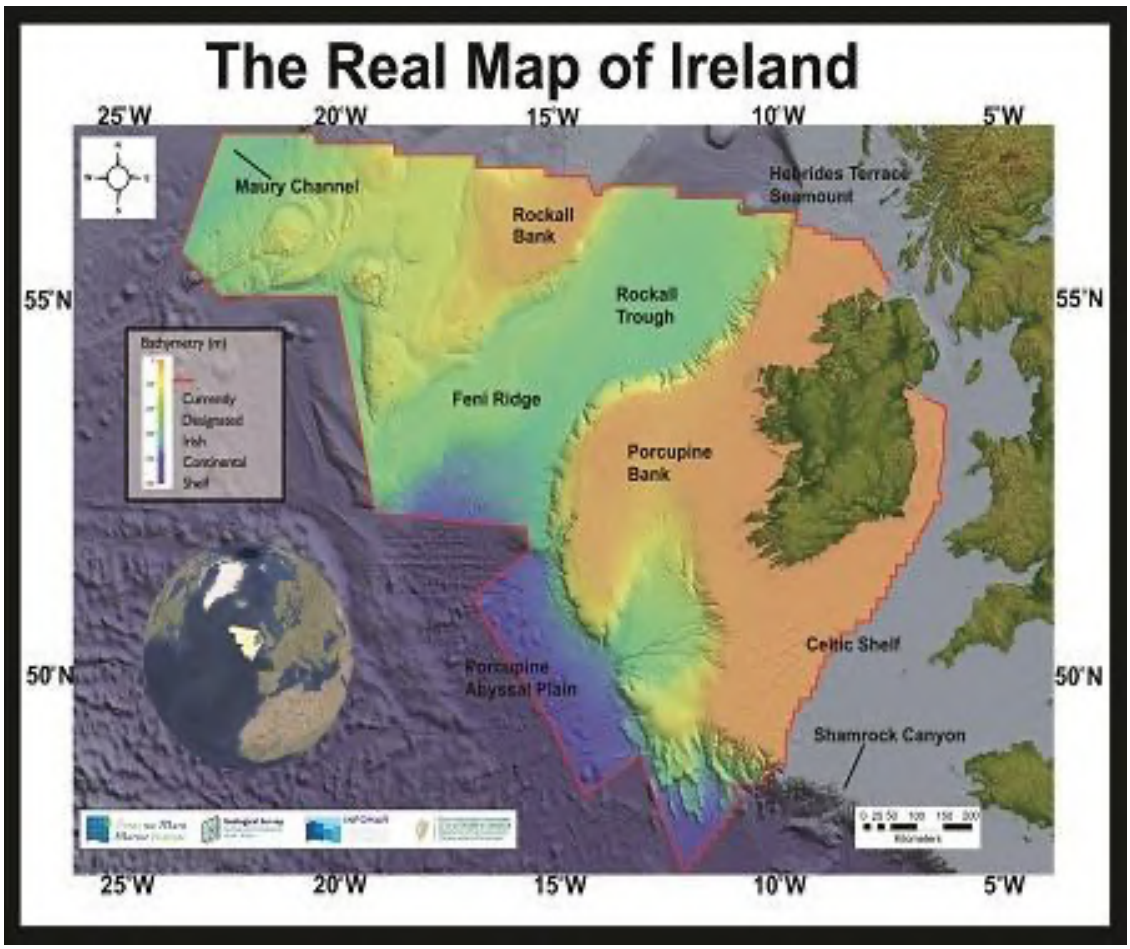


Figure 4.4.2 The 'real map of Ireland' highlighting Ireland's Exclusive Economic Zone (EEZ). Provided by Marine Institute.

b) **Optimal Climate:** The North Atlantic Current moderates Ireland's climate, resulting in relatively stable and mild water temperatures year-round, creating ideal growing conditions for a variety of commercially valuable seaweed species like ***Saccharina latissima*** and ***Laminaria digitata***, as well as native seagrasses like ***Zostera marina***. Unlike regions experiencing extreme temperature fluctuations, Ireland's consistent climate reduces the risks of temperature-induced stress on these crops.

c) **Established Skilled Workforce and Historical Connection:** Ireland has a strong maritime tradition and a skilled workforce in the marine sector. In 2019, the marine economy directly employed over 34,000 full-time workers

[100] https://www.marine.ie/site-area/news-events/news/map-ireland-bigger-you-think

and contributed €2.2 billion to Ireland's GDP (1.1% of total GDP).[101] providing a robust foundation for further growth in seaweed aquaculture and seagrass restoration. Ireland's historical use of seaweed as food, fertiliser, and medicine demonstrates a deep cultural understanding of the value of developing these sectors.

d) **Coastlines:** Ireland's coastline is characterised by diverse habitats, including sheltered bays, estuaries, and exposed rocky shores. This variety allows for tailored approaches to seaweed farming and seagrass restoration. Sheltered bays are suitable for longline seaweed farming, while estuaries offer ideal conditions for seagrass restoration projects.

Despite these advantages, Ireland faces challenges such as navigating complex regulatory frameworks and securing sufficient funding for research and infrastructure.

Addressing these challenges is vital for industry development in Ireland and wider Europe.

4.4.5 Challenges

While seaweed aquaculture and seagrass restoration present promising opportunities for enhancing Europe's oceans and advancing the blue economy, they are often met with significant challenges.

4.4.6 Policy Contradictions

The EU has established various policies aimed at promoting sustainable aquaculture and marine ecosystem restoration, including the Common Fisheries Policy (CFP), the Marine Strategy Framework Directive (MSFD), and the Biodiversity Strategy for 2030. However, contradictions within these policies can hinder economic activity and create confusion among stakeholders.

a) **EU Biodiversity Strategy for 2030:** While this policy sets ambitious targets for restoring degraded ecosystems, it lacks specific, targeted support for seagrass restoration and seaweed growth. The strategy focuses heavily on terrestrial ecosystems and protected areas, overlooking the vital role these marine habitats play in biodiversity conservation and climate change mitigation.

b) **EU Climate Action Policies:** The EU has set ambitious targets for reducing greenhouse gas emissions through various climate action policies.[102] While seaweed aquaculture and seagrass restoration can

[101] https://www.universityofgalway.ie/media/researchsites/semru/files/Online_Irelands-Ocean-Economy-Report_for-web_final.pdf

[102] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

contribute to carbon sequestration, these activities are not fully integrated into climate mitigation strategies.

The lack of specific incentives for carbon sequestration through marine habitat restoration seems contradictory, considering the impact of seagrass restoration on carbon sequestration.

c) **EU Blue Economy Strategy:** While it looks at the potential of aquaculture and marine biotechnology, it prioritises established industries such as fisheries, shipping, and tourism.

This prioritisation seems to lead to a lack of focus on emerging sectors like seaweed aquaculture and seagrass restoration, limiting their access to funding.

4.4.7 Barriers to Entry

Establishing seaweed aquaculture or seagrass restoration projects often involves significant barriers to entry for organisations:

a) **High Initial Investment:** The establishment of seaweed farms or seagrass restoration sites requires substantial upfront capital for equipment, infrastructure, and operational costs. According to BIM, the cost of setting up the hatchery unit is estimated to be €48,130 in year 1, and the running costs are estimated at €90,000.[103] This financial burden can deter new entrants into the market.

b) **Technical Expertise:** Successful implementation requires specialised knowledge in marine biology, ecology, and aquaculture techniques. The lack of readily available expertise can hinder organisations from effectively setting up and managing these projects.

4.4.8 Lack of Funding

Access to funding is a critical challenge for both seaweed aquaculture and seagrass restoration initiatives in the EU. While some funding opportunities exist through EU programmes, competition for these funds is intense, and many projects struggle to secure adequate financial support, especially if they are not an academic institution.

Seaweed aquaculture and seagrass restoration must compete for resources with other established and politically influential blue economy sectors, such as fisheries, shipping, and offshore energy. The EU Blue Economy Report 2022. [104]

[103] https://bim.ie/wp-content/uploads/2021/02/Business,Plan,fot,the,Establishment,of,a,Seaweed,Hatchery,and,Grow-out,Farm.pdf

[104] https://op.europa.eu/en/publication-detail/-/publication/156eecbd-d7eb-11ec-a95f-01aa75ed71a1

acknowledges the need to balance the interests of various maritime sectors to ensure sustainable development, but often, the emerging and less established sectors struggle to gain prominence.

4.4.9 Comparison with Successful Economic Zones

In successful economic zones such as China and Australia, streamlined regulatory processes and government support have facilitated the growth of seaweed aquaculture and seagrass restoration initiatives:

a) **China:** China has implemented large-scale seaweed farming with substantial government backing through subsidies and streamlined planning permitting that encourages investment.[105] This has resulted in China becoming the world's largest producer of farmed seaweed. This level of support encourages rapid growth in their aquaculture industry compared to the EU.

b) **Australia:** Australia has also developed supportive policies that encourage investment in marine restoration projects. For example, initiatives such as "Blue Carbon" programmes[106] incentivise coastal ecosystem restoration by providing financial rewards based on carbon credits generated through seagrass restoration efforts.

4.4.10 Lack of Competitiveness

Ulysses[107] is an Irish company focused on robotic seagrass restoration technology; however, it has relocated its headquarters to San Francisco while primarily operating in Australia. The decision was influenced by several factors:

a) **Favourable Regulatory Environment:** Australia offers a more conducive regulatory environment with clear guidelines for licensing and permitting that encourage innovation in marine restoration technologies.

b) **Incentives for Innovation:** The Australian government provides various incentives for companies engaged in environmental conservation efforts through grants and partnerships with research institutions.

The case of Ulysses highlights the EU's lack of competitiveness in attracting innovative companies focused on sustainable practices. While the EU has ambitious goals for environmental sustainability outlined in its Green Deal, its regulatory complexities and insufficient financial incentives create barriers that hinder growth in sectors such as seaweed aquaculture and seagrass restoration.

---

[105] https://op.europa.eu/en/publication-detail/-/publication/156eecbd-d7eb-11ec-a95f-01aa75ed71a1

[106] https://onlinelibrary.wiley.com/doi/10.1111/rec.13739

[107] https://www.ulysses.eco/

As a result, innovative companies may seek opportunities elsewhere where they encounter fewer obstacles to entry.

4.4.11 Recommendations for the European Oceans Pact

To effectively address the challenges blocking the advancement of seaweed aquaculture and seagrass restoration, the European Oceans Pact should incorporate the following recommendations:

a) **Establish Dedicated Funding Mechanisms:** Create specific budget lines earmarked for seaweed aquaculture and seagrass restoration projects. This ensures that these sectors receive targeted financial support, rather than competing with established interests.

b) **Streamline Funding Application Processes**: Simplify the application procedures for EU funding programmes to reduce the administrative burden on smaller organisations and innovative startups. This includes providing clear guidelines and offering technical assistance.

c) **Integrate Marine Ecosystem Services into Policy Frameworks:** Incorporate the economic value of ecosystem services provided by seaweed and seagrass habitats into policy decision-making. While researching for this consultation, there was not a vast amount of independent research available. This includes recognising the role of these habitats in carbon sequestration, nutrient cycling, and coastal protection.

d) **Enhance Skills and Training:** Support education and training programmes that give individuals the necessary skills to perform well in seaweed aquaculture and seagrass restoration sectors. This includes promoting training, apprenticeships, and university courses focused on marine science, ecology, and sustainable aquaculture practices. Perhaps courses could also be funded and advertised as a solution to a skills gap, such as Springboard do in Ireland.

e) **Streamline Licensing and Permitting:** Simplify and accelerate the licensing and permitting processes for seaweed aquaculture and seagrass restoration projects by establishing clear guidelines and reducing bureaucratic hurdles.

f) **Prioritise Innovation:** Invest in research and development to advance the knowledge and technologies needed to improve the sustainability, effectiveness and scalability of seaweed aquaculture and seagrass restoration initiatives. This includes supporting projects focused on developing innovative restoration techniques (including robotic) and assessing the ecological impacts of these activities by using AI.

4.5 Deep-Sea Mining And Its Environmental Risks

Deep-sea mining presents a significant threat to marine ecosystems and biodiversity, yet current EU policies lack the comprehensive regulatory framework necessary to address this emerging issue. Although the **European Oceans Pact** is designed to promote sustainable ocean governance, it must urgently incorporate stronger measures to prevent the irreversible environmental damage deep-sea mining could cause.

The **Common Fisheries Policy (CFP)**, **Marine Strategy Framework Directive (MSFD)**, and **EU Biodiversity Strategy for 2030** establish important precedents for protecting marine environments, yet the regulatory gap for deep-sea mining persists. This gap must be addressed to align the EU's ocean governance with its broader environmental and climate goals.

4.5.1 Destruction of Marine Ecosystems

Deep-sea mining involves the extraction of minerals such as manganese, cobalt, and rare earth metals from the ocean floor. These activities disturb the seabed, threatening unique ecosystems that have yet to be fully understood. **Sediment plumes** generated during mining operations could smother marine life, disrupt feeding patterns, and spread toxic materials throughout the water column, affecting ecosystems far from the mining site.

The seabed also hosts species with long lifespans and slow reproductive rates, making **recovery from mining disturbances nearly impossible**. The destruction of these habitats contradicts the goals of the **MSFD**, which aims to achieve **Good Environmental Status (GES)** in EU marine waters.

4.5.2 Threat to Biodiversity

The deep sea is one of the most biodiverse environments on Earth, yet it remains largely unexplored. Vast, isolated, and home to thousands of unique species, these deep-sea ecosystems play a critical role in maintaining the ecological balance of marine environments. However, deep-sea mining presents a significant threat to this biodiversity. The extraction of minerals from the ocean floor could lead to the destruction of fragile habitats, including hydrothermal vent communities, seamount ecosystems, and abyssal plains.

Species extinction is a real possibility, especially for organisms adapted to specific and extreme conditions of the deep sea. Many of these species have yet to be discovered or studied, meaning that mining activities could result in the loss of unknown species before their ecological roles are fully understood. Some species may also have long life cycles and low reproductive rates, making their recovery from mining-related disturbances particularly difficult, if not impossible.

The risks of deep-sea mining are heightened by the European Union's (EU) commitment to the **EU Biodiversity Strategy**, which aims to protect 30% of its seas by 2030. This ambitious goal is part of a broader international effort to halt biodiversity loss and safeguard marine ecosystems. Mining operations in these areas could directly conflict with these protection goals, undermining efforts to conserve marine biodiversity. Furthermore, damage to biodiversity in deep-sea ecosystems could have far-reaching consequences, affecting not only the organisms in those environments but also the broader oceanic food web and global biodiversity.

4.5.3 Climate Change and Carbon Sequestration

The deep sea plays a pivotal role in the global carbon cycle and is an essential natural sink for atmospheric carbon dioxide (CO2). Through processes such as **carbon sequestration**, the deep sea helps absorb vast amounts of CO_2, mitigating the impacts of climate change. Deep-sea sediments, marine organisms, and biological processes store carbon in what is known as the "biological pump," transferring CO_2 from the surface of the ocean to the deep sea, where it can remain sequestered for thousands of years.

Mining operations in the deep sea could disrupt these processes by disturbing the sediments that store carbon. The extraction of minerals often involves the removal or displacement of large amounts of seafloor material, potentially releasing trapped CO_2 back into the ocean or atmosphere. This disturbance can weaken the ocean's ability to sequester carbon, diminishing one of the planet's natural defences against climate change.

Additionally, the resuspension of deep-sea sediments during mining could affect the delicate balance of chemical processes that control carbon storage in these ecosystems. Once disturbed, it may be difficult or impossible to restore these systems to their original state, resulting in long-term impacts on carbon sequestration.

Given the growing urgency to combat climate change, protecting the deep sea's role as a carbon sink is more critical than ever. The disruption caused by deep-sea mining could exacerbate global warming by releasing stored carbon and reducing the ocean's ability to absorb future CO_2 emissions. This presents a significant challenge to meeting global climate targets, such as those set by the **Paris Agreement**, and further emphasizes the need for caution in pursuing deep-sea mining operations.

4.5.4 Policy Gaps in the European Oceans Pact

4.5.4.1 Lack of Comprehensive Environmental Impact Assessments (EIAs)

A significant oversight in the current framework is the absence of mandatory, comprehensive Environmental Impact Assessments (EIAs) for deep-sea mining activities. Given the limited understanding of deep-sea ecosystems, mining could proceed without fully comprehending its long-term environmental impacts. The **International Seabed Authority (ISA)** has developed provisions related to EIAs for exploration activities in the international seabed area. However, these regulations are still under development, and the treatment of environmental impact remains a subject of ongoing discussion.[108]

The **European Union (EU)** has expressed concerns about the lack of comprehensive EIAs for deep-sea mining.[109] The EU continues to advocate for prohibiting deep-sea mining until scientific gaps are properly addressed and it can be demonstrated that no harmful effects arise from mining.

To address this gap, the EU should mandate comprehensive EIAs for all deep-sea mining projects within its jurisdiction. These EIAs must be **mandatory, rigorous, and independently verified** to ensure that all potential risks are fully understood and mitigated before any mining activity begins. The scope of these assessments should include not only **direct impacts**—such as habitat destruction and biodiversity loss—but also **indirect consequences**, such as sediment plumes, water column contamination, and the disruption of deep-sea ecosystems that serve critical roles in global nutrient cycling and carbon sequestration. EIAs should also factor in **cumulative impacts**, taking into account the potential for long-term degradation from multiple projects over time. Furthermore, public participation and **stakeholder engagement** must be integral parts of the EIA process, ensuring transparency and accountability. By instituting these comprehensive assessments, the EU would uphold the **precautionary principle**, ensuring that no mining activities proceed without conclusive evidence that they will not cause long-term environmental damage.

4.5.4.2 Fragmented Regulations and Governance

While the **Common Fisheries Policy (CFP)** ensures sustainable management of marine resources, there is no equivalent framework governing deep-sea mining. The **Marine Strategy Framework Directive (MSFD)** aims to achieve Good Environmental Status (GES) of EU marine waters and protect the resources on which marine-related economic and social activities depend.

---

[108] https://www.isa.org.jm/protection-of-the-marine-environment/environmental-impact-assessments/?utm

[109] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52022JC0028&utm_

However, the MSFD does not specifically address the emerging threat of deep-sea mining.[110]

The **European Commission** has reaffirmed its stance against deep-sea mining, emphasizing the need for robust environmental protection measures.[111] The Commission's position underscores the importance of prioritizing marine protection over potential economic gains from mining activities.

To address this fragmentation, the EU should integrate binding regulations for deep-sea mining into the European Oceans Pact. These regulations should create a **unified framework** that brings deep-sea mining under the same scrutiny as other ocean-related activities like fisheries and offshore energy. This would include **clear, enforceable guidelines** for licensing, operational standards, and environmental protections specifically tailored to deep-sea mining's unique challenges. Such a framework would ensure that **marine protection goals** outlined in the MSFD, such as achieving Good Environmental Status (GES), are not undermined by the expansion of deep-sea mining. The regulations should also enforce **monitoring and reporting requirements**, compelling companies to regularly demonstrate compliance with environmental safeguards and ensuring that any breaches result in **swift penalties**. By aligning these mining activities with established marine protection regulations, the EU would create a more **integrated and consistent approach** to ocean governance, reducing regulatory gaps and ensuring sustainable use of marine resources.

4.5.5 Global Leadership and International Standards

The EU has the opportunity to lead global efforts in setting international standards for deep-sea mining. Without strong regulations, other countries or corporations may engage in unsustainable mining practices, undermining global marine conservation efforts. The **International Seabed Authority (ISA)** is responsible for regulating mineral-related activities in the international seabed area. However, the current regulatory framework is still under development, and there is a lack of agreement on environmental baseline data requirements and permissible environmental harm.[112]

The EU should lead efforts to establish international standards for deep-sea mining that prioritise environmental protection. This leadership role requires the EU to work closely with the **International Seabed Authority (ISA)** and other global actors to develop **binding international agreements** that establish strict environmental baseline data requirements, including the assessment of **ecologically significant areas** that should be permanently excluded from

[110] https://en.wikipedia.org/wiki/Marine_Strategy_Framework_Directive?utm

[111] https://ejfoundation.org/news-media/eu-commission-reaffirms-stance-against-deep-sea-mining-in-favour-of-marine-protection?utm

[112] https://www.pewtrusts.org/en/about/news-room/opinion/2025/01/15/the-world-currently-lacks-the-ability-to-govern-deep-sea-mining?

mining. The EU's influence can help shape a framework that mandates **independent environmental audits**, stringent **extraction limits**, and **post-mining ecosystem restoration obligations** to mitigate long-term impacts. By championing a global standard, the EU would promote **harmonized regulations** across jurisdictions, reducing the risk of **regulatory arbitrage**, where companies seek out regions with weaker protections. Moreover, the EU should push for an **international moratorium** on deep-sea mining until adequate scientific evidence demonstrates that it can be conducted without causing irreversible damage. By taking this proactive stance, the EU would not only protect its own marine ecosystems but also act as a global leader in **sustainable ocean management**, setting a precedent for responsible resource extraction.

4.5.6 Economic and ethical Considerations

4.5.6.1 Long-Term Economic and Environmental Trade-Offs

Deep-sea mining offers short-term economic gains, particularly in industries like renewable energy and technology. However, these benefits come at the expense of long-term environmental degradation, which could harm coastal communities that rely on healthy oceans for their livelihoods.[113] The degradation of marine ecosystems and the disruption of fisheries could have severe consequences for coastal communities dependent on ocean health.

To ensure that economic activities do not outpace environmental protections, the EU should implement a moratorium on deep-sea mining. This would provide the necessary time to conduct comprehensive scientific research on the long-term impacts of mining and develop sustainable alternatives.

4.5.6.2 Ethical and Equity Concerns

Deep-sea mining often occurs in international waters or the exclusive economic zones (EEZs) of developing countries. This raises significant ethical questions about the exploitation of global commons and the potential harm to small, developing nations that rely on healthy oceans for economic stability. The lack of clear regulations creates an uneven playing field, where wealthier nations and corporations can exploit resources that belong to humanity as a whole, while poorer countries or marginalized communities bear the environmental costs.[114]

Strong EU regulations could promote fairness and prevent exploitation in vulnerable regions. By advocating for stringent international standards and supporting developing countries in building capacity for environmental

[113] https://easac.eu/publications/details/deep-sea-mining-assessing-evidence-on-future-needs-and-environmental-impacts?

[114] https://www.wwf.eu/?2111841%2FWWF-report-deep-seabed-mining-is-an-avoidable-environmental-disaster=&

assessments, the EU can help ensure that deep-sea mining activities are conducted responsibly and equitably.

4.5.7 Decisive and Immediate Action Needed

The insufficient regulation of deep-sea mining represents a critical and urgent gap in the European Oceans Pact, undermining the EU's broader commitments to environmental sustainability, biodiversity conservation, and climate action. As one of the most biodiverse yet least understood environments on Earth, the deep sea demands a precautionary approach to prevent irreversible damage. The rapid push for mineral extraction, fuelled by increasing demand for resources such as rare earth metals used in technology and renewable energy sectors, risks outpacing the development of robust environmental protections.

Zero Waste Alliance Ireland underscores the need for the EU to take decisive and immediate action. A moratorium on deep-sea mining would serve as a necessary step to halt potentially destructive activities until comprehensive scientific assessments can determine the full extent of the ecological and climate impacts. This moratorium would allow time for regulators and scientists to better understand the cumulative effects of mining on deep-sea ecosystems, biodiversity, and the global climate system.

Aligning deep-sea mining regulations with existing frameworks like the **Common Fisheries Policy (CFP)**, **Marine Strategy Framework Directive (MSFD)**, and **EU Biodiversity Strategy for 2030** is crucial to closing this regulatory gap. These established policies provide a solid foundation for sustainable ocean management, emphasizing ecosystem-based approaches, the precautionary principle, and the need for good environmental status in European waters. Integrating deep-sea mining into this framework would ensure that mining activities are subjected to the same stringent environmental and sustainability criteria that govern other maritime sectors, such as fisheries and marine conservation.

The EU has positioned itself as a global leader in ocean governance, advocating for the sustainable use of marine resources and the protection of marine biodiversity. However, without strong regulations governing deep-sea mining, the EU risks undermining its own goals, including its commitment to protecting 30% of European seas by 2030 as part of the EU Biodiversity Strategy. A failure to regulate deep-sea mining could not only lead to ecological degradation but also weaken the EU's credibility in international environmental negotiations.

By addressing this policy gap, the EU can demonstrate its leadership in sustainable ocean governance, setting a global precedent for responsible stewardship of the deep sea. A moratorium on deep-sea mining would signal the EU's commitment to safeguarding marine ecosystems and would align with broader global efforts, such as the **United Nations' Sustainable Development**

Goal 14 (Life Below Water), which calls for the conservation and sustainable use of oceans, seas, and marine resources.

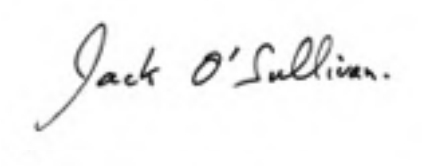
Moreover, adopting stricter regulations would ensure that future mining activities, if pursued, are conducted within a framework that prioritises environmental sustainability, scientific knowledge, and the protection of ecosystem services—such as carbon sequestration and biodiversity—that are critical for combating climate change and preserving ocean health. In doing so, the EU would not only protect marine ecosystems for future generations but also contribute to global efforts to mitigate climate change and foster sustainable development.

Through decisive action, including a moratorium and policy alignment, the EU can secure a legacy of ocean stewardship that prioritises long-term ecological health over short-term economic gains.

5. CONCLUDING OBSERVATIONS

In this submission we hope we have provided sufficient evidence that the proposed Ocean Pact, while admirable in many places, is also deficient in many respects; and therefore we have made a number of suggestions for its significant improvement, and we hope that these suggestions will be taken up by the European Commission.

Jack O'Sullivan



Zero Waste Alliance Ireland

17 February 2025

This submission was researched and written by Sara Guigui (ZWAI Board member), Sara Borkent (ZWAI Board member), Luke Fagan (ZWAI Board member), Nazia Husain (ZWAI member) and Jack O'Sullivan (ZWAI Vice-chair); with additional research and editing by Orla Coutin (ZWAI researcher and administrator), and final editing by Jack O'Sullivan. Thanks are due to Dalia Smelstoriūtė for assisting with formatting of the text and preparation of the contents pages.

European Commission

Appendix I

European Commission Call for Evidence on the European Oceans Pact

Opportunity to Provide Feedback

Deadline 17 February 2025

1. About this Call for Evidence

The European Oceans Pact is intended to set a comprehensive vision for a holistic approach to ocean-related policies, and it will examine and consider:

- how we affect the ocean;
- how the ocean affects coastal communities; and,
- the opportunities that the ocean provides us with.

The European Oceans Pact will aim to bring coherence across all EU policy areas linked to oceans. It will also focus on supporting resilient and healthy oceans and coastal areas, promoting the blue economy.

Topic Maritime affairs and fisheries

Type of Act Communication

Category Commission Work Programme

Feedback: Open

Feedback period: 20 January 2025 - 17 February 2025 (midnight Brussels time).

The Commission's invitation to provide feedback at this stage says that all feedback received will be summarised by the European Commission and presented to the European Parliament and Council with the aim of feeding into the legislative debate. Feedback received will be published on this site and therefore must adhere to the feedback rules; and, in order to contribute, ZWAI will need to register (ZWAI is already registered) or login using our existing social media account.

In preparation

Call for evidence

Feedback period

20 January 2025 - 17 February 2025

Feedback: Closed

Upcoming

Commission adoption

Planned for

Second quarter 2025

About this initiative

Summary	The European Oceans Pact will set a vision for a holistic approach to ocean-related policies. It will look at: • how we affect the ocean • how the ocean affects coastal communities • the opportunities that the ocean provides us with. It will aim to bring coherence across all EU policy areas linked to oceans. It will also focus on supporting resilient and healthy oceans and coastal areas, promoting the blue economy.
Topic	Maritime affairs and fisheries
Type of act	Communication
Category	Commission Work Programme

Call for evidence

Jack O'Sullivan <jack@zwai.ie>

'Have your say' - Acknowledgement of receipt

European Commission - 'Have your say' <DO-NOT-REPLY@ec.europa.eu> 17 February 2025 at 22:45
To: jack@zwai.ie

Appendix II

European Commission Have your say

Dear Sir or Madam,

Thank you for submitting your feedback on Have your say.

We acknowledge receipt of your feedback which may be used to improve the proposed legislation.

https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14474-The-European-Oceans-Pact/F3521122_en

To make corrections, you can unpublish your feedback and send a new one, if the feedback period is still open.

This is an automatic notification message. Please do not reply to it.

With kind regards,

European Commission
Secretariat-General