The Water Forum

AN FÓRAM UISCE

Water Quality of Transitional and Coastal Waters

Policy Brief

Policy Recommendations for Aligning and Strengthening Integrated Catchment and Coastal Management.

This report was produced for An Fóram Uisce, March 2026.

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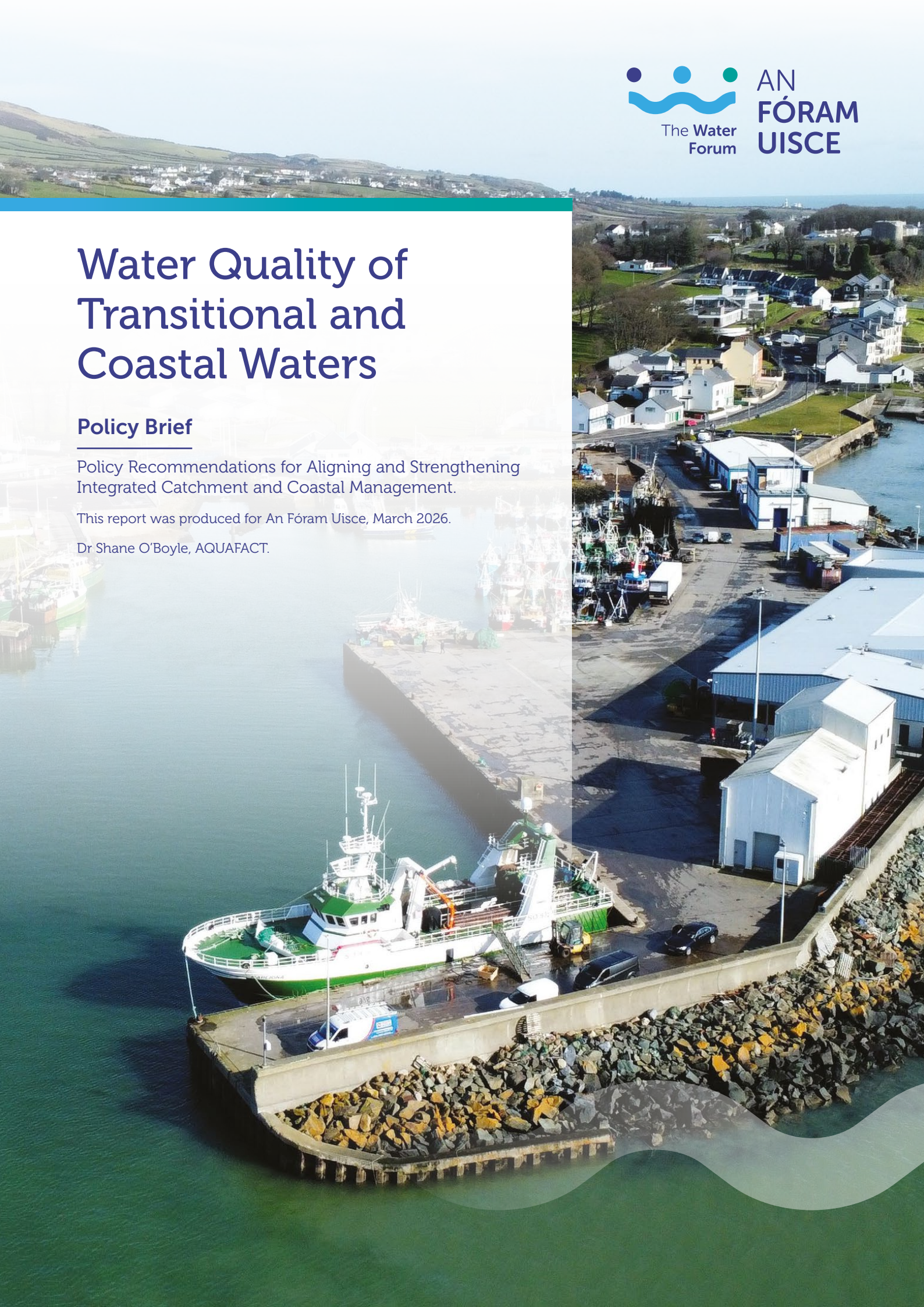


Executive Summary

Ireland's transitional and coastal waters are facing increasing pressures that challenge their ecological integrity and sustainable management. While significant progress has been made through the implementation of the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD), the analysis in this report highlights persistent gaps in integration, coordination, and strategic alignment. Addressing these challenges requires a more coherent approach that bridges freshwater and marine governance, strengthens cross-directive collaboration, and supports evidence-based, site-specific management. The policy recommendations set out practical steps to enhance policy coherence, improve environmental outcomes, and support a more integrated catchment-to-coast management framework that takes into account the ecological complexity of these waters.

Summary of Policy Recommendations

1. Develop an Integrated Nutrient Management Strategy to reduce both nitrogen and phosphorus along the freshwater-marine continuum.
2. Apply targeted measures based on local conditions by aligning actions with the expected ecological response in estuarine and coastal waters.
3. Strengthen scientific understanding of the scale and extent of eutrophication in estuarine and coastal waters, including development of a national vulnerability index for nutrient enrichment and eutrophication.
4. Develop site-specific action plans which consider both upstream and downstream impacts, integrated into the Catchment Management Work Plans of Ireland's Water Action Plan.
5. Establish a Joint Steering Group and implementation plan for WFD and MSFD.
6. Address regulatory gaps in water standards and indicators across the WFD and MSFD.
7. Adopt a Statement of Consistency approach for land-based activities to address how proposed activities will align with the WFD.
8. Provide clear technical guidance (data requirements, assessment methodologies, and mitigation measures) to regulators and developers on how to assess project compatibility with the WFD and MSFD.
9. Introduce a Statutory Integrated Coastal Zone Management (ICZM) Strategy to bridge the gap between land-sea governance.
10. Expand citizen science across both the WFD and the MSFD.

Contents

Introduction

Ireland's transitional and coastal waters are among its most ecologically diverse and economically valuable natural assets. These waters support a rich biodiversity, provide essential ecosystem services, and underpin key sectors such as fisheries, tourism, and maritime transport. However, they are vulnerable to pressures such as coastal pollution, climate change, biodiversity loss and competing maritime activities.

The complexity of managing these waters arises from the interplay of multiple European and national policies, each with distinct objectives, geographic scopes, and implementation mechanisms. Addressing these challenges requires a more integrated and coherent approach to catchment and coastal management, informed by robust scientific evidence and policy analysis.

This report has been commissioned by the Water Forum (An Fóram Uisce) to provide policy recommendations aimed at improving the alignment of existing legislative frameworks and enhancing the integration of catchment and coastal management in Ireland. The primary focus of this report will be on the level of interaction and coherence between the Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD).

Dun Laoghaire

Policy Landscape

Ireland's water and marine governance is shaped by European and national instruments including the WFD, MSFD, Marine Spatial Planning, the National Marine Planning Framework (NMPF), the Maritime Area Planning Act, national biodiversity strategies and climate legislation (Table 1).

The emergence of new legislation, including the Nature Restoration Law and the Marine Protected Areas Bill, signals a growing commitment to restoring and safeguarding marine ecosystems.

While significant progress has been made in establishing frameworks such as the WFD, MSFD, and NMPF, challenges remain in achieving full integration across sectors and scales.

To ensure resilient and well-managed coastal and transitional waters, Ireland must continue to strengthen cross-directive coordination, enhance stakeholder engagement, and invest in integrated planning approaches that reflect the dynamic nature of its marine and coastal environments.

Table 1. Policy and Legislative Summary

Policy / Legislation	Lead Organisation	Brief Summary
EU Water Framework Directive (WFD)	Department of Housing, Local Government and Heritage (DHLGH)	Requires protection and improvement of water quality in all waters to achieve at least good ecological status by 2027; implemented via river basin management plans every 6 years.
EU Marine Strategy Framework Directive (MSFD)	Department of Climate, Energy and the Environment	Aims to achieve Good Environmental Status (GES) of marine waters using 11 descriptors; implemented through marine strategies including monitoring and measures.
EU Marine Spatial Planning Directive	Department of Climate, Energy and the Environment	Mandates national marine spatial plans to promote sustainable growth of maritime economies and use of marine resources.
National Marine Planning Framework (NMPF)	Department of Climate, Energy and the Environment	Ireland's first marine spatial plan; sets a 20-year blueprint for sustainable development and conservation of marine resources.
Maritime Area Planning Act & MARA	Maritime Area Regulatory Authority (MARA)	Establishes MARA to regulate maritime area consents and marine usage licences; supports marine spatial planning and enforcement.
EU Biodiversity Strategy for 2030	European Commission / National implementation by DHLGH & NPWS	Targets legal protection of at least 30% of EU sea area; aligns with OSPAR Convention goals for MPAs.

Policy / Legislation	Lead Organisation	Brief Summary
EU Nature Restoration Law	Council of the EU / National implementation	Requires restoration of 20% of degraded EU land and sea ecosystems by 2030; sets progressive restoration targets for habitats.
4th National Biodiversity Action Plan (2023–2030)	NPWS & DHLGH	Comprehensive national plan to address biodiversity loss through science-led, inclusive strategies.
Maritime Area Planning (Marine Protected Areas) (Amendment) Bill	Government of Ireland	Establishes legislative framework for designating and managing MPAs; supports "30x30" biodiversity goal.
OSPAR Convention	Department of Climate, Energy and the Environment	Regional cooperation with 15 countries for marine protection in the North-East Atlantic; legally binding actions under OSPAR Acquis.
Integrated Catchment Management (ICM)	DHLGH	Holistic approach to water management at catchment level; underpinned by WFD and Water Action Plan 2024.
Integrated Coastal Zone Management (ICZM)	No dedicated national policy; MARA plays a role	Promotes sustainable use of coastal resources by integrating land-sea interactions; partially addressed through MAP Act and MARA.
National Coastal Change Management Strategy	DHLGH & Office of Public Works (OPW)	Addresses climate change impacts like sea-level rise and coastal erosion through a whole-of-government approach.
Climate Action and Low Carbon Development Act	Department of Climate, Energy and the Environment	Framework for Ireland's transition to a low-carbon economy by 2050; operationalised through annual Climate Action Plans.
Other Legislation	Various (EU & National)	Includes SEA Directive, EIA Directive, Shellfish Waters Directive, Bathing Water Directive, Urban Wastewater Treatment Directive, EU Common Fisheries Policy, Blue Economy policy.

The Silver Strand, Mayo

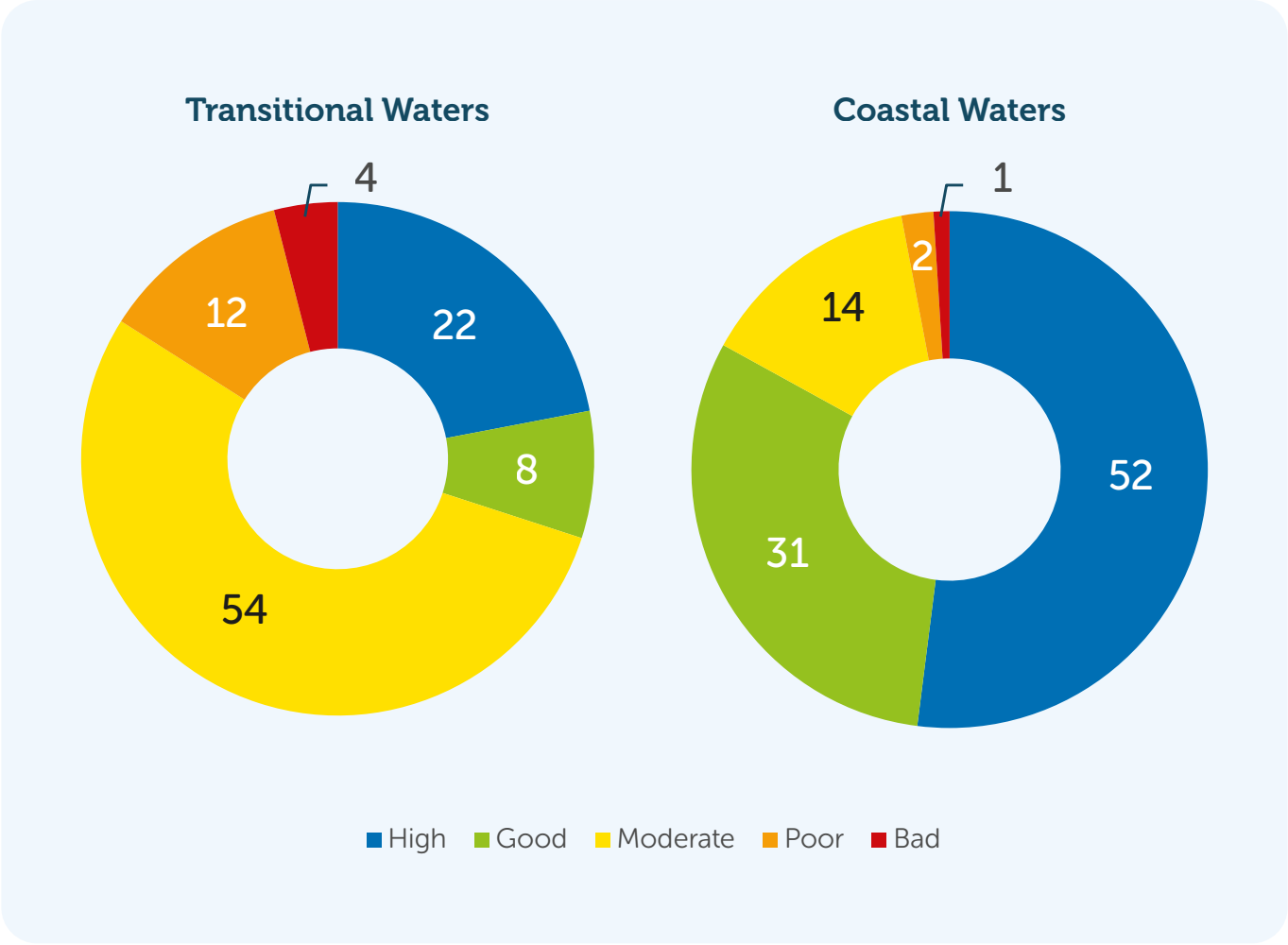
Current Status, Pressures and Trends in Estuarine and Coastal Waters

Only 30% of transitional waters achieve good or better ecological status. The pressures are diverse, but dominated by nutrient enrichment.

Current Status

Recent assessments of estuarine and coastal waters reveal a mixed picture. While Ireland performs relatively well in a European context, particularly for coastal waters, the trend for transitional waters is concerning. According to the EPA's latest report for the period 2019–2024 (EPA, 2025), only 30% of transitional waters and 83% of coastal waters achieve good or better ecological status. This represents a slight decline compared to previous cycles and underscores the vulnerability of estuarine systems, which act as the ultimate receiving waters for upstream pressures.

Figure 1. Percentage (%) of transitional and coastal waters in each of the WFD classes for the period 2019-2024



Pressures

The pressures on these waters are diverse but dominated by nutrient enrichment.

Agriculture remains the primary source, affecting 65% of impacted transitional and coastal waters, followed by urban wastewater discharges (39% of impacted waters), urban run-off (22%) and domestic waste water (9%). Estuaries located near urban centres are particularly vulnerable, receiving inputs from wastewater treatment plants, stormwater overflows, and domestic systems. Climate change compounds these pressures, with rising sea temperatures and altered hydrodynamics increasing susceptibility to ecological stress.

Eutrophication: A Complex Challenge

Eutrophication, the enrichment of waters with nitrogen and phosphorus, drives excessive algal growth, leading to oxygen depletion and biodiversity loss.

In Ireland, eutrophication manifests itself as the formation of microscopic (phytoplankton) blooms which mutiply to a level that can result in water discolouration or the growth of macroscopic algal blooms visible as extensive mats of green/brown/red seaweed.

Thankfully, the presence of extensive low-oxygen areas known as "dead zones" seen in the Gulf of Mexico or the Baltic Sea are not yet a feature of eutrophication in Irish waters but warming seas, which hold less oxygen, may amplify these risks in the future, as appears to be the case in other marine regions (Hepach et al., 2024).

The response of marine systems to eutrophication differs significantly to the response in freshwater systems (Cloern, 2001). Factors such as light availability, shorter residence times and varying nutrient ratios can in some cases dampen or modulate the response of marine systems which means that these systems display a range of different sensitivities to eutrophication (O'Boyle et al., 2015).

Some systems, such as the Lower Suir estaury are less sensitive to eutrophication due to low light levels and short flushing times whereas other areas with adequate light availbility and longer residence times can be more sensitive (Table 2).

Other systems such as the shallow intertidal estuaries found along our southern coasts can be extremely sensitive to enrichment as inflows of nutrients from land based sources can be further exacerbated by the influx of seawater relatively rich in phosphorus, creating conditions that are ideal for macroalgal bloom formation (Ní Longphuirt et al., 2015a).

Understanding the factors that are modulating the response of nutrient enrichment in estuaries will be critical in ensuring that interventions and measures are targeted in those areas where they will deliver the greatest ecological benefit.

Algal bloom, Rogerstown Estuary

Table 2. Sensitivity of Irish Estuarine and Coastal Water Bodies to Nutrient Enrichment Under Varying Environmental Scenarios (O'Boyle et al., 2015)

Scenario	Water body	Modulating Factor	Sensitivity
High Nutrients Low Algal Biomass	Lower Suir Estuary Middle Suir Estuary Upper Slaney Estuary Upper Blackwater Estuary Fergus Estuary	The eutrophic response in these water bodies is modulated by either light availability or residence time.	Less sensitive to nutrient enrichment due to presence of modulating factors.
High Nutrients High Algal Biomass	Lower Bandon Estuary Lower Slaney Estuary Upper Suir Estuary Upper Bandon Estuary	No strong primary modulating factor.	Highly sensitive to nutrient enrichment due to absence of modulating factors.
Low Nutrients Low Algal Biomass	Kinsale Harbour Dublin Bay Gweebarra Bay Killary Harbour Sligo Bay Outer Dundalk Bay	The eutrophic response in these water bodies is controlled by low nutrient availability for algal growth. Unlikley to be modulated by light availability or residence time as both would appear sufficient for algal growth.	Potentially sensitive to nutrient enrichment if nutrient levels increase.

Algal bloom, Malahide Estuary

Nutrient Dynamics and Management

Managing eutrophication is complicated by shifting nutrient limitations along the freshwater–marine continuum.

Freshwaters are typically phosphorus-limited, while marine systems are nitrogen-limited. Historically, mitigation efforts focused on phosphorus removal, altering Nitrogen (N) to Phosphorus (P), i.e. N:P ratios, and inadvertently increasing nitrogen export to coastal waters. Typically, the ratio between N and P should vary from approximately 75:1 in the upper reaches of estuarine waters to approximately 16:1 (the Redfield Ratio) in open coastal and offshore marine waters.

In some estuarine waters of the south coast of Ireland this ratio is as high as 500:1 due mostly to the disproportionate reduction of P over N over recent decades (O'Boyle et al., 2015). In some coastal waters, this imbalance has flipped the limiting nutrient from nitrogen to phosphorus, reducing nitrogen uptake, and creating unintended consequences for ecosystem functioning such as the greater export of nitrogen to downstream nitrogen sensitive coastal waters (Ní Longphuirt et al., 2015b).

Effective management of eutrophication in these complex waters demands a dual-nutrient approach, informed by system-specific models and empirical data. Measures must consider upstream and downstream interactions, hydrodynamics, and ecological sensitivities to avoid simply transferring problems from one location to another.

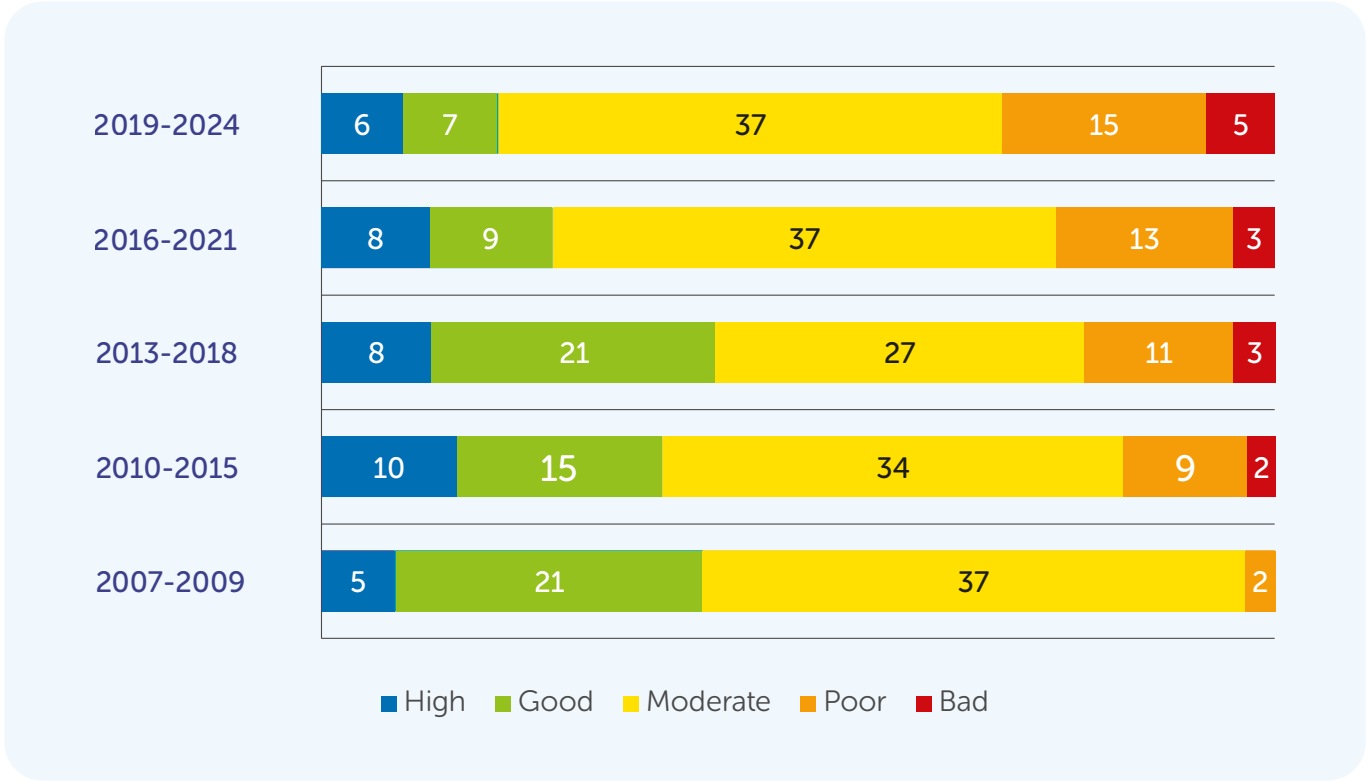
Trends and Lessons Learned

Long-term monitoring shows that Ireland achieved significant improvements in estuarine water quality during the early 2000s, driven by better wastewater treatment and agricultural practices (Ní Longphuirt and Stengel, 2016, EPA, 2019). However, since 2014, nutrient inputs have risen again, reversing earlier gains. Transitional waters (Figure 2) have seen the sharpest decline in ecological status, while coastal waters remain relatively stable. What is of most concern is the increase in the number of poor and bad status transitional waters indicating a significant decline in the ecological health and resilience of these waters.

The Blackwater Estuary exemplifies this dynamic. Once eutrophic, it improved markedly following nutrient reductions, only to deteriorate again under renewed agricultural pressures (Ní Longphuirt et al., 2015b). This case highlights both the potential for recovery and the fragility of progress, reinforcing the need for adaptive, evidence-based management.

Brown seaweed (Laminaria), Sligo Bay

Figure 2. Change in ecological status of transitional waters since the first WFD assessment period in 2007-2009



Sustaining and enhancing ecological status in estuarine and coastal waters requires a deeper understanding of system-specific responses and a commitment to integrated catchment-to-coast strategies. Without such an approach, management measures risk inefficiency, or worse, unintended ecological consequences.

An assessment of alignment between the Water Framework Directive and the Marine Strategy Framework Directive

The Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD) share a common goal of protecting and enhancing aquatic ecosystems.

Shared Objectives, Different Approaches

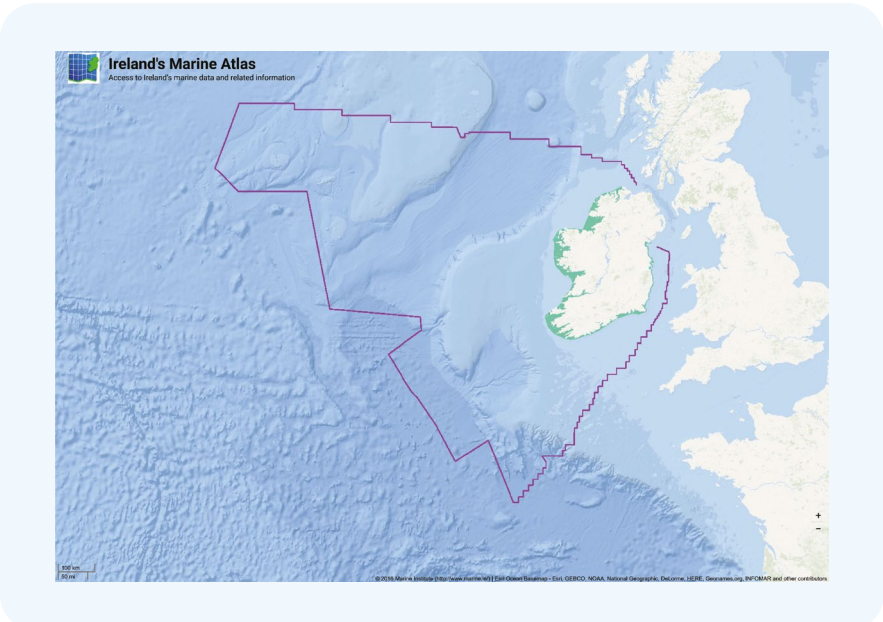
At their core, the Water Framework Directive and Marine Strategy Framework Directive aim to achieve healthy aquatic environments. The WFD focuses on inland waters, transitional waters, and coastal waters up to one nautical mile past the baseline, seeking "good ecological and chemical status" through river basin management plans. In contrast, the MSFD casts a wider net, covering Ireland's entire marine area - over 500,000 km^2, and targeting "good environmental status" across 11 descriptors, from biodiversity and eutrophication to marine litter and underwater noise.

While the WFD is structured around water bodies and prescriptive assessment methods, the MSFD adopts a broader ecosystem-based approach. This difference in scale and complexity creates challenges for integration but also opportunities for synergy.

Geographic Scope and Assessment Scales

The overlap between the directives occurs in coastal waters, where both apply (Figure 3)[1]. However, their assessment units differ: the WFD uses discrete water bodies, while the MSFD employs flexible marine reporting units tailored to ecological relevance. For example, eutrophication under the MSFD is assessed across six offshore and coastal zones, whereas the WFD evaluates individual estuaries and bays. Aligning these scales is essential to avoid duplication and ensure coherent evaluations. The MSFD does not include transitional waters as defined under the WFD.

Figure 3 Spatial extent of the WFD (green line) and MSFD (purple line). Source: Ireland's Marine Atlas: atlas.marine.ie



1. The MSFD only applies if the particular aspect being addressed is not already being addressed by the WFD

Standards, Indicators, and Methodologies

Both directives rely on robust scientific criteria, but their frameworks diverge. The WFD uses ecological quality ratios (EQRs) and environmental quality standards (EQSs), supported by CEN-standard monitoring methods. The MSFD, guided by Commission Decision 2017/848, sets criteria for each descriptor and requires member states to define thresholds in cooperation with regional conventions like OSPAR.

Integration is evident where MSFD indicators draw on WFD data, for instance, nutrient and chlorophyll measurements in coastal waters. However, gaps remain, particularly in hydromorphological standards for transitional and coastal waters under the WFD and certain MSFD indicators such as non-indigenous species and bycatch.

Monitoring Programmes

Ireland operates two extensive monitoring programmes: the WFD programme covers all water categories and biological, chemical, and hydromorphological elements. The MSFD programme consolidates 20 monitoring schemes and 36 surveys, integrating data from WFD, OSPAR, and EU fisheries assessments.

Despite this breadth, the WFD programme does not explicitly reference the MSFD, and reporting cycles remain unaligned. Greater coordination, such as joint planning workshops and integrated data platforms, could reduce duplication and enhance efficiency.

The absence of MSFD integration into the WFD implies that opportunities for greater collaboration and coherence are not being fully realised.

Programmes of Measures

Both directives require member states to implement measures to achieve their objectives. Ireland's Water Action Plan 2024, lists 265 actions under the WFD, many of which, such as nutrient reduction and invasive species control, are directly relevant to MSFD goals.

Yet, the MSFD is not mentioned explicitly, signalling a missed opportunity for policy coherence. It reflects a broader issue in environmental governance where directives operating within the same ecological space are not sufficiently integrated.

Aligning these programmes would strengthen strategic planning, improve cost-effectiveness, and ensure that measures deliver benefits across both freshwater and marine domains.

Governance and Coordination

Governance structures for the WFD and MSFD share similarities but operate largely in parallel. The WFD relies on regional and local committees, reflecting its catchment-based approach, while the MSFD is managed nationally and internationally through OSPAR and EU coordination groups. A complete list of bodies and committees involved in governance is included in the main report.

Integrated Catchment Management (ICM)

Integrated Catchment Management is central to the implementation of the WFD in Ireland. It promotes a holistic approach to managing water quality by considering the entire catchment area, including land use, biodiversity, and socio-economic factors. Under Ireland's Water Action Plan 2024, ICM is operationalized through:

- Catchment Management Work Plans (CMWPs): These plans will evolve into fully integrated frameworks for managing water quality at the catchment level and tracking progress.
- Sectoral Action Work Plans (SAWPs): These identify how individual sectors—such as agriculture, forestry, and wastewater—will reduce pressures on water quality.
- Governance: A new Programme Delivery Office within the Department of Housing, Local Government and Heritage will oversee implementation, supported by Regional Operational Committees.
- Guiding Principle: "The right measure in the right place," ensuring interventions are data-driven and targeted where they will have the greatest impact.

ICM is designed to deliver better environmental outcomes by aligning measures with local conditions and fostering collaboration across agencies and sectors.

Integrated Coastal Zone Management (ICZM)

Ireland currently lacks a statutory national ICZM policy, but steps toward integration have been made through the MSFD and the establishment of the Maritime Area Regulatory Authority (MARA). Key points include:

- MARA consolidates marine governance by managing Maritime Area Consents (MACs) and Marine Usage Licences (MULs), ensuring sustainable use of marine resources and compliance with environmental objectives.
- Applicants for marine activities must demonstrate consistency with the National Marine Planning Framework (NMPF), WFD, MSFD, climate objectives, and biodiversity strategies.
- MARA requires Appropriate Assessment (AA) screening and risk assessments for Annex IV species and may mandate Environmental Impact Assessments (EIA) for certain activities.
- While MARA strengthens marine governance, its role in broader land–sea integration is limited.

A similar statement of consistency report could be developed for land-based activities. The approach, modelled on MARA's process for marine projects, would require applicants to demonstrate how proposed developments align with the objectives of the Water Framework Directive (WFD), relevant national biodiversity strategies, and other environmental policies. Such an approach would considerably bridge the gap between ICM and ICZM.

The SWOT Analysis

The SWOT analysis between the WFD and the MSFD (Table 3) identifies notable strengths, including shared environmental targets, comprehensive monitoring systems, standardised methodologies, and established water quality standards and indicators. At the same time, it highlights critical weaknesses such as fragmented governance, misaligned reporting cycles, and the absence of explicit cross-referencing between directives in key areas like the development and implementation of measures. Despite significant thematic and geographic overlap, particularly in coastal waters, their implementation remains largely parallel, with limited formal integration.

Ireland could improve the effectiveness of both directives by adopting best practices from other EU member states. Finland offers a strong example, having undertaken a comprehensive review of its governance structures for WFD and MSFD, which resulted in a fully integrated framework that fosters coordination and cooperation between the two. Ultimately, the analysis underscores the need for stronger institutional and policy linkages to unlock the full potential of these directives in protecting aquatic and marine ecosystems.

Aligning governance structures, planning cycles, and data platforms would strengthen coherence between WFD and MSFD implementation, enhance policy efficiency, and improve Ireland's capacity to address emerging challenges such as climate change and marine biodiversity loss.

Table 3. SWOT Analysis of the Alignment Between the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD)

Feature	Strength	Weakness	Opportunity	Threat
Objectives	Both directives aim to protect and enhance aquatic ecosystems through ecosystem-based management and public participation.	The fact that both directives express their core status objective using the same acronym GES may potentially result in confusion.	Alignment of objectives can foster joint research, monitoring, and stakeholder engagement initiatives, reducing duplication and improving efficiency.	If integration efforts stall or are absent, objectives may be pursued in isolation, weakening overall environmental outcomes.
Geographic Scope	Coastal waters are covered by both directives, allowing for shared data and assessments.	Potential for confusion and duplication.	Sharing of resources.	Overlapping scopes and differing definitions may lead to duplication or gaps in implementation.
Criteria, indicators, standards and methodologies	Applied across both directives. Extensive number of criteria, indicators, standards and methodologies.	Gaps in standards and indicators (e.g. hydromorphological standards for the WFD and indicators for MSFD (e.g. for non-indigenous species, bycatch).	Sharing of data between directives. Fill remaining gaps.	Delays in updating standards and indicators could hinder progress.
Monitoring Programme	Comprehensive, co-ordinated and technically robust programmes in place. Programmes meet the obligations of both directives. MSFD adopts a more integrative approach (includes WFD, CFP, OSPAR surveys programmes).	WFD programme does not explicitly reference the MSFD. Potential duplication of effort given the complexity of both programmes. Gaps in programmes for both directives.	Greater alignment in programmes design, data collection and data sharing. Alignment of reporting obligations. Joint planning workshops. Integrated data platforms to support more holistic understanding of aquatic and ecosystem health.	Duplication and inefficient use of resources. Climate change.

Feature	Strength	Weakness	Opportunity	Threat
Programme of Measures (PoMs)	Measures common to both directives identified in each others PoMs although measures of relevance to MSFD not explicitly identified in WFD PoMs.	MSFD not directly referenced in WFD PoMS indicating lack of integration and coherence. Non-aligned reporting cycles.	Aligning PoMs across directives could enhance coherence and cost-effectiveness. Increased cross-directive coordination.	Hinders strategic planning.
Governance	National and European steering committees and technical groups exist for both directives, enabling coordination. Local and regional governance particularly strong in WFD.	Multiple departments and agencies involved with limited cross-directive coordination. MSFD not directly referenced in WFD PoMS indicating lack of integration and coherence.	Significant opportunity to improve cooperation and coordination through the introduction of overarching governance structure which could reduce duplication and highlight key operational and implementation links.	Fragmented governance.
Policy Alignment	MSFD environmental targets reference WFD actions (e.g. Water Action Plan 2024).	No statutory Integrated Coastal Zone Management (ICZM) strategy in Ireland. MSFD not directly referenced in WFD PoMS indicating lack of integration and coherence.	A national ICZM policy could bridge land-sea governance and improve integration. Improve stakeholder engagement.	Fragmented governance and policy alignment.
Citizen Science Integration	MSFD monitoring includes long-standing citizen science initiatives.	No reference to role of citizen science in WFD monitoring.	Enhanced public engagement, understanding and data collection.	Lack of public engagement.

Overall Conclusion and Policy Recommendations

Ireland's transitional and coastal waters are facing increasing pressures that challenge their ecological integrity and sustainable management. While significant progress has been made through the implementation of the Water Framework Directive and the Marine Strategy Framework Directive, the analysis in this report highlights persistent gaps in integration, coordination, and strategic alignment. Addressing these challenges requires a more coherent approach that bridges freshwater and marine governance, strengthens cross-directive collaboration, and supports evidence-based, site-specific management. The following recommendations set out practical steps to enhance policy coherence, improve environmental outcomes, and support a more integrated catchment-to-coast management framework.

Policy Recommendations

1. **Develop an Integrated Nutrient Management Strategy to reduce both nitrogen and phosphorus along the freshwater-marine continuum.**

Implement a dual-nutrient management approach that addresses both nitrogen and phosphorus to effectively control eutrophication along the freshwater–marine continuum. Historically, efforts have concentrated on reducing phosphorus in freshwater systems, which has altered N:P ratios and inadvertently increased nitrogen export to vulnerable coastal waters. Future strategies must account for the shift in nutrient limitation - from phosphorus in freshwater environments to nitrogen in marine systems. These strategies should be guided by system-specific ecological models and robust empirical data to identify the critical nutrients and the reduction targets necessary to achieve established management objectives.

2. **Apply targeted measures based on local conditions by aligning actions with the expected ecological response.**

Advance the principle of "the right measure in the right place" by aligning planned actions with the expected ecological response. For transitional and coastal waters, incorporate key factors that influence this response such as water residence time, light penetration, nutrient balance, and ecological interactions - when developing mitigation strategies. Recognize that some systems are inherently less sensitive to nutrient enrichment than others and ensure that interventions are targeted toward those areas where they will deliver the greatest ecological benefit.

3. **Strengthen scientific understanding of the scale and extent of eutrophication in estuarine and coastal waters, including development of a national vulnerability index for nutrient enrichment and eutrophication.**

Continue to invest in research that helps to understand the complexity of the processes which determine the scale and extent of eutrophication in estuarine and coastal waters. Prioritise studies on how climate change may increase vulnerability to nutrient enrichment and alter ecological dynamics along the freshwater–marine continuum.

This research could focus on developing a National Vulnerability Index for Nutrient Enrichment and Eutrophication (VI NEE) to identify transitional and coastal water bodies that are inherently more or less vulnerable to nutrient inputs, based on their physical, optical, and ecological characteristics. This index would integrate multiple biophysical indicators to provide an accessible, evidence based, and spatially explicit tool for prioritising management interventions and to better understand the susceptibility of these waters to future climate-driven changes in nutrient pressures and impacts.

4. **Develop site-specific action plans which consider both upstream and downstream impacts, integrated into the Catchment Management Work Plans of Ireland's Water Action Plan.**

Build upon existing knowledge and outputs of the previous recommendations to develop site-specific action plans to inform the development of targeted, locally appropriate management strategies that consider both upstream and downstream impacts. These should be integrated into the Catchment Management Work Plans under Ireland's Water Action Plan 2024.

5. **Establish a Joint Steering Group and implementation plan for WFD and MSFD.**

Form a national-level body to oversee strategic alignment between the WFD and MSFD. This group should develop a Combined Implementation Plan that identifies key linkages across standards, indicators, monitoring, measures, data sharing, reporting and public engagement. Identifying linkages and aligning activities such as programmes of measures across the two directives would enhance coherence, reduce duplication and improve cost-effectiveness.

6. **Address regulatory gaps in water standards and indicators across the WFD and MSFD.**

Fill existing gaps in standards, targets and indicators across the WFD and MSFD. Finalise and legislate standards for hydromorphological elements in transitional and coastal waters to support better integration with WFD and MSFD hydrographical and hydromorphological assessments.

7. **Adopt a Statement of Consistency approach for land-based activities to address how proposed activities will align with the WFD.**

To ensure environmental coherence across both marine and terrestrial domains, it is recommended that a similar Statement of Consistency requirement as currently used by MARA be introduced for land-based activities. This statement should explicitly address how proposed activities align with the objectives of the Water Framework Directive (WFD) and other relevant national and EU environmental strategies.

8. **Provide clear technical guidance (data requirements, assessment methodologies, and mitigation measures) to regulators and developers on how to assess project compatibility with the WFD and MSFD.**

Provide clear technical guidance (data requirements, assessment methodologies, and mitigation measures) to regulators and developers on how to assess project compatibility with the Water Framework Directive and Marine Strategy Framework Directive. This would have multiple benefits, including consistency in applications, improved legal compliance, reduced delays, improved stakeholder engagement and better-informed decision-making.

9. **Introduce a Statutory Integrated Coastal Zone Management (ICZM) Strategy to bridge the gap between land-sea governance.**

Develop and implement a national ICZM policy to bridge land–sea governance and promote holistic ecosystem-based management.

For the WFD and MSFD this strategy should explicitly link with the Catchment Management Work Plans (CMWPs) under Ireland's Water Action Plan 2024. Each CMWP should not only address nutrient inputs from upstream catchments but also consider the expected ecological response within estuarine and coastal environments. Site specific factors must be incorporated into planning to predict system sensitivity and guide targeted interventions.

By embedding ICZM and aligning it with WFD and MSFD objectives, Ireland can reduce fragmented decision-making and deliver more effective, integrated measures to protect water quality and biodiversity.

10. **Expand citizen science across both the WFD and the MSFD.**

Broaden citizen science initiatives under the WFD to match the MSFD approach. This will enhance public engagement, improve data collection, and foster greater awareness of water quality issues.

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See the main report for the full set of references

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