



# **SUBMISSION TO THE DEPARTMENT FOR HOUSING, LOCAL GOVERNMENT AND HERITAGE**

## **PUBLIC CONSULTATION ON THE SIGNIFICANT WATER MANAGEMENT ISSUES IN IRELAND**

5 August 2020

### **Introduction to An Fóram Uisce**

An Fóram Uisce | The Water Forum was established in June 2018 in accordance with the provisions of Part 5 of the Water Services Act 2017, and is the only statutory body representative of all stakeholders with an interest in the quality of Ireland's water bodies. An Fóram Uisce consists of 26 members including representatives from a wide range of organisations with direct connections to issues relating to water quality and also public water consumers. Approximately 50 different organisations were involved in the nomination of members. Further information can be found at [www.thewaterforum.ie](http://www.thewaterforum.ie).

### **Summary of Submission**

1. An Fóram Uisce welcomes the opportunity to respond to the public consultation on the Significant Water Management Issues (SWMI) in Ireland.
2. The wide scope of work undertaken by the Department to develop the SWMI public consultation document is recognised.
3. This document represents an agreed submission of An Fóram Uisce as a whole.
4. The submission is presented in three parts:

**PART ONE** outlines the background information upon which this submission is based. It details an overview of implementation of Integrated Catchment Management (ICM) in the 2<sup>nd</sup> cycle RBMP, providing recommendations for the improvement of each of the core components of ICM. This review of ICM implementation has been undertaken by An Fóram Uisce as a means of considering whether it is a strategic issue requiring further progress during the next cycle. A total of 18 recommendations are provided for improving ICM implementation in Ireland.

Part One also introduces a new Framework for Land and Landscape Management (FILLM) which provides An Fóram Uisce's position for progressing the concept of ICM in respect of the recommendations made for improving ICM delivery. The FILLM broadens ICM to include all

the components of the natural environment (air, water, ecosystems, soils, rocks, land, landscape) which are interrelated and interlinked, while retaining the catchment as the appropriate landscape unit for management. By using the FILLM as the underpinning concept for water management, it is possible to re-examine how Significant Water Management Issues can be identified and mitigated to further protect and enhance Ireland's water resources through the river basin management planning process

**PART TWO** provides this re-examination through overarching comment on the Significant Water Management Issues (SWMIs) described in the SWMI public consultation document, with six components of water management addressed. Part Two also reconceptualises Ireland's Significant Water Management Issues by introducing the sector-pressure-stressor approach as an alternative for understanding and managing Ireland's Significant Water Management Issues. Underpinned by the FILLM, the focus of this approach is to identify the environmental *stressors* which manifest through water quality and WFD status. By examining the linkages between stressors, pressures and the sectors through which they are delivered, it is possible to take an integrated, holistic approach to developing and implementing mitigation measures which can also produce co-benefits for climate change and biodiversity.

**PART THREE** directly responds to the SWMI questions provided in the public consultation document through the prisms of Parts One and Two. It also provides brief comment on seven components that were not included in the SWMI public consultation document but which are considered by An Fóram Uisce to be of vital importance to be addressed in the 3<sup>rd</sup> RBMP to improve the integrated management of Ireland's waters as required under the Water Framework Directive.

5. An Fóram Uisce considers the SWMI public consultation document questions to be overly technical, consequently creating barriers and inequity for non-expert engagement in the consultation process.
6. A total of 82 key points are outlined in response to the questions provided in the SWMI public consultation document.
7. By taking the approaches outlined in Parts One, Two and Three of this submission, An Fóram Uisce presents its position on the future management of Ireland's water resources both through the river basin management planning cycle, and through the interlinked legislation and policies associated with water management.
8. Further engagement in relation to the content of this submission, the FILLM and the 3<sup>rd</sup> cycle RBMP planning process is warmly welcomed.

**End**

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# Contents

EXECUTIVE SUMMARY .....	6
INTRODUCTION.....	13
PART ONE: TOWARDS A FRAMEWORK FOR LAND AND LANDSCAPE MANAGEMENT (FILLM) .....	15
1.1 An overview of implementation of Integrated Catchment Management in the 2 <sup>nd</sup> cycle RBMP .....	15
1.1.1 Public engagement.....	16
1.1.2 Developing a shared vision .....	17
1.1.3 Characterisation at catchment scale.....	17
1.1.4 Characterisation at local scale .....	18
1.1.5 Programme of measures.....	18
1.1.6 Environmental policy and regulations .....	18
1.1.7 Incentives .....	19
1.1.8 New/upgrading infrastructure .....	19
1.1.9 Inspections and enforcement of the regulations.....	19
1.1.10 Recommendations .....	19
1.2 An overview of the Framework for Land and Landscape Management (FILLM).....	21
PART TWO: OVERARCHING COMMENT ON THE SIGNIFICANT WATER MANAGEMENT ISSUES IN IRELAND PUBLIC CONSULTATION .....	23
2.1 Overarching Components of Significant Water Management Issues.....	23
2.1.1 Governance .....	23
2.1.2 Public and Stakeholder Engagement and Awareness.....	24
2.1.3 Legislation and Policy Coherence .....	25
2.1.4 River Basin Management Plan Monitoring and Evaluation .....	27
2.1.5 Time Lags and Timescales for Achieving WFD Status Objectives .....	28
2.1.6 Climate Change .....	29
2.2 Reconceptualising Ireland’s Significant Water Management Issues from an Integrated Land and Landscape Management Perspective .....	30
2.2.1 Examining Sectors, Pressures and Stressors as an Alternative Approach to Addressing Significant Water Management Issues .....	31
PART THREE: SIGNIFICANT WATER MANAGEMENT ISSUES IDENTIFIED IN THE PUBLIC CONSULTATION DOCUMENT .....	36
3.1. Addressing the SWMIs Identified in the Public Consultation Document .....	36
3.1.1 Prioritisation.....	36
3.1.2 Public Participation .....	38

3.1.3 Land-use Planning .....	39
3.1.4 Agriculture.....	40
3.1.5 Climate Change .....	43
3.1.6 Pollution of Waters (phosphorus and nitrogen).....	43
3.1.7 Physical Changes to Surface Waters/Hydromorphology (including barriers to fish migration).....	45
3.1.8 Siltation .....	46
3.1.9 Public Health/Drinking Water Quality .....	46
3.1.10 Invasive Alien Species .....	49
3.1.11 Hazardous Chemicals .....	50
3.1.12 Urban Pressures .....	51
3.1.13 Other Issues – Aquaculture.....	53
3.1.14 Other Issues – Antimicrobial Resistance (AMR) Bacteria in Waste Water .....	54
3.2. SWMIs Not Identified in the Public Consultation Document .....	54
Appendix 1: Background information and justification for selection of stressors .....	56
Sediment .....	56
Nutrients (NO <sub>3</sub> , P, NH <sub>4</sub> ) .....	57
Microbes, Bacteria, Parasites and viruses .....	58
Chemicals .....	59
Invasive Alien Species .....	60
Microplastics .....	62
Organic Matter.....	63
Water Level and Flow .....	64
Temperature .....	66

## EXECUTIVE SUMMARY

This document represents an agreed submission from An Fóram Uisce as a whole to the public consultation on the Significant Water Management Issues for the third cycle River Basin Management Plan (RBMP) for Ireland 2022-2027.

The submission is comprised of three parts. **Part One** outlines the background information upon which this submission is based. It details an overview of implementation of Integrated Catchment Management (ICM) in the 2<sup>nd</sup> cycle RBMP, providing recommendations for the improvement of each of the core components of ICM. This review of ICM implementation has been undertaken by An Fóram Uisce as a means of considering whether it is a strategic issue requiring further progress during the next cycle. The review covers each of the nine components of the ICM toolkit: 1) Public engagement; 2) Developing a shared vision; 3) Characterisation at catchment scale; 4) Characterisation at local scale; 5) Programmes of measures; 6) Environmental policy and regulations; 7) Incentives; 8) New/upgrading infrastructure; and 9) Inspections.

Successful implementation of ICM is based on actions for each of these 9 components of ICM in a cohesive, interwoven manner. A total of 18 recommendations are provided for improving these nine components.

Part One also introduces a new Framework for Land and Landscape Management (FILLM) which provides An Fóram Uisce's position for progressing the concept of ICM in respect of the recommendations made for improving ICM delivery. The FILLM broadens ICM to include all the components of the natural environment (air, water, ecosystems, soils, rocks, land, landscape) which are interrelated and interlinked, while retaining the catchment as the appropriate landscape unit for management.

By doing this, the FILLM becomes the overarching framework for environmental management as a means of connecting legislation and policies such as the Water Framework Directive, the Urban Waste Water Treatment Directive, the Habitats Directive, the Floods Directive, the Drinking Water Directive, climate change adaptation and mitigation, soil conservation, spatial planning and sustainable food and timber production. In addition, it is a means for achieving the Sustainable Development Goals for 2030.

Taking such a whole-of-system approach requires a multi-disciplinary, multi-objective and multi-stakeholder process which can link the environmental components and human activities within a catchment to optimise water quality returns while also delivering co-benefits for biodiversity and climate change.

By using the FILLM as the underpinning concept for water management, it is possible to re-examine how Significant Water Management Issues can be identified and mitigated to further protect and enhance Ireland's water resources through the river basin management planning process. **Part Two** provides this re-examination through overarching comment on the Significant Water Management Issues (SWMIs) described in the SWMI public consultation document, with six components of water management addressed: Governance; Public and stakeholder engagement and awareness; Legislation and policy coherence; RBMP monitoring and evaluation; Time lags and timescales for achieving WFD status objective; and Climate change. Some of these components are listed as SWMIs in the public consultation document, but in this submission these are not considered to be SWMIs as they can 1)

Be mechanisms through which improvements in water management governance, water quality and Water Framework Directive (WFD) status can be made, for example Prioritisation and Public Participation; or 2) Manifest other water management issues.

Part Two also reconceptualises Ireland’s Significant Water Management Issues by introducing the sector-pressure-stressor approach as an alternative for understanding and managing Ireland’s Significant Water Management Issues. Underpinned by the FILLM, the focus of this approach is to identify the environmental *stressors* which manifest through water quality and WFD status. By examining the linkages between stressors, pressures and the sectors through which they are delivered, it is possible to take an integrated, holistic approach to developing and implementing mitigation measures which can also produce co-benefits for climate change and biodiversity.

Following an examination of the 2<sup>nd</sup> RBMP and the SWMI public consultation document and the international literature, eight stressors are identified: sediment, nutrients (nitrogen, in terms of nitrate and ammonium, and phosphorus), microbes (bacteria, viruses and parasites), chemicals, organic matter, microplastics, water level and flow, and temperature. This list of stressors and their linked pressures and sectors may not be exhaustive, but are used to highlight that by focusing on the linkages of each of these environmental stressors with the pressures and sectors through which they are manifested, it is possible to create a more holistic picture of the complex interactions acting on Ireland’s waters.

While Parts One and Two review ICM implementation and introduce the FILLM as a new environmental management framework, and the sector-pressure-stressor approach as an alternative for identifying and addressing SWMIs, **Part Three** directly responds to the SWMI questions provided in the public consultation document through the prisms of Parts One and Two. A summary of the key points addressed through answering these questions are provided below.

SWMI	Summary of Points
Prioritisation	<ul style="list-style-type: none"> <li>• While it is recognised that limited resources must be sparingly shared, An Fóram Uisce considers that the prioritisation of measures into 190 sub-catchment Priority Areas for Action (PAAs) undertaken in the 2<sup>nd</sup> RBMP contravenes Ireland’s obligations under Articles 3 and 4 of the Water Framework Directive.</li> <li>• Prioritisation of resources to PAAs can make it difficult to address water quality deterioration in non-prioritised areas.</li> <li>• Investment in <i>protection</i> and <i>restoration</i> of water quality is needed.</li> <li>• Prioritising PAAs in the 2<sup>nd</sup> RBMP failed to fully implement ICM by taking a sub-catchment approach to prioritisation.</li> <li>• There is currently a lack of quantitative evidence to support claims of improvements in water quality in PAAs as a direct result of LAWPRO and ASSAP actions.</li> <li>• Resources provided to Local Authorities to protect and improve water quality outside of PAAs are insufficient.</li> <li>• Current resources available to Local Authorities for water quality protect and improve measures outside of PAAs may be redirected to other non-water areas as a result of a perception that LAWPRO is undertaking the necessary work.</li> </ul>

	<ul style="list-style-type: none"> <li>• Any revision to the PAAs in the 3<sup>rd</sup> RBMP should prioritise catchments which are used as drinking water sources to provide co-benefits of measures for drinking water quality and public health.</li> <li>• Commitments to improve urban wastewater infrastructure as part of the 2<sup>nd</sup> RBMP should be urgently progressed.</li> <li>• Transparent reporting of progress of wastewater treatment infrastructure improvements should be a priority for the 3<sup>rd</sup> RBMP.</li> <li>• Improvements in the monitoring, evaluation and reporting of RBMP measures and actions is an essential priority.</li> <li>• Agencies and bodies with responsibility for undertaking RBMP actions must be required to report on metrics aligned with the RBMP actions.</li> </ul>
Public participation	<ul style="list-style-type: none"> <li>• The SWMI public consultation document questions are overly technical, creating barriers and inequity for non-expert engagement in the consultation process.</li> <li>• People are given the opportunity to <i>respond</i> to the way our waters are managed, with little transparency as to whether any responses are incorporated into decision making.</li> <li>• The FILLM outlined in Part One explicitly requires public engagement at all stages.</li> <li>• Recommendations from <a href="#">An Fóram Uisce’s briefing note on public engagement in water management</a> should be incorporated into the 3<sup>rd</sup> RBMP actions.</li> <li>• Pilot engagement catchments should be implemented in the 3<sup>rd</sup> RBMP to incorporate social science expertise into public engagement, and to trial engagement and monitoring and evaluation methodologies.</li> <li>• Co-designed catchment management plans can be developed with local communities and stakeholders to raise awareness of issues and incorporate local knowledge and expertise. These could be trialled in the pilot engagement catchments.</li> <li>• Given its statutory role in water management, it is proposed that An Fóram Uisce is appointed as a champion body for the delivery of the SDGs and their water-related actions.</li> </ul>
Land-use planning	<ul style="list-style-type: none"> <li>• The FILLM provides an overarching framework for environmental management which connects multiple legislative instruments and incorporates spatial planning.</li> <li>• Currently, there is no planning guidance for Local Authorities regarding WFD concerns meaning decisions are being made within a knowledge deficit.</li> <li>• WFD-relevant planning guidelines for Local Authorities are required, along with training for relevant staff and decision makers involved in planning and WFD implementation.</li> <li>• The commitments to land-use planning in the Programme for Government are welcomed and An Fóram Uisce looks forward to working with the relevant Departments to achieve them.</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Agriculture is considered in this submission as a sector, the functions of which act as pressures impacting the stressors of water bodies.</li> <li>• Some historical policies have reduced the social values associated with water and landscape; and the FILLM provides the framework for increasing such social value.</li> </ul>

	<ul style="list-style-type: none"> <li>• Farming for Nature projects, Results-Based Agri-Environmental Schemes and EIPs must be further encouraged and their results widely disseminated.</li> <li>• Providing public money for public goods can provide support to farmers based on the environmental services they provide as part of their farming.</li> <li>• The recommendations of a new OECD report regarding managing water quantity and risks under climate change and reducing pollution from agriculture should be heeded.</li> <li>• Further action is required to address nitrate pollution of waters following the recent EPA report on Water Quality 2013-2018.</li> <li>• Results from agricultural research projects such as SmartBufferz, Slowwaters and Watermarke should inform agricultural measures included in the 3<sup>rd</sup> RBMP.</li> <li>• An Fóram Uisce has commissioned a research project to investigate water quality returns from the reform of the CAP. The final report is due in September 2020 and its findings should be used to inform the 3<sup>rd</sup> RBMP planning.</li> <li>• A combination of national and locally targeted CAP measures and approaches will be necessary to protect <i>and improve</i> water quality.</li> </ul>
Climate change	<ul style="list-style-type: none"> <li>• In this submission, climate change is considered a direct driver of change rather than a specific SWMI.</li> <li>• The visibility of water within climate mitigation and adaptation measures must be increased to improve the linkages between climate policy and water policy.</li> <li>• Knowledge gaps exist surrounding abstractions below the threshold for registration, and their cumulative effect within catchments and how this may be exacerbated by climate change.</li> </ul>
Pollution of waters (phosphorus and nitrogen)	<ul style="list-style-type: none"> <li>• Urgent progress on the commitments to improving national wastewater treatment infrastructure made in the 2<sup>nd</sup> RBMP is essential.</li> <li>• The 3<sup>rd</sup> RBMP should include statements on the progress made to date on 2<sup>nd</sup> RBMP UWWTP commitments, reasons for lack of progress, updates on compliance and non-compliance of individual WWTPs, projected timeframes for achieving compliance where needed, and an action plan for achieving commitments regarding WWTP infrastructure improvements made in the 3<sup>rd</sup> RBMP.</li> <li>• It is not acceptable that 36 agglomerations are without wastewater treatment systems with untreated wastewater being discharged to receiving waters.</li> <li>• Funding should be made available to review the current data availability on combined sewer overflows and storm water overflows in Ireland, with the view to creating a publicly-accessible information hub for locations of discharges, discharge times, rates and volumes.</li> <li>• The recently announced grant system for domestic wastewater treatment systems is welcomed and must be carried over into the 3<sup>rd</sup> RBMP.</li> <li>• Monitoring and evaluation metrics for bodies and agencies charged with implementing RBMP actions must be aligned to RBMP reporting mechanisms.</li> <li>• Further research into the efficacy of contaminant removal from wastewater sludge for recycling is necessary as are measures and policy</li> </ul>

	<p>to further encourage the recovery and recycling of nutrients from wastewater.</p> <ul style="list-style-type: none"> <li>• Pathway interception measures should be prioritised for mitigating impacts from phosphate.</li> <li>• Source reduction and mobilisation control measures should be prioritised for mitigating impacts from nitrate.</li> <li>• Soft engineering options such as Integrated Constructed Wetlands should be included as management options for reducing nutrient pollution at the catchment scale rather than relying solely on WWTP engineered solutions.</li> </ul>
Physical changes to water bodies/ Hydromorphology (including barriers to fish migration)	<ul style="list-style-type: none"> <li>• Barriers to facilitating river restoration works, such as planning requirements, should be examined to improve ease of implementation.</li> <li>• Guidelines for assessing hydromorphological impacts on waters in the planning process should be introduced.</li> <li>• Natural water retention measures must be incorporated as options for catchment-scale flood mitigation measures and habitat restoration measures, using international best practice guiding principles.</li> <li>• Rivers where migratory fish populations are in crisis compared to historical figures should be prioritised for action where barriers have been found to be a significant contributory factor to the population decline.</li> <li>• Lessons learned and knowledge gaps identified from the implementation of the National Biodiversity Action Plan 2017-2021 should be used to inform the actions required through the 3<sup>rd</sup> RBMP to help achieve the National Biodiversity Action Plan.</li> </ul>
Siltation	<ul style="list-style-type: none"> <li>• Local co-designed catchment management plans developed within the supporting framework of the FILLM would raise awareness of local issues and incorporate local knowledge and solutions for mitigation.</li> <li>• Pathway interception measures are important for the management of siltation.</li> </ul>
Public health/ Drinking water quality	<ul style="list-style-type: none"> <li>• Greater ambition to reduce leakage to below 38% nationally is required post 2021.</li> <li>• A whole-of-catchment cumulative approach to abstraction licencing should be undertaken, with due consideration to the impact of abstractions on ecological character and flow and water level regimes.</li> <li>• A collaborative approach to drinking water source protection is essential to deliver Integrated Catchment Management through the FILLM. Such a collaborative approach can only be fostered through clear and strong governance, defined roles for action, and appropriate resourcing.</li> <li>• Key lessons can be drawn from the Phase I and Phase II Drinking Water Source Protection Projects delivered by the National Federation of Group Water Schemes.</li> <li>• Clarity is needed as to how the National Water Resources Plan and the Drinking Water Safety Plans in development by Irish Water link to the 3<sup>rd</sup> RBMP and catchment-scale objectives.</li> <li>• A greater focus on improving water quality in Small Private Supplies is needed and the National Federation of Group Water Schemes Framework for Drinking Water Source Protection would assist this. In addition, greater awareness of the importance of drinking water source protection within the Small Private Supplies sector is necessary.</li> </ul>

	<ul style="list-style-type: none"> <li>• The National Federation of Group Water Schemes Framework for Drinking Water Source Protection is recommended to deliver co-benefits for climate and biodiversity through drinking water source protection measures.</li> <li>• A national peatlands rewetting strategy would improve drinking water quality by reducing sediment entering water courses and reducing dissolved organic carbon concentrations (leading to fewer lower concentrations disinfection by-products, such as Trihalomethanes, in drinking water supplies), while providing co-benefits for flood alleviation (by slowing the flow), carbon sequestration, and biodiversity through peatland rehabilitation.</li> </ul>
Invasive Alien Species	<ul style="list-style-type: none"> <li>• Clear and transparent governance structures for invasive species management are essential.</li> <li>• Priority should be given to addressing management actions required to reduce the likelihood of introduction and spread of those Invasive Alien Species identified as being of greatest concern through the Horizon Scanning approach undertaken and published by IT Sligo.</li> <li>• Easily accessible funding could be provided to local community groups, such as River Trusts and Catchment Partnerships and Associations to map riparian invasive species presence within their catchment and to develop invasive species management plans to implement the appropriate management measures to reduce their prevalence and potential to spread.</li> <li>• Active engagement measures to raise awareness of local IAS issues, preventative measures and activities associated with the spread of IAS are required.</li> <li>• The content of An Fóram Uisce’s submission under the public consultation for the National Marine Planning Framework under the Descriptor Non-Native Invasive Species is highly relevant to RBMP measures to address IAS and highlights the necessary policy coherence required to deliver integrated management of IAS in Ireland.</li> <li>• Local community and sporting groups should be engaged through a national campaign to raise awareness of local IAS issues, preventative measures and activities associated with the spread of IAS.</li> </ul>
Hazardous chemicals	<ul style="list-style-type: none"> <li>• Public awareness campaigns and labelling information are important to address behaviour around hazardous chemicals, and lessons can be learned from other water-related campaigns such as <i>Think before you Flush</i>.</li> <li>• Policy and legislation are important to drive consumer choice, as has been observed regarding microplastics/microbeads in personal care products.</li> </ul>
Urban pressures	<ul style="list-style-type: none"> <li>• Lessons can be learned from international best practice to create and deliver guidance on design and implementation of green infrastructure and sustainable drainage systems.</li> <li>• Policy and resources need to be devoted by Local Authorities to further install such green infrastructure in urban areas to slow the flow while creating co-benefits for biodiversity and society.</li> <li>• Catchment-scale flood alleviation requires a greater focus on natural water retention measures to be used in combination with harder engineering flood alleviation measures where deemed appropriate and subject to the required legislative environmental assessments.</li> </ul>

	<ul style="list-style-type: none"> <li>• Ireland’s building regulations need revision to facilitate national-scale action to reduce water consumption. Opportunities for retrofitting also need to be pursued.</li> <li>• There is little stimulus for the general public to initiate domestic water conservation measures or install domestic green infrastructure which could help to both slow the flow and improve water quality.</li> <li>• Where possible, opportunities to create green and blue spaces around water courses that would create environmental and societal co-benefits should be prioritised ahead of culverting or other hard engineering solutions.</li> <li>• Irish-focused research on green-blue infrastructure should be used in combination with lessons from international case studies of successful delivery of such infrastructure to inform recommendations for its delivery through the 3<sup>rd</sup> RBMP in Ireland.</li> <li>• It is essential for the appropriate funding to be delivered to ensure no impairments of Irish Water’s ability to meet their commitments on upgrading urban wastewater treatment infrastructure.</li> </ul>
Aquaculture	<ul style="list-style-type: none"> <li>• The content of An Fóram Uisce’s response to the public consultation on the draft National Marine Planning Framework is highly relevant to RBMP measures and highlights the necessary policy coherence required to deliver integrated management through the FILLM.</li> <li>• An Fóram Uisce expresses concerns that many aquaculture operations were able to continue operating without a licence due to a loophole in the Fisheries Amendment Act which allows continued operation once a licence renewal has been applied for. In addition, the speedy process at which the backlog was eliminated provided local communities with little opportunity to take part in the public participation process.</li> <li>• Regarding nutrient inputs from aquaculture, it is highlighted that pseudofaeces, faeces and silt from shellfish aquaculture can have detrimental impacts on the local environment through anoxia and reduction in faunal abundance and diversity.</li> </ul>
Antimicrobial resistance (AMR) bacteria in waste water	<ul style="list-style-type: none"> <li>• Further understanding is needed on the prevalence of AMR bacteria in wastewater in addition to the pathways through which they can present a public health threat – e.g. contamination of drinking water, bathing/recreational waters, etc.</li> <li>• A One Health approach is required to reduce both water contamination risk from wastewater treatment discharge and public health risk from contact with contaminated waters.</li> </ul>

Finally in Part Three, brief comment is provided on seven components that were not included in the SWMI public consultation document but which are considered by An Fóram Uisce to be of vital importance to be addressed in the 3<sup>rd</sup> RBMP to improve the integrated management of Ireland’s waters as required under the WFD: 1) Governance; 2) Coastal issues; 3) Forestry; 4) Microplastics; 5) Water level and water availability; 6) Peat extraction; and 7) Unregulated wetland/peatland drainage.

## INTRODUCTION

The vision of An Fóram Uisce is that Ireland has *clean and healthy waters, capable of supporting biodiversity and providing the basis for a productive and healthy economic and cultural life*. The Forum's mission is to ensure that all stakeholders are regularly reminded of this vision and their role in achieving and supporting it.

This document represents the submission of An Fóram Uisce to the public consultation on the Significant Water Management Issues for the third cycle River Basin Management Plan for Ireland 2022-2027.

The submission is comprised of three parts. Part One outlines the background information upon which this submission is based. It details an overview of implementation of Integrated Catchment Management (ICM) in the 2<sup>nd</sup> cycle River Basin Management Plan, providing recommendations for the improvement of each of the core components of ICM.

Part One also introduces a new Framework for Land and Landscape Management (FILLM)<sup>1</sup> which provides An Fóram Uisce's position for progressing the concept of ICM. The FILLM broadens ICM to include all the components of the natural environment (air, water, ecosystems, soils, rocks, land, landscape) which are interrelated and interlinked, while retaining the catchment as the appropriate landscape unit for management.

Using the FILLM as the underpinning concept, Part Two provides overarching comment on the Significant Water Management Issues (SWMIs) described in the SWMI public consultation document. Six overarching components of water management are addressed. Some of these overarching components are listed as SWMIs in the public consultation document, but in this submission these are not considered to be SWMIs as they can 1) Be mechanisms through which improvements in water management governance, water quality and Water Framework Directive (WFD) status can be made, for example Prioritisation and Public Participation; or 2) Manifest other water management issues.

Part Two reconceptualises Ireland's Significant Water Management Issues by introducing the sector-pressure-stressor approach as an alternative for understanding and managing the SWMIs which impact on Ireland's aquatic environments. Underpinned by the FILLM, the focus of this approach is to identify the environmental *stressors* which manifest through water quality and WFD status. By examining the linkages between stressors, pressures and the sectors through which they are delivered, it is possible to take an integrated, holistic approach to developing and implementing mitigation measures which can also produce co-benefits for climate change and biodiversity.

Part Three directly responds to the SWMI questions provided in the public consultation document through the prisms of the FILLM and the sector-pressure-stressor approach described in Parts One and Two respectively.

By taking these approaches, An Fóram Uisce outlines its position on the future management of Ireland's water resources, both through the river basin management planning cycle, and through the interlinked legislation and policies associated with water management. Further engagement in

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<sup>1</sup> An Fóram Uisce (2020). Protecting and enhancing our environment: A Framework for Integrated Land and Landscape Management. Available from: [https://thewaterforum.ie/app/uploads/2020/07/An-Fóram-Uisce\\_Framework-for-Integrated-Land-and-Landscape-Management.pdf](https://thewaterforum.ie/app/uploads/2020/07/An-Fóram-Uisce_Framework-for-Integrated-Land-and-Landscape-Management.pdf)

relation to the content of this submission, the FILLM and the 3<sup>rd</sup> cycle RBMP planning process is welcome.

# **PART ONE: TOWARDS A FRAMEWORK FOR LAND AND LANDSCAPE MANAGEMENT (FILLM)**

## **1.1 An overview of implementation of Integrated Catchment Management in the 2<sup>nd</sup> cycle RBMP**

The central concept to the Water Framework Directive (WFD) is integration as this is seen as key to the management and protection of water within river basin districts. This includes integration of, for instance: i) all water resources combining fresh surface water and groundwater, wetlands, coastal water resources at the catchment scale; ii) environmental objectives for water bodies; iii) water uses, functions and values; iv) disciplines and expertise; v) stakeholders and civil society; vi) measures to achieve the objectives; and vii) the different decision-making levels (local, regional and national) that influence water management. The Integrated Catchment Management (ICM) approach was developed as the means of enabling the required integration. This is acknowledged in the River Basin Management Plan (RBMP) for Ireland 2018-2021<sup>2</sup> as follows: *“A new approach to implementation known as ‘integrated catchment management’ is being used to support the development and implementation of the RBMP, using the catchment (an area that contributes water to a river and its tributaries, with all water ultimately running to a single outlet) as the means to bring together all public bodies, communities and businesses.”*

A review of the implementation of ICM has been undertaken by An Fóram Uisce as a means of considering whether it is a strategic issue requiring further progress during the next cycle.

The ICM components or ‘toolkit’, outlined in Table 1 is used as the basis for considering the use of ICM to-date and for making recommendations for the next RBMP in the final section.

It is recognised that a number of evaluative studies are currently underway, and these are awaited with interest. The overall sense, however, is that the public body that applies the ICM approach most consistently in its work is LAWPRO in collaboration with ASSAP farm advisors (primarily Teagasc). Specific units, e.g. EPA Catchment Science & Management Unit, and individuals in EPA and local authorities also use the approach as the basis for their work. It is considered that this uneven implementation of ICM is unsatisfactory and is hindering progress towards achieving WFD objectives.

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<sup>2</sup> <https://www.housing.gov.ie/water/water-quality/river-basin-management-plans/river-basin-management-plan-2018-2021>

Table 1: The Integrated Catchment Management Toolkit<sup>3</sup>

<b>'Tools in the toolkit'</b>
<b>1. Public engagement</b>
<b>2. Developing a shared vision</b>
<b>3. Characterisation at catchment scale</b>
<b>4. Characterisation at local scale</b>
<b>5. Programmes of measures</b>
<b>6. Environmental Policy &amp; Regulations</b>
<b>7. Incentives</b>
<b>8. New/upgrading infrastructure</b>
<b>9. Inspections</b>

### **1.1.1 Public engagement**

The current measures – establishment of An Fóram Uisce, work of LAWPRO together with ASSAP farm advisors, communications via the website [www.catchments.ie](http://www.catchments.ie), and the input and support of the Rivers Trusts – represent significant progress on public and stakeholder engagement during the 2<sup>nd</sup> RBMP cycle.

Successful, *integrated* catchment management must be based on social acceptability by local communities as well as on protection and rehabilitation measures. This requires effective public engagement based on mutual respect and an understanding of community values and aspirations. It brings the social (including political), wellbeing (physical and mental), cultural and economic dimensions to catchment management. In essence, ICM requires scientists and policy makers to find ways to walk alongside the people who live and work in the catchment. An Fóram Uisce believes that significant further progress is needed in this area during the next RBMP cycle as a priority and that clear proposals to enable this be included in the RBMP.

A truly collaborative approach to ICM would include stakeholders from the earliest possible stage. Local expertise must be engaged, not at some later point in the ICM process, but from the very beginning and it should be allowed meaningful impact in decision-making and actions undertaken<sup>4</sup>. The delay in timelines on the implementation of the 2<sup>nd</sup> RBMP meant that LAWPRO Community Water Officers were appointed in late 2016 and the publication of the draft RBMP in April 2017 resulted in

<sup>3</sup> <http://lawaters.ie/technical-resources/>

<sup>4</sup>Bresnihan, P and Hesse, A. (2019). Public engagement in water governance. Report to An Fóram Uisce. Available from: [https://thewaterforum.ie/app/uploads/2020/03/Water-Forum\\_Public-Participation\\_Bresnihan-and-Hesse\\_2019.pdf](https://thewaterforum.ie/app/uploads/2020/03/Water-Forum_Public-Participation_Bresnihan-and-Hesse_2019.pdf)

there not being enough time for such meaningful early engagement with the public in the planning process for the 2<sup>nd</sup> cycle.

Since then however, significant progress is being made. Targeted community engagement has led to a growing number of Rivers Trusts and Catchment Associations across the country. DHLGH is currently supporting a Rivers Trusts Resilience Pilot project whereby the Inishowen and Maigue Rivers Trusts are funded to employ a project officer to deliver their objectives over the next 3 years. Rivers Trusts are community led and driven, their objectives are designed by the community and all encompass water quality, ecological integrity, biodiversity protection, addressing alien species as well as education and training programmes and most have an aspect related to local economic development and tourism.

Some communities have facilitated community development ‘visioning’ approaches to define their objectives and action plan for their local river catchments. As these visioning workshops are open to and targeted at all members of the community, all age groups and backgrounds, a wide range of interests and perspectives are represented. This community development approach initiated and developed by the Rivers trusts in the UK has been undertaken in a number of catchments including the Nore river catchment and Dundalk Bay catchment, amongst others. Through this RIPPLE<sup>5</sup> process the community identifies actions that they would like to see happen in their catchment, they consider how these actions might be delivered and who might take the lead in the delivery of each action, and in this way they create a plan for their catchment<sup>6</sup>. At further meetings, this plan is ratified and turned into a ‘vision’ for their catchment. To date, these community plans, whilst pertaining to local river catchments do not only include actions for water quality but also for biodiversity, climate, heritage, education and tourism, an outcome that might be expected when ‘all of the community’ have an input to the plan<sup>7</sup>. The aim of promoting a ‘visioning’ exercise within a catchment is to encourage thinking and networking that might initiate the development of a catchment association or rivers trust to lead on the implementation of the community catchment plan.

### **1.1.2 Developing a shared vision**

Developing a collective vision and strategy in a multi-stakeholder catchment situation, while challenging, is critical to establishing priorities and encouraging practice change where needed as a means of dealing successfully with certain of the environmental stressors and pressures. This is particularly important with regard to the Statutory Agencies each of whom has a particular and distinctive role but who need to work and communicate more closely with one another in formulating a joint agenda. Realising this vision requires an engagement process based on the principles such as trust, respect and open communication. The strategy must be locally meaningful as well as nested in the broader scale objectives.

### **1.1.3 Characterisation at catchment scale**

Catchment characterisation is undertaken by the EPA Catchments Unit in collaboration with public bodies such as local authorities, IFI and Irish Water. A comprehensive integrated assessment of all

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<sup>5</sup> Ballinderry River Trust and WWF (Undated). RIPPLE: A river action plan for the Ballinderry. Available from: [http://assets.wwf.org.uk/downloads/wwf\\_ripple\\_brochure\\_final\\_layout\\_1.pdf](http://assets.wwf.org.uk/downloads/wwf_ripple_brochure_final_layout_1.pdf)

<sup>6</sup> <https://fliphtml5.com/dabkz/rmnn/basic>

<sup>7</sup> <https://www.catchments.ie/creating-vision-dundalk-bay-rivers/>

relevant scientific aspects of catchments and sub-catchments is undertaken. The relevance and quality of this work is acknowledged, and An Fóram Uisce supports its continuation.

### **1.1.4 Characterisation at local scale**

The application of ICM is already happening as part of the new Governance structures set up as part of the 2<sup>nd</sup> RBMP cycle. The development of these structures resulted from learnings from the first RBMP and aimed to ensure a more co-ordinated approach to the development and implementation of 2<sup>nd</sup> cycle measures, ‘the right measure in the right place’.

LAWPRO is a Local Authority shared service with responsibility for managing this ICM approach on a national basis with significant support from the EPA Catchments Unit. Five Regional Management Committees consisting of Local Authority Directors of Service with direct responsibility for staff delivering against RBMP actions, chaired by a Local Authority CEO, report back to the National Co-ordination and Management Committee. There are 5 Regional Operational committees comprising staff from all the Agencies delivering actions to address the requirements of the RBMP Priority Action Areas and this committee is supported primarily by the LAWPRO Science teams, the EPA Catchments Unit and Chaired by a Local Authority Director of Service. Both Committees meet on a regular basis to discuss progress on the implementation of the RBMP, fieldwork results and potential measures within the Priority Areas of Actions.

A key part of the deliverables in the 2<sup>nd</sup> Cycle was the appointment in late 2016 of 12 Community Water Officers whose role it is to ‘engage local communities’ in the management of their local water bodies. Supported by initiatives such as the ‘Community Water Development Fund’ they engage with communities and support them to take actions to improve water quality, as well as raise awareness and build capacity through training programmes. An internal evaluation of LAWPRO work has recently been completed.

### **1.1.5 Programme of measures**

Progress has been made in undertaking measures to achieve WFD objectives. However, the continuing deterioration of our water quality<sup>8</sup> indicates that the measures being implemented are not adequate or have yet to achieve environmental outcomes. Currently there is an information deficit on progress updates through the RBMP monitoring and evaluation process (described further in Section 2.1.4), in particular in relation to the effectiveness of measures in addressing specific pressures and impacts, and due to this deficiency it is hard to be definitive on progress of RBMP measures.

### **1.1.6 Environmental policy and regulations**

While regulations alone will not enable environmental objectives to be met, they are nevertheless a critically important ‘tool in the toolkit’. The high standard of many of the environmental regulations, such as the Good Agricultural Practices Regulations are recognised. However, they tend to be ‘one size fits all’ and a number of policy gaps are evident.

For instance, payments under the current CAP Pillar 1, farmers’ remuneration is based on land under agriculture and therefore if measures for water quality and biodiversity are implemented, such as

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<sup>8</sup> EPA (2019). Water Quality in Ireland 2013-2018. Available from: <https://www.epa.ie/pubs/reports/water/waterqua/waterqualityinireland2013-2018.html>

wide riparian buffer strips, those payments are lost. In addition, certain categories of 'unworked', low productivity farmland with environmental benefits (such as scrub, woods and bare rock) are ineligible for payments leading to some farmers converting these areas to farmland so that they may be eligible for subsidies. For farmers within the 2<sup>nd</sup> RBMP Priority Areas for Action (PAAs), this issue has been addressed in that they no longer lose CAP payments for lands given over to achieving environmental benefits. There is a strong case for this measure to be made available to all farmers, not just those located within PAAs.

### 1.1.7 Incentives

While An Fóram Uisce supports compliance with the regulations as a requirement, a policy of targeted incentives to enable land-use change, for instance, on high risk land or where large environmental benefits are feasible should be utilised as a means of achieving environmental objectives.

### 1.1.8 New/upgrading infrastructure

Over half of urban wastewater is not meeting EU standards<sup>9</sup> and the Water Advisory Body has noted that Ireland is not addressing the deficiencies in its wastewater treatment at a fast-enough pace<sup>10</sup>. Expediting urban wastewater treatment infrastructure upgrades is critical to achieve RBMP objectives. Of immediate priority are the 36 towns where raw sewage is being released untreated into local receiving waters.

Obtaining progress updates on wastewater infrastructure improvements remains challenging, particularly with regards to measures identified in the 2<sup>nd</sup> RBMP. This is in part due to reporting structures and mechanisms that are not aligned to RBMP objectives and KPIs. A revision of progress reporting, monitoring and evaluation, and provision/availability of information is required for the 3<sup>rd</sup> RBMP cycle.

### 1.1.9 Inspections and enforcement of the regulations

Engagement and collaboration should be prioritised as the means of enabling both practice change where needed and social acceptability for environmental protection actions over compliance checking and sanctions, which can often cause alienation towards environmental protection. Nevertheless, enforcement of regulations is essential as a means of enabling compliance and indicating to those that are complying that the system is being applied in a fair manner. However, inspections are not always incorporated adequately with the other ICM 'tools in the toolkit' and therefore their cost-effectiveness and efficiency in achieving environmental outcomes could be improved.

### 1.1.10 Recommendations

Successful implementation of ICM is based on actions for **each** of the components in a cohesive, interwoven manner. Recommendations for the components listed in Table 1 are outlined below.

ICM Component	Recommendations
Public engagement	1. That local communities and individuals be involved in social learning and decision-making by means of implementation of a participatory process at catchment and/or sub-catchment level in <u>all</u> catchments, i.e. not only those with an 'improvement' objective, but also those with a 'protection'

<sup>9</sup>EPA (2019). Urban Waste Water Treatment in 2018. Available from: <https://www.epa.ie/water/uww/wwater/>

<sup>10</sup> Water Advisory Body (2019). Quarterly Report No.1 October 2019. Available from: <https://wateradvisorybody.ie/quarterly-reports/>

	<p>objective. Account should be taken of the An Fóram Uisce Briefing Note on public engagement and the experience and expertise of LAWPRO and the River Trusts.</p> <p>2. As farm advisors are at the forefront of liaising with farmers and the public on environmental issues arising from farming, relevant training on environmental aspects such as water quality and ecology, climate change and biodiversity should be part of undergraduate agriculture courses and ongoing education. All agricultural trainers and educators should themselves be trained in the best practices of water quality, climate change and biodiversity protection.</p>
Developing a shared vision	<p>3. That developing a shared vision be a component of the public engagement.</p> <p>4. That a shared vision (including of the role and importance of the ICM approach) is developed among all the relevant public body stakeholders, such as NPWS, OPW, IFI, local authority Environment and Planning Sections, LAWPRO, Irish Water and EPA, within the existing governance and co-ordination structures.</p>
Characterisation at catchment scale	<p>5. That the multidisciplinary approach and collaboration with relevant public bodies continue.</p>
Characterisation at local scale	<p>6. That the approach used by LAWPRO should be applied in all remaining catchments and sub-catchments during the next cycle, including not only the Areas for Improvement in Priority Areas for Action (PAAs) as currently, but also the Areas for Protection.</p> <p>7. That training of local authority staff on local scale characterisation be initiated as a means of following the ‘right measure in the right place’ philosophy in dealing with diffuse and small point sources.</p> <p>8. That greater input from communities in catchments be facilitated.</p> <p>9. That consideration be given to dealing with whole catchment areas in an integrated manner rather than the current practice of dealing with sub-catchments in PAAs.</p>
Programmes of measures	<p>10. Greater transparency in the monitoring and evaluation of principal actions identified in the RBMP and, the publication of interim reports would achieve greater transparency and assist in the evaluation of progress.</p> <p>11. More ambitious programmes in wastewater treatment and leakage and mains replacement should be undertaken.</p>
Environmental policy & Regulations	<p>12. That a review of possible policy/regulatory gaps be undertaken.</p> <p>13. That the ‘area for eligibility’ under Pillar 1 of CAP be modified to take account of Pillar 2 requirements and be applied countrywide, rather than just in PAAs as is the situation currently.</p>

	14. That the development and implementation of County Development Plans (CDP) and Local Economic and Community Plans (LECP) for each local authority area build upon local community catchment and neighbourhood planning processes using a collaborative, consultative and participative approach in doing so.
Incentives	15. That, with regard to payments to farmers, while Pillar 2 payments (or whatever equivalent payments in the new CAP are called) incentivise environmental protection, consideration should be given to the means of making additional resources available. 16. That consideration be given to ‘public money for public goods’ as a principle and to utilising ‘results-based payments’ as a means of achieving environmental outcomes.
New/upgrading infrastructure	17. That a review of the adequacy of slurry storage be undertaken and, if considered necessary, grant aid is provided for increasing storage facilities.
Inspections	18. Where this is not already the situation, the approach to inspections should, in so far as is practicable, not be ‘stand-alone’ but should be part of an ICM process and should be based on and take account of the characterisation results.

## **1.2 An overview of the Framework for Land and Landscape Management (FILLM)**

In the context of Section 1.1, above, a position paper is presented by An Fóram Uisce, available [here](#), which outlines a Framework for Land and Landscape Management (FILLM).

The FILLM builds on the ICM approach detailed in Section 1.1. and broadens it to include all the components of the natural environment (air, water, ecosystems, soils, rocks, land, landscape) which are interrelated and interlinked, while retaining the catchment as the appropriate landscape unit for management. By doing this, the FILLM becomes the overarching framework for environmental management as a means of connecting legislation and policies such as the Water Framework Directive, the Urban Waste Water Treatment Directive, the Habitats Directive, the Floods Directive, the Drinking Water Directive, climate change adaptation and mitigation, soil conservation, spatial planning and sustainable food and timber production. In addition, it is a means of achieving the UN Sustainable Development Goals (SDGs) for 2030.

Taking such a whole-of-system approach requires a multi-disciplinary, multi-objective and multi-stakeholder approach which can link the environmental components and human activities within a catchment to optimise water quality returns while also delivering co-benefits for biodiversity and climate change.

By using the FILLM as the underpinning concept for water management, it is possible to re-examine how Significant Water Management Issues can be identified and mitigated to further protect and enhance Ireland’s water resources through the river basin management planning process.

Part Two of this submission provides this re-examination of SWMIs, firstly through an overarching comment on the Significant Water Management Issues as presented in the SWMI public consultation document; and secondly by outlining the sector-pressure-stressor approach as an alternative for identifying and managing Ireland's SWMIs.

# **PART TWO: OVERARCHING COMMENT ON THE SIGNIFICANT WATER MANAGEMENT ISSUES IN IRELAND PUBLIC CONSULTATION**

## **2.1 Overarching Components of Significant Water Management Issues**

The SWMI public consultation document identifies 12 Significant Water Management Issues and two ‘other Issues’ which are impacting on Ireland’s water environment. It is considered that, rather than being specific SWMIs, some of these identified issues are higher level, overarching components of water management which can:

1. Be mechanisms through which improvements in water management governance, water quality and WFD status can be made, for example Prioritisation and Public Participation. Or
2. Manifest other water management issues. For example, climate change is a *direct driver*<sup>11</sup> of changes in ecosystems, for instance with regards to water availability, water quality and biodiversity.

Below, An Fóram outlines six of these overarching components and details rationale surrounding aspects of each that can be improved for the 3<sup>rd</sup> river basin management planning cycle.

### **2.1.1 Governance**

The revisions to the broader governance structure implemented in the 2<sup>nd</sup> RBMP were welcome and it is recognised that they represent improvements on the previous governance structures for water management in Ireland.

Many difficulties that present themselves in the management of water can be a result, solely or in part, of water governance structures and differences in perceptions as to what ‘governance’ means. “For some, governance is an instrument, a means to achieve certain ends, an administrative and technical toolkit that can be used in different contexts to reach a given objective, such as enforcing a particular water policy. For others, governance is a process involving not the implementation of decisions taken by experts and powerholders, but rather the debate of alternative, often rival projects of societal development, and the definition of the ends and means that must be pursued by society, through a process of substantive democratic participation”<sup>12</sup>.

It is considered that many perceptions of governance focus primarily on governance as a process to implement decision by experts and powerholders. Recognising that governance can also be implemented through improved public and stakeholder participation is essential for participative water governance in Ireland and this topic is the subject of a briefing note detailed further in Section 2.1.2 of this submission.

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<sup>11</sup> A driver is any natural or human-induced factor that directly or indirectly causes a change in an ecosystem. A *direct driver* unequivocally influences ecosystem processes. An *indirect driver* operates more diffusely by altering one or more direct drivers. Climate variability and change has been identified as a direct driver of ecosystem change. Millennium Ecosystem Assessment (2005). Scenarios Assessment. Chapter 7: Drivers of change in ecosystem condition and services. <https://www.millenniumassessment.org/documents/document.331.aspx.pdf>

<sup>12</sup> Castro, J.E. (2007). Water governance in the 21<sup>st</sup> Century. *Ambiente and Sociedade* 10. <http://dx.doi.org/10.1590/S1414-753X2007000200007>.

The following aspects of Ireland's governance in water management can be improved:

- Transparency of each of the relevant bodies within the RBMP governance structure in terms of
  - Publication of meeting minutes
  - Visibility of membership of all bodies
  - Visibility of reporting by all bodies
  - Provision of information as requested
  - Linkages and communication between relevant bodies for shared and collaborative approaches to water management
  - Visibility and publication of progress towards achieving RBMP targets, goals and KPIs (see Section 2.1.4 for further information on monitoring and evaluation)
- Recognition that the focus of water governance is not solely to implement decision-making processes undertaken by experts and powerholders.
- Incorporating public and stakeholder engagement through the core principles of engagement as outlined in Section 2.1.2.

Participation in the recently initiated IPA-EPA research programme on Experimental Governance and the receipt the project recommendations is welcomed. Clear and transparent processes as to how any recommendations provided by the research project can be incorporated into the 3<sup>rd</sup> RBMP cycle should be clearly communicated, particularly as the results and recommendations from the research project may not be available until after implementation of the 3<sup>rd</sup> cycle RBMP has begun.

### **2.1.2 Public and Stakeholder Engagement and Awareness**

Public and stakeholder engagement is critical for the successful management of Ireland's water resources through the river basin management planning process, and public engagement is a legal requirement of the Water Framework Directive and is included in the Dublin Principles (1992)<sup>13</sup> and as a core component of the Aarhus convention<sup>14</sup>. Stakeholder engagement is a principle of good water governance, incentivised in a broader context of a bottom-up call for open government and society<sup>15</sup>.

It is recognised that improvements in public and stakeholder engagement have been introduced through the governance structures as part of the 2<sup>nd</sup> RBMP, including the establishment of An Fóram Uisce itself as well as the Local Authority Waters Programme (LAWPRO) and the Agricultural Sustainability Support Programme (ASSAP).

There is concern regarding the monitoring and evaluation processes undertaken on engagement actions being delivered as part of the second river basin management planning cycle. This issue is addressed under Section 2.1.4 of this response. In addition, there has been a distinct lack of both qualitative and quantitative assessments of changes in public awareness of water management issues as a result of the structures established in the 2<sup>nd</sup> RBMP. Such assessments are necessary to inform the success or otherwise of these structures and to inform improvements in engagement practices into the future.

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<sup>13</sup> The Dublin Statement on Water and Sustainable Development. <http://www.un-documents.net/h2o-dub.htm>

<sup>14</sup> Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. <https://ec.europa.eu/environment/aarhus/>

<sup>15</sup> International Network of Basin Organisations (INBO) (2014). Stakeholder engagement for inclusive water governance. INBO, Paris.

In early 2020, An Fóram Uisce issued a briefing note on *Public Engagement in Managing Ireland's Waters* to the then DHPLG. The note made four high level recommendations for the improvement of public engagement processes:

1. **Introduce and support public participation processes which incorporate the three key principles of effective public engagement:**
  - address inequity and power imbalances between different individuals and stakeholder groups
  - incorporate various forms of knowledge/expertise to recognise the value of lay knowledge as well as scientific expertise
  - address issues of scale e.g. how pressures and processes that operate at national levels circumscribe local decision-making regarding water management.
2. **Conduct an evaluation of current engagement initiatives** based on the above principles. This should also include an **assessment of wider water governance** for compliance with good governance principles: accountability, transparency, equity, inclusiveness, responsiveness, effectiveness, and efficiency. This is because such governance is necessary to support public engagement<sup>16</sup>.
3. **Include communities and individuals in procedures and decision-making around water resources from the beginning.** This recognises the value of their knowledge early in the catchment management process. It also elicits concerns, connections, and expertise early on and, vitally, it builds trust.
4. **Support medium/long-term interdisciplinary research on public engagement** including in the form of pilot projects. These should trial a range of approaches, while integrating multiple forms of expertise (e.g. biological; sociological; lay) into scientific research in ways that produce meaningful public engagement. Because this kind of participatory research involves time to establish relations of trust between stakeholders and across disciplines and expertise, medium/long-term institutional and financial supports are essential.

In particular, strong improvements can be made regarding the monitoring, evaluation, review and implementation of engagement practices to learn lessons of what works well and what can be improved to inform future actions.

In developing the FILLM approach, An Fóram Uisce was particularly concerned to ensure that public engagement should be a requirement at all stages, and this has been included in the approach.

### **2.1.3 Legislation and Policy Coherence**

As the overarching national management plan associated with water management in Ireland, the River Basin Management Plan is inherently linked with multiple EU legislation and national policies. These linkages are all the more explicit when examined within the FILLM. The SWMI public consultation document references the linkages with other EU Directives and the importance of consistent policy integration, tying the third cycle RBMP to Climate Adaptation Plans, Marine Spatial Planning, Flood

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<sup>16</sup> An Fóram recognises and welcomes the newly initiated IPA\_EPA research project on Experimental Governance which has the potential to review and address deficiencies in the current governance structures.

Risk Management Plans, and Biodiversity Action Plans, for example (SWMI public consultation document, p. 7).

An Fóram welcomes the recognition of these interlinkages between RBMP actions and other legislation, policy and plans. In the development of the actions for the 3<sup>rd</sup> RBMP following the closing of the SWMI public consultation period and the collation and responses to submissions, it is proposed that the linkages for each action to achieving initiatives in other relevant plans and policy are explicitly stated.

It is also proposed that explicit linkages are made between the actions of the 3<sup>rd</sup> RBMP and achieving the UN Sustainable Development Goals<sup>17</sup> in Ireland. Research being undertaken by University of College Cork<sup>18</sup> is focussing on SDG17: Partnerships for the Goals, and in particular Target 17.4 Enhance policy coherence for sustainable development. The research identifies the linkages between the RBMP and other policies towards achieving the SDGs and the 3<sup>rd</sup> RBMP should expand on these.

Ireland is lagging behind other countries in its integration of the SDGs into water-related management planning and implementation. For example, Sweden has incorporated the SDGs and the 2030 Agenda into governance and decision-making processes and measures, and the SDGs are reflected in the activities of all government ministries. A summary as to how Sweden plans to achieve SDG6 Clean Water and Sanitation highlights that good governance lies at the heart of implementation<sup>19</sup>.

In 2019, then Minister for Communications, Climate Action and Environment, Richard Bruton, appointed 12 leaders to drive forward Ireland's progress towards the SDGs. Water underpins *all* of the SDGs, yet there is no designated champion for delivering water-related actions to achieve the SDGs. Given its statutory role in water management, it is proposed that An Fóram Uisce is appointed as a champion body for the delivery of the SDGs and their water-related actions.

As well as the RBMP examining its synergies with other policies and plans, it is equally essential that those policies and plans recognise the importance of their linkages with the RBMP. In its submissions under the DHPLG public consultations on the Marine Strategy Framework Directive and the National Marine Planning Framework, An Fóram Uisce expressed its concern that responsibility for implementing actions relating to the near shore environment may simply be deferred to another legislative process (e.g. the WFD and RBMP for transitional waters) without overarching governance to undertake an integrated approach to managing Ireland's river catchments, transitional waters and coastal waters. Simply deferring responsibility to another legislative process reinforces governance silos, limits mitigating actions and restricts the *integrated and collaborative approach* needed to address the environmental status of Ireland's near shore environment. The SWMI public consultation document minimally identifies the linkages between the identified SWMIs and near coastal and transitional water issues despite the latter being core components of RBMPs to achieve the WFD.

DHLGH is strongly encouraged to ensure that robust policy coherence, transparency of action and integrated and collaborative governance and management is implemented in the 3<sup>rd</sup> cycle RBMP.

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<sup>17</sup> <https://www.un.org/sustainabledevelopment/>

<sup>18</sup> Identifying Interactions for SDG Implementation in Ireland: SDG4I. [www.sdg4i.ie](http://www.sdg4i.ie)

<sup>19</sup> <https://www.government.se/49f47b/contentassets/3bef47b49ed64a75bcd56ff053ccea6/6---clean-water-and-sanitation.pdf>

### 2.1.4 River Basin Management Plan Monitoring and Evaluation

Monitoring and evaluation is an essential component of an adaptive management process which facilitates learning from previous actions to deliver improved actions in the future. There are several types of monitoring and evaluation, including:

- Process monitoring, where data is collected and analysed to establish whether actions are being delivered as required to achieve the intended results.
- Financial monitoring, where program expenditure is monitored to ensure adherence to financial budgets.
- Impact monitoring, which assesses whether an action is achieving the desired impact or benefits.

For successful monitoring and evaluation, the data collected must be analysed against a set of predetermined indicators, for example Key Performance Indicators (KPIs), against which progress can be tracked.

The 2<sup>nd</sup> RBMP states that (2<sup>nd</sup> RBMP, p.126):

- Responsibility for monitoring and evaluation of the RBMP is the responsibility of the National Technical Implementation Group (NTIG, with support of the regional structures).
- Oversight of national implementation measures given by the National Coordination Management Committee (NCMC).
- Regional Integrated Catchment Management Programmes will set out details of planned interventions which can be monitored over time.
- The implementation of measures in the regional work programmes must be continuously monitored and evaluated.
- Each regional committee will, therefore, produce a concise annual report that will provide an update on implementation progress and evaluation of measures implemented.
- This reporting will be integrated with the WFD web-based application insofar as possible (accessible only to EPA staff, and other public agencies and local authorities engaged in WFD-work).
- The website [www.catchments.ie](http://www.catchments.ie) will be a valuable source of up-to-date river basin management plan information for the general public.

In addition, with regards to monitoring progress for 'Further Assessment of Areas', the 2<sup>nd</sup> RBMP states that "suitable performance indicators for tracking progress will be designed. The Key performance Indicators (KPIs) will be monitored and used to track progress" (2<sup>nd</sup> RBMP, p.122).

It is considered that the monitoring and evaluation undertaken for the 2<sup>nd</sup> RBMP must be improved for the 3<sup>rd</sup> RBMP cycle regarding:

1. Unclear monitoring and evaluation processes being undertaken
2. Transparency and availability of KPIs against which performance can be tracked.
3. Availability of data against which progress of the 2<sup>nd</sup> RBMP can be tracked.
4. Transparency and availability of monitoring and evaluation actions undertaken by each body within the revised 2<sup>nd</sup> RBMP governance structure.
5. Transparency and availability of the annual reports produced by each regional committee showing progress on implementation and evaluation of measures.

6. A lack of a coherent 'mid-term review' process of the 2<sup>nd</sup> RBMP to inform progress, adapt measures if necessary, and inform the 3<sup>rd</sup> RBMP cycle.
7. A clear and transparent process of how the monitoring and evaluation evidence generated during the 2<sup>nd</sup> RBMP timeframe is used to inform the identification of SWMIs for public consultation and to inform the 3<sup>rd</sup> RBMP planning cycle.

The recent review of LAWPRO, and the EPA-IPA research project on Experimental Governance that will review the governance processes introduced in the 2<sup>nd</sup> RBMP are both welcomed. An Fóram Uisce will be undertaking a review of its own process later in 2020 to identify avenues for improving its own functioning, both internal and external to the Forum.

In providing these recommendations on monitoring and evaluation, it is recognised that for certain aspects of 2<sup>nd</sup> cycle RBMP implementation, time delays are apparent as to when improvements in status or results of measures may be observed. Further details on these time lags and timescales for achieving WFD Status Objectives are provided in Section 2.1.5.

### **2.1.5 Time Lags and Timescales for Achieving WFD Status Objectives**

It is considered that for water bodies that have not achieved their WFD status objectives, clarity and transparency on the progress projected during the next cycle should be a component of the 3<sup>rd</sup> RBMP. This has arisen from a concern within the membership of An Fóram Uisce regarding the lack of information on and monitoring and evaluation of progress on the principal actions of the current RBMP.

It is understood and accepted that time delays for improvements in water quality are often unavoidable. However, an analysis of and an estimation of these time delays is essential not only for communication purposes, but also to assist work and resource planning and to enable projections on dates for restoration to the required water body status.

#### ***2.1.5.1 Factors determining time delays for improvement***

The factors considered relevant to estimating time delays are illustrated in Figure 1 below.

To provide further information on these factors, An Fóram Uisce has developed a Briefing Note on *Achieving Water Framework Directives: The issue of time delays – How long will it take for improvements to occur?* This briefing note is available at: [https://thewaterforum.ie/app/uploads/2020/06/Time-Delays\\_May2020.pdf](https://thewaterforum.ie/app/uploads/2020/06/Time-Delays_May2020.pdf).

The Briefing Note provides a means of estimating time delays for improvement for water bodies impacted by two *significant issues* – phosphate and nitrate. The Briefing Note provides a systematic approach for determining time delays and projected dates for achieving the WFD status objectives for *At Risk* water bodies, which can either be used directly or in an amended form.

To account for time delays in communicating progress on the 2<sup>nd</sup> RBMP and for implementation of the 3<sup>rd</sup> RBMP, the following recommendations are made for monitoring, evaluation and reporting:

- An analysis of the likely time delays for improvement in the water quality of water bodies that have not achieved their status objectives by 2021 be undertaken.
- The projected date for achievement of the of status objective for each water body should be provided together with reasoning for this projected date.

- Trend analyses are undertaken as an indicator of improvements that can then be reported to bodies such as An Fóram Uisce during the next cycle.
- If necessary, appropriate additional monitoring is carried out to assess the effectiveness of mitigation measures and actions so that adjustments can be made if the projected improvements are not occurring.

Implementing the above recommendations would assist in supporting the development and implementation of SMART objectives for planning and particularly resource allocation with regards to the 3<sup>rd</sup> RBMP cycle.

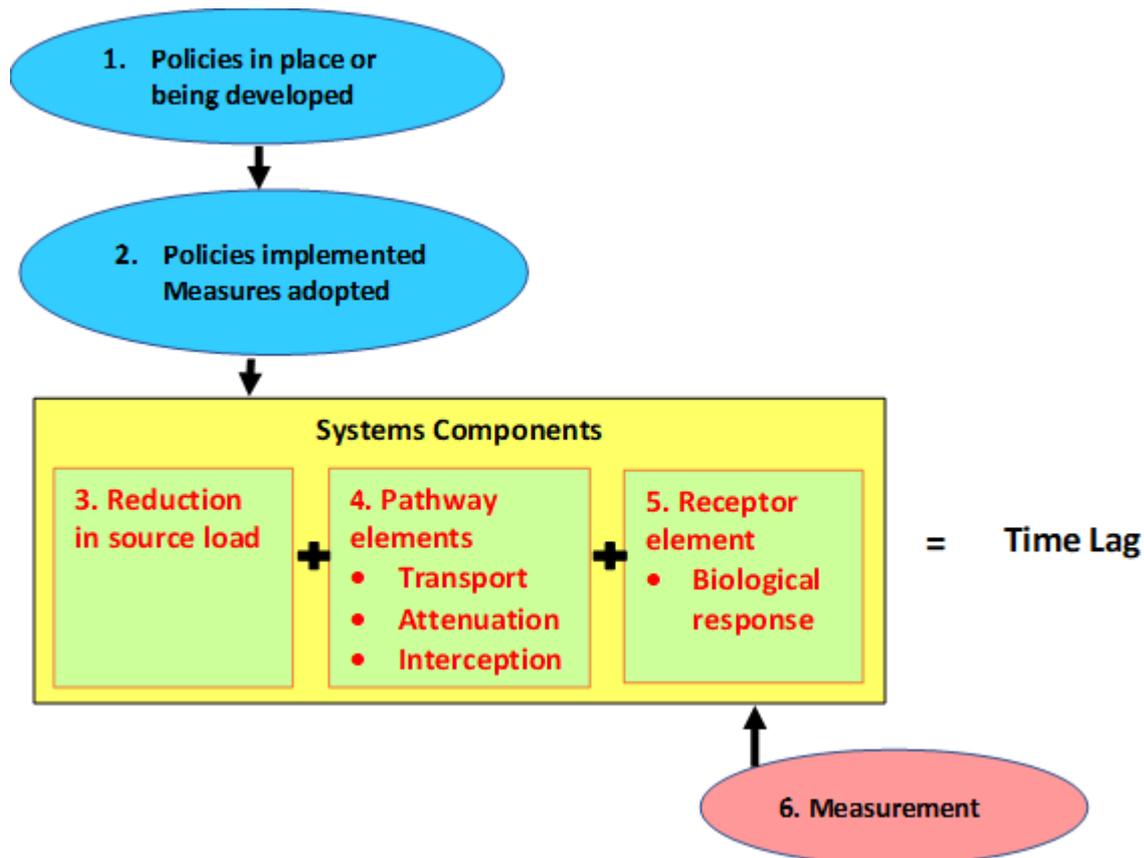


Figure 1: Schematic showing the major elements of the potential time delay for water quality improvement, including policy development and implementation component, catchment time lag components and the time needed to undertake monitoring.

### 2.1.6 Climate Change

The impacts of climate change on Ireland’s water resources may be multi-factorial as drought magnitude and duration may increase in the future, and Ireland has been identified as one of six European countries where the impact of a +2°C global warming will be most extreme<sup>20</sup>. Weather extremes and climate variability directly impact the hydrological cycle, potentially resulting in

<sup>20</sup> Roudier, P., Andersson, J.C.M., Donnelly, C., Feyen, L., Greuell, W. and Ludwig, F. (2016). Projections of future floods and hydrological droughts in Europe under a +2°C global warming. *Climatic Change* 135: 341-355. doi: 10.1007/s10584-015-1570-4.

consequences for both social and economic factors<sup>21</sup>. Future climate change projections for Ireland include: an increase of mean annual temperatures of 1-1.6°C; an average increase in the growing season by over 35 days per year by the mid-21<sup>st</sup> Century; significant decreases in average precipitation amounts in spring and summer months as well as over the full year; an increase in heavy precipitation events; and a substantial increase in the number of extended dry periods<sup>22</sup>. Water resources have been identified as being vulnerable to future climate change scenarios for Ireland<sup>23</sup>, and a number of hydrological changes (such as reduced soil moisture storage; lower groundwater recharge for longer, sustained periods; and changes in streamflow) are predicted to manifest through the increased frequency of major high and low river flow events<sup>24</sup>.

The SWMI public consultation document correctly identifies climate change as impacting on the quality of Ireland's water resources, but climate change itself is not considered by this response to be a SWMI. Rather, it is a direct driver of ecosystem change<sup>11</sup> which will also have socio-economic consequences which themselves may manifest through changes in water quality and water availability.

Understanding of the effects of social shifts and economic impacts associated with water resources management is needed in addition to understanding the future impacts of climate change<sup>25</sup>. Ensuring policy coherence of the 3<sup>rd</sup> RBMP with wider climate-related policies and plans is essential for RBMP measures to increase resilience in Ireland's water resources and their management (including management of water and wastewater services), and improve public awareness and involvement in water and climate measures.

## **2.2 Reconceptualising Ireland's Significant Water Management Issues from an Integrated Land and Landscape Management Perspective**

This section introduces the sector-pressure-stressor approach as an alternative for understanding and managing the Significant Water Management issues which impact on Ireland's aquatic environments. Underpinned by the FILLM (Section 1.2), the focus of this approach is to identify the environmental *stressors* which manifest through water quality and WFD status. It is these environmental stressors which can be considered Significant Water Management Issues. Industry and social *sectors* contribute to changes in water quality and WFD status through introducing *pressures* which act on the waters and ecosystems within catchments. These pressures can influence the levels of environmental stressors which, acting either singularly or in multiplicity with other stressors, can result in changes in water quality, ecosystem function, the sequestration of carbon, biodiversity and WFD status.

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<sup>21</sup> Mehan, S., Kannan, N., Neupane, R., McDaniel, R. and Kumar, S. (2016). Climate change impacts on the hydrological processes of a small agricultural watershed. *Climate*. 4. Doi:10.3390/cli4040056.

<sup>22</sup> Nolan, P. (2015). Ensemble of regional climate model projections for Ireland. Report to the Environmental Protection Agency for Ireland.

[https://www.epa.ie/pubs/reports/research/climate/EPA%20159\\_Ensemble%20of%20regional%20climate%20model%20projections%20for%20Ireland.pdf](https://www.epa.ie/pubs/reports/research/climate/EPA%20159_Ensemble%20of%20regional%20climate%20model%20projections%20for%20Ireland.pdf)

<sup>23</sup> Coll, J. and Sweeney, J. (2013). Current and future vulnerabilities to climate change in Ireland. Report to the Environmental Protection Agency of Ireland.

<sup>24</sup> Sweeney, J., Albanito, F., Brereton, A., Caffarra, A., Charlton, R., Donnelly, A., Fealy, R., Fitzgerald, J., Holden, N., Jones, M. and Murphy, C. (2008). Climate change – Refining the impacts for Ireland. Report for the Environmental Protection Agency of Ireland.

<sup>25</sup> Rolston, A. (2016). Water management: Social changes affect water quality too. *Nature* **536**: 396. doi:10.1038/536396b.

How stressors interact is often dependent on the type of aquatic system in which the stressors are present<sup>26</sup>. As an example, nutrient pollution is typically the overriding stressor in lake systems. Yet, for rivers, the effects of nutrient pollution may depend on the combination of different stressors as well as how the impact of these stressor combinations is measured. Consequently, lakes and rivers can require different conservation and management processes<sup>26</sup>. For lakes, the traditional approach of reducing nutrient use and discharge across catchments is key. However, for rivers, more bespoke management approaches are needed which consider the different stressors acting on the system, and how these stressors interact<sup>26</sup>.

By examining the linkages between stressors, pressures and the sectors through which they are delivered, it is possible to take an integrated, holistic approach to developing and implementing mitigation measures which can also produce co-benefits for climate change and biodiversity.

## **2.2.1 Examining Sectors, Pressures and Stressors as an Alternative Approach to Addressing Significant Water Management Issues**

### ***2.2.1.1 Identifying and managing SWMIs within the Framework for Integrated Land and Landscape Management***

The FILLM (Section 1.2) is the underpinning framework for this proposal of using the stressor-pressure-sector model approach to identify and manage Ireland's Significant Water Management Issues. It enables the management of SWMIs to be broadened to include components of our natural and social environments that may not be included in mitigation efforts through alternative SWMI management approaches. In addition, it enables the policy coherence required for the 3<sup>rd</sup> RBMP by connecting the various international and national legislative instruments and policies.

The SWMI public consultation document identifies 12 Significant Water Management Issues and two 'other Issues' which are impacting on Ireland's water environment. Some of these Issues can be considered higher level aspects of water resources management that manifest through various mechanisms and functions to affect water quality and WFD status rather than as specific SWMIs. For example, rather than being SWMIs, Prioritisation and Public Participation (identified as Issue 1 and 2 respectively in the public consultation document) are mechanisms through which improvements in water management governance, water quality and WFD status can be made. Climate Change (Issue 5 in the public consultation document) is an overarching driver of water availability, water quality and biodiversity (as discussed in Section 2.1.6). Addressing climate change within the FILLM requires action for both adaptation and mitigation measures to deliver a resilient landscape.

### ***2.2.1.2 An example of a sectoral contribution within the sector-pressure-stressor approach***

Increasing landscape resilience through the FILLM requires an examination of the contributions of different sectors within an Integrated Catchment Management context. To illustrate this proposed

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<sup>26</sup> Birk, S. *et al.* (2020). Impacts of multiple stressors on freshwater biota across spatial scales and ecosystems. *Nature Ecology and Evolution* <https://doi.org/10.1038/s41559-020-1216-4>

alternative approach to addressing SWMIs, agriculture is used here as an example of identifying sectoral contributions which have implications for land and water management.

Agriculture has featured prominently in previous RBMPs and EPA reports as a pressure acting on our water resources; and agriculture is named in the public consultation document as a SWMI (Issue 4 in the public consultation document). Addressing the agriculture as an individual SWMI creates inherent challenges due to the complexity of the different forms of agriculture, and how they and their different management actions interact with the water environment.

Within the sector-pressure-stressor approach, it is proposed that with regards to water resources management, agriculture should be examined as a sector, the *functions* of which can manifest as multiple pressures. For example, functions of agriculture include land management, run-off, hydromorphological modifications, water abstraction and wetland degradation. Each of these can be considered as pressures which impact on water quality.

Within the FILLM however, tackling any one pressure should be approached from a perspective of optimising outcomes over a series of pressures.

### ***2.2.1.3 Significant Water Management Issues within the sector-pressure-stressor approach***

Examining the SWMI public consultation document and the 2<sup>nd</sup> RBMP, five environmental stressors can be identified which, either singularly or acting in multiplicity, can result in unsatisfactory water quality and WFD status. These environmental stressors are Sediment, Nutrients (nitrogen, in terms of nitrate and ammonium, and phosphorus), Microbes (bacteria, viruses and parasites), Chemicals and Organic Matter. For some of these stressors there may also be public health impacts associated with their presence in waters.

Three more environmental stressors are considered here to be of importance which are not addressed through the 2<sup>nd</sup> RBMP and the current SWMI public consultation paper, but which impact on one or more aspects of water quality, WFD status and public health: Microplastics; Water Level and Flow; and Temperature.

Background information and rationale for inclusion of the eight stressors in this proposed approach is included in Appendix 1.

By focusing on the **linkages** of each of these environmental stressors with the pressures and sectors through which they are manifested, it is possible to create a more holistic picture of the complex interactions acting on Ireland's waters.<sup>27</sup>

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<sup>27</sup>It is recognised that these eight environmental stressors may not be exhaustive, and they may act in combination with other stressors which are not included in this description of this alternative approach to SWMIs. For example, chemicals, sediment, nutrients, microbes, organic matter, water level and flow and temperature all interact with an additional environmental stressor which can have a deleterious impact on water quality and WFD status: dissolved oxygen. In our description of this alternative approach to SWMIs, dissolved oxygen is not included as an environmental stressor as it is not a direct consequence of the pressures identified. Rather, it is a consequence of the interactions of more than one of the eight environmental stressors.

A conceptual diagram of these linkages is provided in Figure 2. The eight environmental stressors are shown at the bottom of the diagram, and each has a defined connection to one or more of ten identified pressures. Each pressure is intrinsically linked to one or more of six sectors. The stressors, pressures and sectors included in this example may not be exhaustive, but are being used as an example as to how, by focussing on the stressors and examining their linkages to pressures and sectors, a more holistic approach to managing Significant Water Management Issues can be developed. The linkages shown in Figure 2 do not attempt to weight the interactions between sectors, pressures and stressors.

Having identified the overarching linkages between all stressors, pressures and sectors, the linkages for singular stressors can be examined (Figure 3). For example, the environmental stressor Nutrients ( $\text{NO}_3$ , P,  $\text{NH}_4$ ) is influenced by eight pressures: Wetland degradation, Urban WWTP, Domestic WWTP, Hydromorphological modifications, Run-off (urban and agricultural), Industrial discharges, Land management, and Invasive Alien Species. To manage nutrient concentrations in Ireland's waters, the FILLM provides a holistic approach to mitigating each of these stressors through integrated management within and between the sectors which influence each of these pressures.

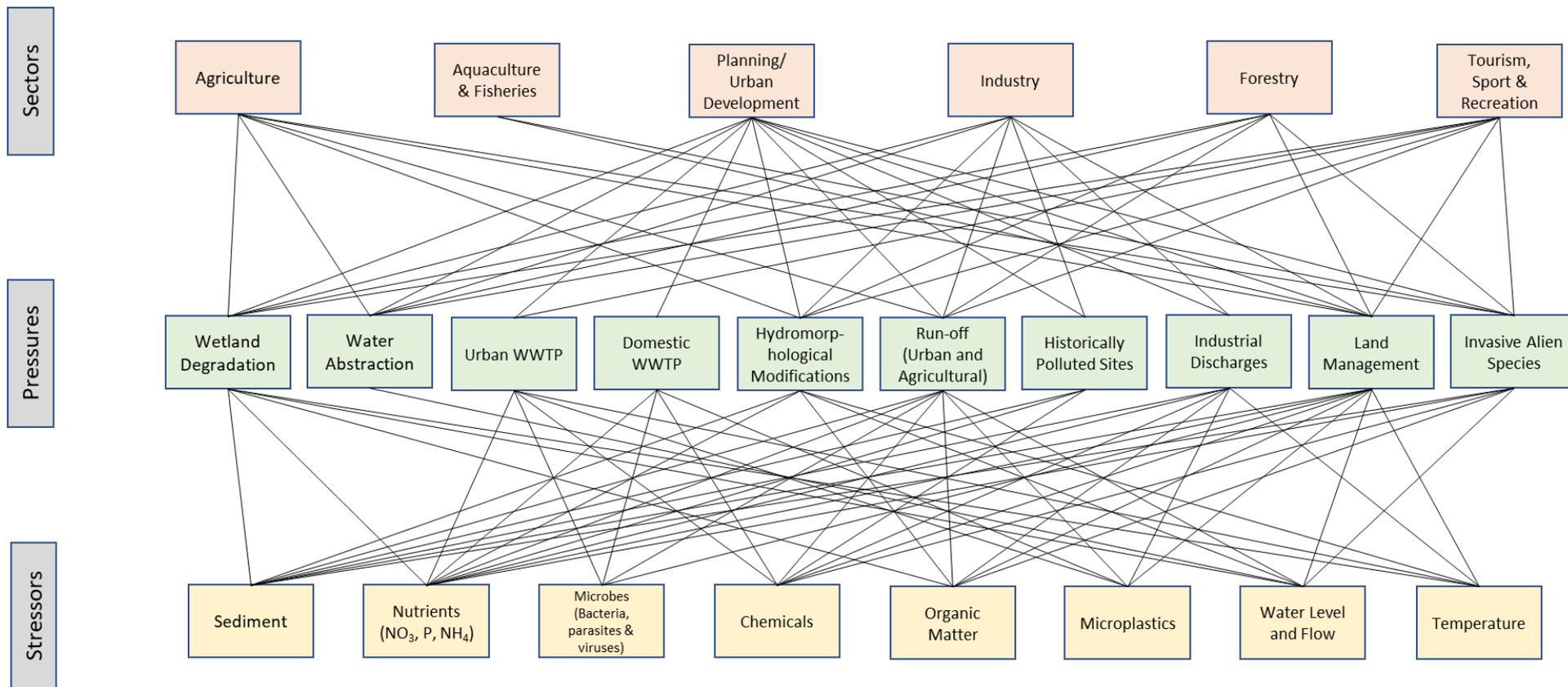


Figure 2: Conceptual diagram of the interactions between environmental stressors, pressures and sectors which, in combination, manifest in water quality and WFD status.

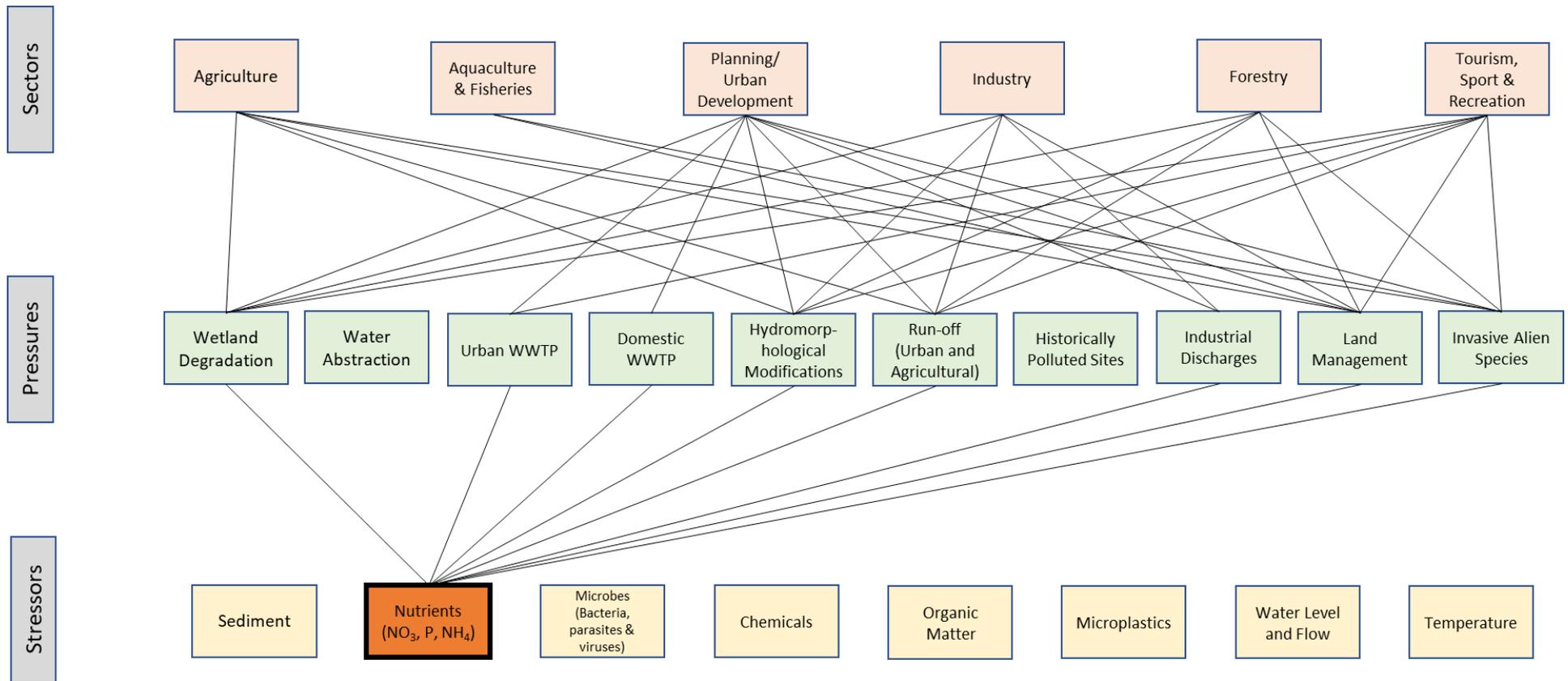


Figure 3: Conceptual diagram of the interactions between the environmental stressor, Nutrients ( $\text{NO}_3$ , P,  $\text{NH}_4$ ), and the pressures through which it is manifested, and the sectors which contribute to the pressure.

## **PART THREE: SIGNIFICANT WATER MANAGEMENT ISSUES IDENTIFIED IN THE PUBLIC CONSULTATION DOCUMENT**

### **3.1. Addressing the SWMIs Identified in the Public Consultation Document**

The SWMI public consultation document identifies 12 SWMIs and two 'other issues' with a number of questions provided for response for each issue. These questions are addressed below within the prism of the FILLM and the sector-pressure-stressor approach presented in Parts One and Two of this response respectively.

#### **3.1.1 Prioritisation**

##### ***Q: Of the current priorities in the RBMP, which do you consider to be the most relevant?***

The Water Framework Directive (WFD) requires all water bodies to achieve good status. As stated in Articles 3 and 4 of the WFD, Member states have an obligation to coordinate programmes of measures for the whole of the river basin district, and that measures should be implemented to prevent deterioration of the status of all bodies of surface water [emphasis added by An Fóram Uisce]. Therefore, the prioritisation of measures into 190 sub-catchment Priority Areas for Action (PAAs) undertaken in the 2<sup>nd</sup> RBMP contravenes Ireland's obligations under the WFD.

It is recognised that limited resources must be sparingly shared. However, in addition to the contravention of the WFD, the PAA prioritisation process immediately restricted the true implementation of Integrated Catchment Management, so widely championed in the 2<sup>nd</sup> RBMP. The PAA process failed to take a whole-of catchment approach, instead prioritising areas for action at the sub-catchment scale.

LAWPRO, ASSAP and the DHLGH have recently communicated that some improvements have been observed in water quality and WFD objectives within the PAAs. However, An Fóram Uisce is unaware of any definitive quantitative evidence to show that these improvements are a direct result of the engagement activities and measures implemented in the PAAs. This is partly due to the limited monitoring and evaluation of these engagement activities and measures. An Fóram Uisce expresses concern that public statements are being made by multiple bodies claiming successes that the LAWPRO and ASSAP programmes are achieving in the PAAs without the evidence available to support such claims.

The EPA have reported<sup>8</sup> that water quality overall has continued to decline nationally. Therefore, to adhere to Ireland's WFD obligations, there is an inherent need to *restore* water bodies in need; and *protect* those water bodies that are achieving their WFD objectives.

Local Authorities have responsibility for *protecting* water quality where it is deemed to be satisfactory. Where water quality is unsatisfactory, LAWPRO are the main public body with responsibility for improving water quality at a local level within PAAs. Therefore, Local Authorities have responsibilities for improving water quality outside of PAAs.

An Fóram Uisce expresses concern that the resources allocated to and by Local Authorities to undertake their responsibilities for protecting water quality and improving water quality outside of PAAs are not sufficient to produce the required results. A lack of appropriate training for Local Authority staff accompanies the lack of resource allocation, resulting in the Local Authorities function for protecting water quality being diminished. Consequently, as highlighted by the EPA's Water Quality Report 2013-2018<sup>28</sup>, water quality is continuing to deteriorate at the national scale.

In addition, An Fóram Uisce is concerned about the potential for Local Authorities to appropriate the resources they do have towards issues unrelated to water quality improvements due to a perception that LAWPRO is already undertaking that body of work.

All eight stressors identified in the sector-pressure-stressor approach described in Section 2.2 are linked to drinking water quality. Catchment management measures aimed at mitigating these stressors and their associated pressures will therefore have the additional benefit of drinking water source protection and public health. Consequently, if a revised PAA selection process is to be introduced in the 3<sup>rd</sup> RBMP, prioritisation should be given to catchments which are used as drinking water sources; and any actions which provide co-benefits for climate change and biodiversity.

***Q: Are there any additional priorities you think should be included in this RBMP?***

Taking a whole-of-catchment approach to land and landscape management as advocated by the FILLM should be included as a priority in the 3<sup>rd</sup> RBMP.

Urgently progressing commitments made in the 2<sup>nd</sup> RBMP, as well as any new commitments introduced in the 3<sup>rd</sup> RBMP, to improve urban wastewater treatment infrastructure is essential. Including transparent reporting of such progress should also be a priority in the 3<sup>rd</sup> RBMP. See Section 3.1.12 for further detail.

***Q: Would you amend any of the existing priorities?***

It is difficult to address this question without clear and timely monitoring and evaluation of 2<sup>nd</sup> RBMP actions. Therefore, the monitoring and evaluation of 1) the actions outlined in the RBMP; and 2) the methods used to achieve these actions should be improved. As mentioned above, a focus on catchments which are used as drinking water sources can maximise co-benefits of ICM and the FILLM approach for drinking water source protection, public health, climate change and biodiversity.

***Q: Are there any external factors you think should be considered in setting priorities for this RBMP cycle?***

It is unclear what is meant by external factors in this question. Approaching this question from the perspective of factors external to WFD implementation, the integrated approach to land and landscape management as proposed by the FILLM comes sharply in to focus. In order to address the stressors and pressures outlined in Part Two of this submission, the integrated and holistic approach of the FILLM is essential to engage the different sectors that link with the pressures and stressors. Engaging the different sectors will inherently require coordination and collaboration across multiple Government Departments, Agencies, and bodies.

In addition, transparent reporting of progress on the RBMP (i.e. monitoring, evaluation and reporting) should be undertaken for all actions stated in the RBMP; and it should be ensured that all bodies with responsibility for undertaking actions are required to report on metrics aligned with the RBMP actions.

### 3.1.2 Public Participation

***Q: Do you feel people are given the opportunity to engage in the way our waters are managed? Please provide examples to support your answer including ways this may be improved.***

People are given the opportunity to *respond* to the way our waters are managed with little transparency as to whether any responses are incorporated into decision making. *Engagement* is a two-way process that allows for knowledge sharing and the incorporation of alternative viewpoints into the decision-making process. The way in which water management-related engagement is undertaken, and who is engaged, must be improved, and the FILLM approach explicitly requires public engagement and input at all stages. An Fóram Uisce has produced a briefing note on public engagement in water management based on commissioned research on this topic: <https://thewaterforum.ie/briefing-note-on-public-participation/>. The key recommendations from this briefing note are:

- 1. Introduce and support public participation processes which incorporate the three key principles of effective public engagement:**
  - address inequity and power imbalances between different individuals and stakeholder groups
  - incorporate various forms of knowledge/expertise, in particular to recognise the value of lay knowledge as well as scientific expertise
  - address issues of scale e.g. how pressures and processes that operate at national levels circumscribe local decision-making regarding water management.
- 2. Conduct an evaluation of current engagement initiatives** based on the above principles. This should also include an **assessment of wider water governance** for compliance with good governance principles: accountability, transparency, equity, inclusiveness, responsiveness, effectiveness, and efficiency. This is because such governance is necessary to support public engagement.
- 3. Include communities and individuals in procedures and decision-making around water resources from the beginning.** This recognises the value of their knowledge early in the catchment management process. It also elicits concerns, connections, and expertise early on and vitally, it builds trust.
- 4. Support medium/long-term interdisciplinary research on public engagement** including in the form of pilot projects. These should trial a range of approaches, while integrating multiple forms of expertise (e.g. biological; sociological; lay) into scientific research in ways that produce meaningful public engagement. Because this kind of participatory research involves time to establish relations of trust between stakeholders and across disciplines and expertise, medium/long-term institutional and financial supports are essential.

Incorporating social science methodologies and social science expertise to assist in the delivery of water-related engagement is an important factor to improve engagement actions and their monitoring and evaluation. Recognising that resources are limited, there is the opportunity to develop ‘pilot engagement catchments’ where a range of engagement, monitoring and evaluation methodologies are undertaken across different scenarios to understand what engagement practices are successful and which can be improved. Lessons derived from national and international public participation approaches in water resources management can be trialled within these pilot engagement catchments to assess what methods and approaches work or do not work within an Irish context.

Co-designed catchment management plans developed in collaboration with local communities and stakeholders provide an opportunity to help raise awareness of issues occurring within local catchments as well as incorporating local knowledge and solutions into the plans. Such inclusive, co-design processes could be trialled in the ‘pilot engagement catchments’ proposed above, incorporating lessons from international case studies where co-design has been implemented in water-resource management projects, for example in the Netherlands and the UK.

Commenting on the content of the SWMI public consultation, An Fóram Uisce has significant concerns regarding the technical nature of the questions to which responses have been directed to answer. These questions frequently require detailed environmental knowledge around water management and the individual SWMIs to which the individual questions are addressed. This creates challenges for lay persons to respond to the SWMI public consultation, particularly as preference is stated for responses to be submitted via the online survey portal through which these questions can be answered. Little consideration is given to citizens with limited knowledge of the river basin management planning process or water management in general, but who wish to partake in the public consultation process. This creates an inequity in the public consultation process and it has the potential to reduce the likelihood that less expert citizens will submit a response. This inequity, and the lack of incorporation of lay, non-expert knowledge, are addressed within the recommendations of An Fóram Uisce’s briefing note on public participation, detailed above.

As discussed in section 2.1.3, given its statutory role in water management, it is proposed that An Fóram Uisce is appointed as a champion body for the delivery of the SDGs and their water-related actions.

### **3.1.3 Land-use Planning**

***Q: How can the planning system be further improved to contribute effectively to the protection and improvement of water resources in Ireland?***

The FILLM is an overarching framework for environmental management which connects multiple legislative instruments and incorporates spatial planning. As stated in the FILLM, a spatial planning system is needed that takes account of all environmental components in a holistic and cohesive manner. Reduced compartmentalisation of planning and actions within the various environmental

components is needed, as cross-component planning can deliver benefits in terms of cost-efficiency and environmental effectiveness.

Currently, there is no planning guidance for Local Authorities regarding Water Framework Directive concerns and consequently decisions are being made within a knowledge deficit. Planning guidelines for Local Authorities are required, along with training for relevant staff and decision makers involved in planning and WFD implementation.

The recent Programme for Government states multiple commitments relating to land use which are directly applicable to the FILLM, including:

- Undertaking a national land use review including farmland, forests, and peatlands so that optimal land use options inform all relevant government decisions.
- Promoting an all-Ireland approach to land use planning and river basin management plans to stop cross-border pollution.
- Evaluating the potential for contributions towards our climate ambition from land use improvements within 24 months of government formation, and to set in train the development of a land use plan based on this evaluation.

An Fóram Uisce welcomes these commitments in the Programme for Government and looks forward to working with the relevant Departments to achieve them.

### 3.1.4 Agriculture

#### ***Q: How can the agricultural sector contribute towards improving water quality?***

As described in Section 2.2 of this submission, agriculture has typically been described in previous RBMPs and the SWMI public consultation document as a pressure acting on water bodies. Through the sector-pressure-stressor approach, agriculture is viewed as a sector, the functions of which act as pressures. Delineating the pressures delivered through sectors such as agriculture enables a more targeted approach to reducing the impact of stressors on the water environment.

It is recognised that Irish farmers are required to meet, and through participation in voluntary programmes and agri-environmental schemes often go beyond, EU requirements to maintain farms in Good Agricultural and Environmental Conditions including compliance obligations regarding the management of soils, hedgerows, water courses and fertiliser usage. Yet, it can be argued that some historical policies have resulted in a reduction in the social values associated with water and landscape. The FILLM provides the overarching framework through which action can be taken to ensure that greater value is attributed to water and water-related ecosystems. For farmers currently in receipt of CAP payments, financial rewards are often given for actions which can be detrimental to water-related ecosystems and water quality. Providing incentives that reward the protection and enhancement of water quality and water-related ecosystems will go a long way towards restoring their social and economic value among, not just farmers, but the wider community. Farming for Nature Projects, Results Based Agri-environmental Payment Schemes and EIPs are showing some promising results and such programmes must be further encouraged. Providing public money for public goods

can provide support to farmers based on the environmental services they provide as part of their farming.

The EU Green Deal, the EU Biodiversity Strategy for 2030, the EU Farm2Fork Strategy and the reform of the Common Agricultural Policy all provide high level opportunities to revitalise the social and economic value of water quality, water-related ecosystems and the ecosystem services that they provide.

New research<sup>28</sup> has identified that Ireland lies 35<sup>th</sup> out of 38 countries for aligning policy changes with relevant sections of the OECD Council Recommendation on Water and the 2017 G20 Agriculture Ministerial Action Plan on water and food security (Figure 4). The report recommends that relatively water abundant countries such as Ireland should “*pay attention to their approach to manage water quantity and risks under climate change, [and] all countries should consider improving their policies to reduce pollution from agriculture*”. Ireland should heed this recommendation across water quantity, climate change risks and pollution reduction and the FILLM and the sector-pressure-stressor approaches provide the holistic support necessary to deliver on this recommendation.

The EPA Report on Water Quality in Ireland 2013-2018<sup>8</sup> identifies that nitrates are increasing in both surface and groundwaters, particularly in the south and southeast of the country. In its submission to DAFM on the Nitrates Derogation Review in May 2019, An Fóram Uisce made the following general recommendations for water bodies where nitrate is identified as a significant issue:

- Source control and mobilisation control measures need to have priority in this situation.
- Examples for consideration include:
  - i) Use of protected urea.
  - ii) Use of clover and over-sowing clover. (While there is evidence that this can be effective both in terms of grass production and reduction of inorganic N fertilizers, it requires more management of the grass sward and of the animals (due to the danger of bloat).)
  - iii) Applying N fertilizer ‘little and often’ to facilitate N usage.
  - iv) Introducing incentives for farmers to use slow release fertilizer, e.g. nitrogen inhibitors.
  - v) Enabling an increase of areas that have environmental services as their objective as a means of diluting nitrate concentrations, while at the same time increasing biodiversity and carbon sequestration.

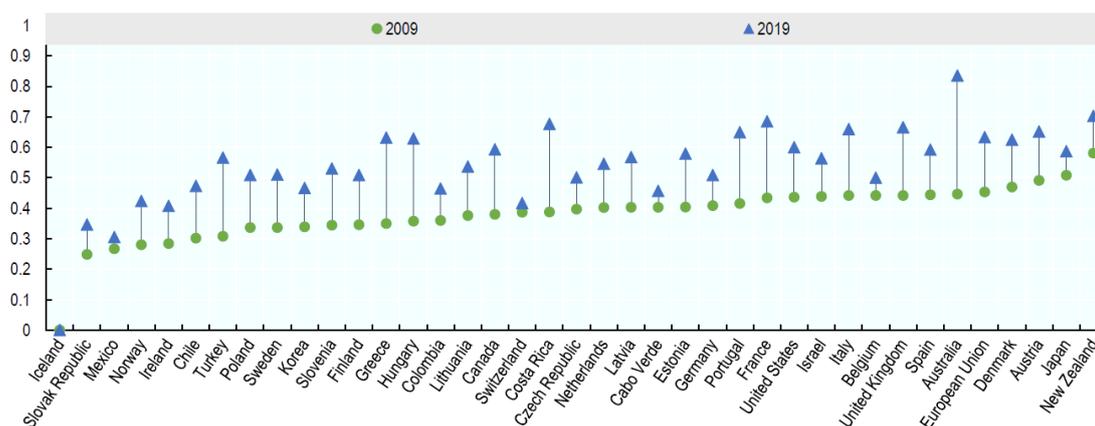
The Nitrates Action Plan is due for public consultation in 2020 and An Fóram Uisce looks forward to engaging with the relevant Departments as part of the NAP consultation process.

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<sup>28</sup> Gruère, G. *et al.*, (2020). Agriculture and water policy changes: Stocktaking and alignment with PECD and G20 recommendations. OECD Food, Agriculture and Fisheries Paper No. 144. [https://www.oecd-ilibrary.org/agriculture-and-food/agriculture-and-water-policy-changes\\_f35e64af-en](https://www.oecd-ilibrary.org/agriculture-and-food/agriculture-and-water-policy-changes_f35e64af-en)

An Fóram Uisce also welcomes the research projects introduced during the course of the second RBMP, such as the SmartBufferz, Slowwaters and Watermarke projects; and looks forward to seeing the results of these projects being used to inform 3<sup>rd</sup> RBMP measures.

(A) Ordered by status in 2009 to highlight changes



(B) Ordered by 2019 status

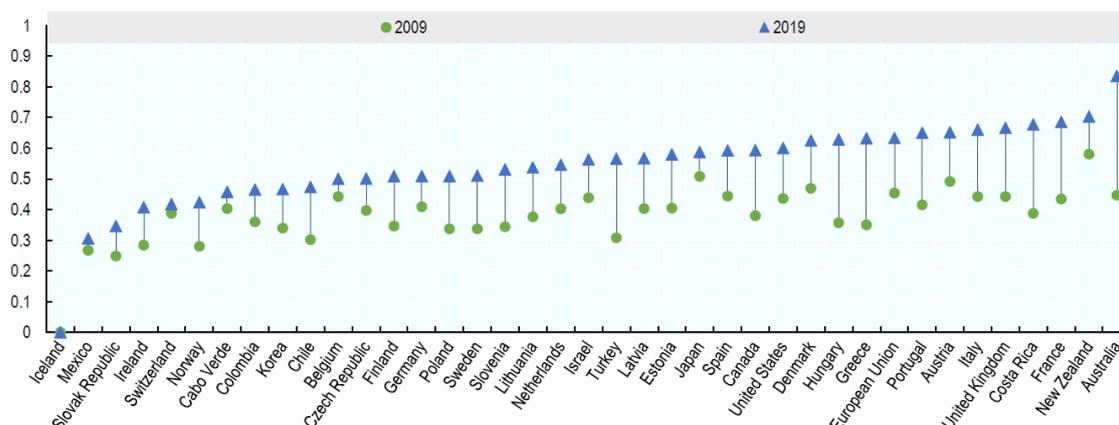


Figure 4: Average alignment of agriculture and water policies with the Council Recommendation on Water by country for (A) ordered by status in 2009; and (B) ordered by status in 2019. Indices range from 0 to 1 with higher indices indicating a higher alignment of policies<sup>29</sup>.

**Q: Do you believe that CAP will have a positive or negative impact on water quality in Ireland?**

An Fóram Uisce has commissioned a research project entitled “Optimising water quality returns from the reform of the Common Agricultural Policy”. The final report will be available in September 2020 and will provide strong policy analysis around CAP reform and its potential impact on water quality.

As mentioned in the previous question, historical agricultural policies, such as the CAP, have resulted in a reduction in the social and economic value of water and its associated ecosystems, as well significantly contributing to the continued decline in overall national water quality. CAP reform has the opportunity to redress this by providing incentives to maintain, protect and improve agricultural

management of water and water related ecosystems while providing important co-benefits for climate and biodiversity. The FILLM provides the overarching framework as to how this can be achieved in a holistic and integrated manner.

***Q: Do you think CAP measures to protect water quality should be retained at a national scale or become more locally targeted?***

There is no one-size fits all approach to protecting *and improving* water quality. Agriculture, facilitated by policy, has been identified as a significant pressure acting on water quality nationally. A combination of national and locally targeted approaches will be necessary. National guidance is important, but an opportunity exists for locally targeted approaches in which farmers can decide on which is the best approach to use on their land through knowledge-sharing and co-design principles.

### **3.1.5 Climate Change**

***Q: Do you believe the links between climate change policy and water quality can be improved, and if so, have you any suggested on how they could be improved?***

Water is often missing from the climate change conversation despite the inherent linkages between the changing climate, water quality and water availability. Increasing the visibility of water within climate mitigation and adaptation measures is an initial step to improving the links between climate change policy and water quality.

As climate change becomes more apparent in Ireland, water availability will become a more frequent issue, as highlighted by two droughts in two years between 2018-2020. Knowledge gaps surrounding abstractions in agriculture, and their cumulative effect within catchments, create difficulties for implementing abstraction legislation into the future. As noted in An Fóram Uisce's submission in October 2018 to the DHPLG on the consultation process in relation to the Water Environment (Abstractions) Bill 2018 General Scheme, the cumulative impact of abstractions below the threshold for registration is unknown.

***Q: Do you consider climate change to be a significant threat to water quality in Ireland?***

This submission addresses the impact of climate change on water resources under Section 2.16 and Appendix 1.

### **3.1.6 Pollution of Waters (phosphorus and nitrogen)**

***Q: Investing in urban waste water infrastructure and providing free agricultural advisory services are two targeted ways that the last RBMP aimed to reduce nutrient losses to surface waters. What other kinds of measures could be targeted and how?***

Progress on the urban wastewater infrastructure commitments made in the 2<sup>nd</sup> RBMP has been slow, and urgent progress on these commitments is essential to reduce nutrient pollution of our waters. The 3<sup>rd</sup> RBMP should include statements on the progress made to date on the 2<sup>nd</sup> RBMP commitments to improving wastewater infrastructure, providing reasons for any lack of progress. This should include updates on compliance and non-compliance of individual WWTPs, projected timeframes for achieving compliance where needed, and an action plan for achieving any 2027 wastewater infrastructure upgrades committed to in the 3<sup>rd</sup> RBMP. It is not acceptable that 36 agglomerations are without wastewater treatment systems. Urgent action is needed to address this and to ensure that Ireland

complies with the UWWT Directive. Currently 58% of the population's wastewater does not meet EU wastewater treatment standards. Greater innovation is needed to address wastewater in urban areas under 500pe and sustainable urban drainage should be further implemented.

Soft engineering options, such as integrated constructed wetlands, for example, should be included as management options for reducing nutrient pollution at the catchment scale rather than solely relying on WWTP engineered solutions.

Data gaps exist regarding the number of combined sewer overflows and storm water overflows present nationally, their locations, discharge rates and discharge volumes<sup>29</sup>. The UK Rivers Trust has recently published mapping for all known CSOs and storm water overflows in England<sup>30</sup>. Funding should be provided to review the current data available for CSOs and SWOs in Ireland with the aim of developing a similar publicly available data-hub to that produced by the Rivers Trust.

The implementation of the recently announced grant system for domestic wastewater treatment systems is welcomed, along with the online interactive map for households to identify if they are eligible for the grant. But An Fóram Uisce notes the delay in the implementation of this grant system since its inclusion in the 2<sup>nd</sup> RBMP in 2018. The grant system must be continued into the 3<sup>rd</sup> RBMP.

Greater transparency in reporting of progress against RBMP measures and actions is necessary. In communications with An Fóram Uisce, Irish Water have confirmed that their monitoring and evaluation and reporting metrics regarding wastewater infrastructure are not aligned to the 2<sup>nd</sup> RBMP. This impedes the monitoring and evaluation of the RBMP and inhibits transparency on progress on commitments made.

Nutrient recovery from wastewater and its recycling into agriculture has the potential to both reduce nutrient pollution of water bodies and reduce use of, for example, mineral phosphorus as land fertiliser. Further research into the efficacy and contaminant removal from wastewater sludge for recycling is necessary as are measures and policy to further encourage the recovery and recycling of nutrients from wastewater<sup>31</sup>.

In addition, further research into alternative waste recovery and recycling methods are required, with consideration given to revision to Part H of the Building Regulations to facilitate domestic urine separation and toilet composting where feasible and appropriate.

The initiation of EPA-funded research projects, such as the SLAM Project regarding load apportionment, are welcomed and the results of such research must be used to inform the

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<sup>29</sup> Morgan, D., Xiao, L. and McNabola, A. (2018). Technologies for monitoring, detecting and treating overflows from urban wastewater networks. Report to the Environmental Protection Agency of Ireland. Available from:

[http://www.epa.ie/pubs/reports/research/water/Research\\_Report\\_240.pdf](http://www.epa.ie/pubs/reports/research/water/Research_Report_240.pdf)

<sup>30</sup> <https://www.arcgis.com/apps/webappviewer/index.html?id=a6dd42e3bc264fc28134c64c00db4a5b&extent=146436.9576%2C27590.8012%2C854242.0922%2C563326.0668%2C27700>

<sup>31</sup> Ryan, M.P., Boyce, A. and Walsh, G. (2016). Identification and evaluation of phosphorus recovery technologies in an Irish context. Report to the Environmental protection Agency of Ireland.

<https://www.epa.ie/researchandeducation/research/researchpublications/researchreports/EPA%20RR%20189%20final%20web.pdf>

development of the 3<sup>rd</sup> RBMP. Further such research must be prioritised to increase the evidence base around nutrient pollution.

An Fóram Uisce recommends that while nutrient management planning is an important means for reducing nutrient losses from land, pathway interception measures should be prioritised for mitigating impacts from phosphate, and source reduction and mobilisation control measures should be prioritised for mitigating impacts from nitrate.

### **3.1.7 Physical Changes to Surface Waters/Hydromorphology (including barriers to fish migration)**

#### ***Q: How can natural processes in waters be protected and restored?***

Physical changes to surface waters have often been implemented due to previous legislation, such as the Arterial Drainage Act 1947, policies and incentives for undertaking bodies of work. To redress some of the physical changes made, consideration needs to be given to the mechanisms through which incentives can be applied to deliver the changes required. Other barriers to facilitating restoration works also need to be examined, for example the planning process for undertaking river restoration works.

In addition, there are no guidelines for assessing hydromorphological impacts on waters in the planning process, and these should be introduced.

#### ***Q: Do you think that natural water retention measures, i.e. slowing the flow, should be explored further? How could these types of measures be implemented?***

Yes, natural water retention measures must be, not just explored further, but incorporated as options for catchment-scale flood mitigation measures and habitat restoration measures. The FILLM provides the holistic framework for environmental management, connecting legislation including the Floods Directive. Inter-agency collaboration is necessary for the design and implementation of these types of measures, along with shared and coordinated policies.

Lessons from international best practice and case studies of successful implementation of natural water retention measures should be incorporated into any plans for delivering such measures. Examples of best practice include the Scottish Environmental Protection Agency Natural Flood Management Handbook<sup>32</sup> and successful implementation of such measures include those presented at the EPA Water Conference 2020 by Hamish Moir of the Rivers and Lochs Institute, University of the Highlands and Islands, Scotland; and Mary-Liz Walshe of Dublin City Council<sup>33</sup>.

#### ***Q: How should existing barriers to fish migration be prioritised for mitigation (either removal or modification to improve fish migration and natural processes)?***

Those rivers where migratory fish populations are in crisis in comparison to historical figures and where barriers to fish migration have been found to be a significant contributory factor to the population declines should be prioritised for action.

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<sup>32</sup> <https://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf>

<sup>33</sup> <https://www.catchments.ie/2020-epa-water-conference-watch-online-now/>

Progress on the actions stated in Ireland's National Biodiversity Action Plan 2017-2021<sup>34</sup> should be reviewed and lessons learned, and knowledge gaps identified to inform the actions required through the 3<sup>rd</sup> RBMP to help achieve the Biodiversity Action Plan.

### 3.1.8 Siltation

***Q: Would you consider source control measures, such as catch crops for tillage and appropriate riparian margins, to prevent soil loss (silt and nutrients) from land and increase biodiversity?***

These measures could be included as part of individual catchment management plans for each RBMP catchment where appropriate. Developing such catchment management plans in collaboration with local communities and stakeholders would help raise awareness of issues occurring within the catchment as well as incorporating local knowledge and solutions into the plans. The FILLM provides the supporting framework for the integrated development of catchment management plans.

Pathway interception measures are important for the management of siltation in addition to being important for nutrient management as stated under section 3.1.6. A targeted approach to pathway mitigation is likely to achieve greater results than a one-size-fits all approach.

***Q: Would you consider developing a land management plan to reduce silt and nutrient losses to waters? This could include measures such as drainage towards naturally wet low-lying areas; the use of drain blocks/silt traps?***

As for the previous question, these measures could be included as part of a catchment management plan co-developed by the local communities and stakeholders for each individual catchment, for which the FILLM provides the supporting framework.

***Q: What else should we consider?***

Sediment is identified in this submission as a stressor (see Section 2.2 and Appendix 1). Using the sector-pressure-stressor approach as advocated in this submission enables the issue of siltation to be addressed in a holistic and integrated manner within the context of the FILLM.

### 3.1.9 Public Health/Drinking Water Quality

***Q: What can we do to improve the resilience of our drinking water supplies and their associated ecosystems? How can climate change impact on this resilience?***

The vulnerability of the drinking water supply for the Greater Dublin area was highlighted by the outages at the Liffey water treatment plant which affected 600,000 on two separate occasions in 2019. Increasing the diversity of supply to the Dublin area is essential as are infrastructure upgrades to increase headroom in water treatment plants.

Irish Water's preferred option for diversifying supply is the Eastern and Midlands Supply Project. If the project is approved to proceed, it may take more than 10 years to be completed. In the meantime, it is feasible that the country will face further water shortages following two droughts in two years. An

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<sup>34</sup><https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf>

Fóram Uisce provided a submission to the CRU on the proposed Eastern and Midlands Supply Project in June 2019.

Irish Water is aiming to reduce leakage from the current 43% to 38% in 2021 following a €500 million investment. Recognising that further resources and time are necessary to reduce leakage rates further, An Fóram Uisce presses for greater ambition to reduce leakage below 38% post 2021. Given the wide range of infrastructure upgrades required nationally, the regional population growth projections and the expenditure controls applied by the CRU for the period 2020-2024, An Fóram Uisce has concerns regarding achieving further ambitious targets to increase the resilience of drinking water supplies. Leakage reduction will reduce water demand, but will not, on its own, address the issue of water security and water resilience.

Climate change will undoubtedly impact on the resilience of Ireland's water supplies, directly through water availability (both high and low flow scenarios), water quality; and indirectly, for example, as projected temperature increases in surface waters are expected to increase the potential for disinfection by-products such as Trihalomethanes<sup>35</sup>. Comment on climate change in the context of the SWMI public consultation document, the sector-pressure-stressor approach and the FILLM is provided in Section 2.1.6 of this submission.

The resilience of ecosystems which are used as drinking water supplies is dependent on their ecological character and, in the case of surface water supplies, the maintenance of flow and water level regimes. A whole-of-catchment cumulative approach to abstraction licencing should be undertaken, with due consideration to the impact of abstractions on ecological character and flow and water level regimes.

***Q: Who should implement drinking water source protection? How can a collaborative approach in the catchments be fostered? How can we engage with landowners and the wider public?***

A collaborative approach to drinking water source protection is essential to deliver Integrated Catchment Management through the FILLM. Such a collaborative approach can only be fostered through clear and strong governance, defined roles for action, and appropriate resourcing. Key lessons can be drawn from the two Drinking Water Phase II Source Protection Pilot Projects implemented by the National Federation of Group Water Schemes, as well as the large body of work undertaken by the NFGWS to deliver Phase I drinking water source protection assessments for all Group Water Schemes.

Irish Water has a defined role in developing the National Water Resources Plan and in implementing Drinking Water Safety Plans. The utility has recently begun the process of implementing source protection pilot projects across a small number of catchments, and this is welcomed. Clarity is needed as to how the National Water Resources Plan and the Drinking Water Safety Plans in development by Irish Water link to the 3<sup>rd</sup> RBMP and catchment-scale objectives.

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<sup>35</sup> Valvidia-Garcia, M. *et al.* (2020). Predicted impact of climate change on trihalomethane formation in drinking water treatment. *Nature Scientific Reports* 9. <https://www.nature.com/articles/s41598-019-46238-0>

Engagement with landowners and the general public on water related matters is currently the role of LAWPRO and ASSAP, and these two bodies seem to be collaborating well. Yet, deficiencies in the monitoring and evaluation of engagement actions mean that it is difficult to identify the true impacts and results of engagement actions undertaken to date. As advocated in Section 3.1.2 of this submission, there is the opportunity to develop ‘pilot engagement catchments’ which incorporate social science expertise and methodologies to deliver Integrated Catchment Management within the FILLM.

Small Private Supplies are consistently shown to have lower drinking water quality than public supplies, publicly-sourced Group Water Scheme supplies and privately-sourced Group Water Scheme supplies. A greater focus on improving water quality in Small Private Supplies is needed and the National Federation of Group Water Schemes Framework for Drinking Water Source Protection<sup>36</sup> would assist this. In addition, greater awareness of the importance of drinking water source protection within the Small Private Supplies sector is necessary.

***Q: How can we realise co-benefits from source protection including for biodiversity and climate?***

Many aspects of the FILLM and consequently Integrated Catchment Management can be achieved through drinking water source protection actions. In particular, An Fóram Uisce recommends adopting the National Federation of Group Water Schemes Framework for Drinking Water Source Protection<sup>36</sup>, which emphasises the importance of co-benefits in protecting drinking water sources, and which applies the FILLM approach to source protection.

Within the sector-pressure-stressor approach of Section 2.2 of this submission, all of the stressors have a direct link to drinking water quality; and drinking water source protection measures aimed at mitigating the pressures acting on the stressors could also provide co-benefits for biodiversity and climate. For example, a national peatlands rewetting strategy would reduce sediment entering water courses and reduce dissolved organic carbon concentrations (leading to fewer lower concentrations disinfection by-products, such as Trihalomethanes, in drinking water supplies), while providing co-benefits for flood alleviation (by slowing the flow), carbon sequestration, and biodiversity through peatland rehabilitation.

***Q: How would you describe our attitudes to water usage and the value of water? How could we develop this area?***

This is a key component of An Fóram Uisce’s role and is incorporated into its Strategic Plan. An Fóram Uisce is committed to working with all stakeholders to increase the social value of water and to help raise awareness to create water-wise communities. A number of awareness and engagement initiatives are being planned by An Fóram Uisce and collaboration with the DHLGH and other stakeholders in the delivery of these initiatives would be warmly welcomed.

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<sup>36</sup> <https://nfgws.ie/a-framework-for-drinking-water-source-protection-2/>

### 3.1.10 Invasive Alien Species

***Q: In your opinion, what invasive species are the biggest concern in Ireland?***

For species that have yet to arrive in Ireland, recent horizon-scanning research<sup>37</sup> has identified the invasive species of greatest concern to experts and stakeholders working in invasive species management. Priority should be given to addressing management actions required to reduce the likelihood of introduction and spread of those species identified in this research (Appendix 1).

***Q: What more could be done to help prevent the introduction and spread of riparian invasive species at a national level and a local level?***

At a local level, easily accessible funding could be provided to local community groups, such as River Trusts and Catchment Partnerships and Associations to map riparian invasive species presence within their catchments and to develop invasive species management plans to implement the appropriate management measures to reduce their prevalence and potential to spread.

At the national level, clear and transparent governance structures for invasive species management are necessary. This needs to be combined with active engagement measures to raise awareness of local IAS issues, preventative measures and activities associated with the spread of IAS.

An Fóram provided the following in its submission under the public consultation for the National Marine Planning Framework under the Descriptor Non-Native Invasive Species. The content is highly relevant to RBMP measures to address IAS and highlights the necessary policy coherence required to deliver integrated management of IAS in Ireland:

Minimising the introduction and spread of NIS is key to achieving and maintaining Good Environmental Status. Public consultation and awareness raising is a key component of this, and An Fóram Uisce proposes a targeted information campaign across all relevant stakeholders highlighting the actions necessary to minimise introduction opportunities and spread of NIS.

In order to coordinate such a public awareness campaign, clear and transparent governance structures are required for NIS management and to assist in the implementation of actions outlined in the National Biodiversity Action Plan. Such governance structures should include

1. An overarching lead authority/body/agency for the management of NIS in marine, transitional and freshwater environments (recognising that the National Biodiversity Action Plan identifies Inland Fisheries Ireland as the lead agency for aquatic invasive species).
2. Clearly defined roles for all agencies and management working groups/taskforces within the governance structure.
3. Realistic, integrated national action plans aim to minimise the introduction and spread of NIS in marine, transitional and freshwater environments.

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<sup>37</sup> Lucy, F. et al. (2020). Horizon scan of invasive alien species for the island of Ireland. *Management of Biological Invasions. International Journal of Applied Research on Biological Invasions* 11: 155-177.  
[https://www.reabic.net/journals/mbi/2020/2/MBI\\_2020\\_Lucy\\_et.al.pdf](https://www.reabic.net/journals/mbi/2020/2/MBI_2020_Lucy_et.al.pdf)

4. Strong policy coherence and integrated management across marine, transitional and freshwater environments.

To support the actions undertaken within this governance structure, greater scientific understanding is required to inform public awareness campaigns in terms of:

- The prevalence, distribution and risk of spread of established NIS present in marine waters (with the same information available for transitional and freshwater NIS also, delivered through the governance structure and policy coherence recommended above).
- The prevalence, distribution and risk of spread of newly introduced NIS.
- An assessment of risk of introduction of NIS not yet present in Irish marine/transitional/freshwater environments, and mitigating actions to prevent their introduction and spread.

The non-native species risk assessments undertaken by IFI and the National Biodiversity Data Centre (<http://nonnativespecies.ie/risk-assessments/>) should be frequently updated, and expanded beyond those undertaken for non-native species which are subject to trade or potentially subject to trade.

Ensuring direct legal provision in Ireland of the Ballast Water Convention should be undertaken as a matter of urgency.

The European Commission Council Regulation 708/2007 concerning the use of alien and locally absent species in aquaculture should be strictly enforced.

Addressing the above items through the FILLM enables an integrated approach to be undertaken in collaboration with the sectors identified in Part Two of this submission which contribute to the IAS pressures acting on water bodies, and consequently addressing the stressors which IAS influence.

***Q: How can the awareness of invasive species at a local level be improved?***

Local community and sporting groups could be engaged through a national campaign to raise awareness of local IAS issues, preventative measures and activities associated with the spread of IAS. This can be facilitated through new, improved governance structures and appropriate resourcing as outlined above.

### **3.1.11 Hazardous Chemicals**

***Q: How can information on current sectoral pesticide usage statistics (Agriculture, local authorities, forestry, amenities and domestic (home and garden)) be improved to help in assessing risks to water in catchment areas?***

It is not possible to fully answer this question without being aware of the current sectoral pesticide usage statistics and how they are communicated. To assess risks to water in catchment areas requires a detailed understanding of, for example, land use, topography, soil type, geology, field and drain connections to waters in addition to the likelihood of pesticide application and amount of pesticide to be applied. Even if a catchment pesticide risk map to waters can be established for catchments, it doesn't account for human behaviour actions, for example where an individual rinses out a pesticide

container in a local drain or stream resulting in wide-spread contamination of waters in that catchment.

***Q: How can citizen's behaviour regarding the safe disposal of medication be influenced and changed? What other measures can be taken to prevent medications from ending up in wastewater treatment plants?***

Influencing behavioural change is only likely to be achieved if there is an understanding of risk to and by the user or target population. Therefore, public awareness campaigns and labelling information are important, and lessons can be learned from other campaigns such as *Think before you Flush*.

***Q: How can consumer choice be better guided towards choosing personal care products that don't impact negatively on the water environment?***

Public awareness campaigns and effective labelling are important for influencing consumer choice, but price is the over-riding factor. If personal care products which impact negatively on the water environment were more expensive, for example due to a levy, then it would help drive consumer choice to those products that cause less negative impact. Policy and legislation are also important, as has been observed regarding microplastics/microbeads in personal care products (Appendix 1).

### **3.1.12 Urban Pressures**

***Q: How can Green infrastructure be best applied in Ireland to benefit water quality and the alleviation of flooding in towns and cities?***

Lessons can be learned from international best practice to create and deliver guidance on design and implementation of green infrastructure and sustainable drainage systems, such as that recently produced by the RSPB and Wildfowl and Wetlands Trust in the UK<sup>38</sup>. Policy and resources need to be devoted by Local Authorities to further install such green infrastructure in urban areas to slow the flow while creating co-benefits for biodiversity and society.

Catchment-scale flood alleviation requires a greater focus on natural water retention measures to be used in combination with harder engineering flood alleviation measures where deemed appropriate and subject to the required legislative environmental assessments.

At the individual householder scale, the opportunity for increasing rainwater harvesting and greywater recycling exist. But Ireland's building regulations need revision to facilitate national-scale action to reduce water consumption. Opportunities for retrofitting also need to be pursued. In the UK, current building regulations state that all new homes should be built to a water consumption standard of 125 litres per person per day, with an optional requirement of 110 litres per person per day in water stressed areas where there is a clear need. In Ireland, the average person uses 129 litres of water per day and encouragement is needed to increase water conservation measures.

In 2015, the €100 Water Conservation Grant for all households registered with Irish Water, promoted household expenditure on water conservation measures. No audits were held regarding the use of this grant which was suspended in 2016, and no further grants to enable domestic water conservation

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<sup>38</sup> <https://www.rspb.org.uk/globalassets/downloads/documents/positions/planning/sustainable-drainage-systems.pdf>

measures have been introduced since. Consequently, there is little stimulus for the general public to initiate domestic water conservation measures or install domestic green infrastructure which could help to both slow the flow and improve water quality.

***Q: What are the particular issues associated with river restoration in urban rivers, and are we applying appropriate actions?***

Where possible, opportunities to create green and blue spaces around water courses that would create environmental and societal co-benefits should be prioritised ahead of culverting or other hard engineering solutions. Such spaces have been shown to promote mental and physical health, and reduce morbidity and mortality by providing psychological relaxation and stress alleviation, simulating social cohesion, supporting physical activity and reducing exposure to air pollutants, noise and excessive heat<sup>39</sup>. Irish-focused research on green-blue infrastructure<sup>40</sup> should be used in combination with lessons from international case studies<sup>41 42</sup> which successfully delivered such infrastructure should be used to inform recommendations for its delivery through the 3<sup>rd</sup> RBMP in Ireland.

***Q: Are there any additional concerns in relation to urban pressures that are currently not being considered in Ireland?***

The economic impact of the COVID-19 pandemic on funding availability for Irish Water to urgently progress and complete their commitments on upgrading urban wastewater treatment infrastructure needs clarification. An Fóram Uisce considers it essential for the appropriate funding to be delivered to ensure no impairments of Irish Water's ability to meet their commitments on this matter.

***Q: What other actions do you think could be put in place to reduce the pollution of waters caused by urban pressures?***

As mentioned above, revision of the Building Regulations to encourage increased rainwater harvesting and greywater recycling is necessary. Further actions are necessary, including:

- Ambitious standards for water consumption for new build houses, with consideration for stricter standards in current and future water-stressed areas.
- Adoption of water quality standards for water recovered from waste streams for reuse, addressing the different purposes for reuse rather than a single standard for all recovered water.
- Implementation of a water conservation scheme for houses in addition to or incorporated into the Building Energy Rating (BER) Scheme.
- More stringent standards under Technical Guidance Document G, Section 2.2 to encourage installation of water conserving fittings and water saving appliances particularly for current and future water-stressed areas.

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<sup>39</sup> <https://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2016/urban-green-spaces-and-health-a-review-of-evidence-2016>

<sup>40</sup> [http://www.epa.ie/pubs/reports/research/health/Research\\_Report\\_264.pdf](http://www.epa.ie/pubs/reports/research/health/Research_Report_264.pdf)

<sup>41</sup> Well, F. and Ludwig, F. (2020). Blue-green architecture: A case study analysis considering the synergetic effects of water and vegetation. *Frontiers of Architectural Research* 9: 191-202.

<https://www.sciencedirect.com/science/article/pii/S2095263519300822>

<sup>42</sup> O'Connell, E.C. et al. (2017). Recognising barriers to implementation of blue-green infrastructure: A Newcastle case study. *Urban Water Journal* 14: 964-971 <https://www.tandfonline.com/doi/full/10.1080/1573062X.2017.1279190>

- Administering grant aid for retrofitting water conservation measures for existing housing, including rainwater harvesting systems and grey water reuse systems, with consideration for additional aid in current and future water-stressed areas.
- Developing a national programme across multiple stakeholders for identifying domestic misconnections where household wastewater ends up in the surface drainage system rather than in sewers. Learning from the experiences of the UK Rivers Trusts, for example through their 'Outfall Safari'<sup>43</sup> programme could be beneficial.

### 3.1.13 Other Issues – Aquaculture

An Fóram Uisce recognises that aquaculture is an important component of the Irish coastal economy, providing multiple socio-economic benefits, and aquaculture and fisheries are included as a sector in the sector-pressure-stressor approach outlined in Section 2.2 of this submission.

The following was provided in An Fóram Uisce's response to the public consultation on the draft National Marine Planning Framework (dNMPF). As stated for Invasive Alien Species, the content is highly relevant to RBMP measures and highlights the necessary policy coherence required to deliver integrated management through the FILLM.

The dNMPF states that increased intensity of storms and the frequency of storm surge 'will result in damage to vessels and infrastructure including gear loss in inshore and coastal sector of fisheries and aquaculture' (dNMPF, p. 62). Evidence from Coastwatch shows that aquaculture is becoming an increasing source of marine litter in the Irish environment, yet the OSPAR litter monitoring activities undertaken for the MSFD do not assess litter present in estuarine/transitional waters and no OSPAR marine litter survey locations are close to areas where aquaculture is present. Therefore, the formal reporting of marine litter under the MSFD significantly underestimates the contribution of the aquaculture sector to marine litter.

In addition, aquaculture represents a significant threat to native species – not only, for example, through escaping farmed fish impacting on wild populations; but also through nutrient impacts, disease, marine litter, and the introduction and spread of NIS. The Pacific oyster is a NIS commonly cultivated for aquaculture and despite assurances that this species will not become a problem invasive species in Ireland due to low water temperature, it has already become naturalised in Irish waters (for example, in Lough Foyle). Therefore, cumulative impact of aquaculture should be included in the aquaculture licencing system and the aquaculture planning application process. An Fóram welcomes the proposed ecosystem-based approach to the assessment of proposals, but guiding clarification for this approach is necessary.

The focus of the Department on elimination of the aquaculture licencing backlog following recommendations from the 2016 Review of the Aquaculture Licencing Process is understandable, 'having an immediate beneficial effect on every individual aquaculture operator' (dNMPF, p.92). This elimination process should not be undertaken to the detriment of the environment, and all

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<sup>43</sup> <https://www.riverstrust.org/2019/07/18/drain-misconnections/>

relevant legislation and enforcement should be adhered to. Again, An Fóram Uisce considers that a cumulative impact assessment in the licencing process is essential.

Aquaculture appears to not be included in the draft Marine Planning and Development Bill and therefore it is unclear how the NMPF, including provisions regarding aquaculture, will be fully implemented through the Bill.

The dNMPF states that ‘Eutrophication can have an adverse impact on aquaculture...’ with land-based sources identified as the causes of this eutrophication. It should also be recognised that aquaculture can be a source of nutrients entering the local environment with, for example, uneaten feed and fish wastes from finfish farms being a source of organic nutrients.

Addressing the above items through the FILLM enables an integrated approach to be undertaken to mitigate the pressures acting on water bodies through the aquaculture and fisheries sector and consequently addressing the stressors which this sector influences.

Regarding the clearance of the aquaculture licencing backlog, An Fóram Uisce expresses concerns that many aquaculture operations were able to continue operating without a licence due to a loophole in the Fisheries Amendment Act which allows continued operation once a licence renewal has been applied for. In addition, the speedy process at which the backlog was eliminated provided local communities with little opportunity to take part in the public participation process.

Regarding nutrient inputs from aquaculture, An Fóram Uisce highlights that pseudofaeces, faeces and silt from shellfish aquaculture can also have detrimental impacts on the local environment through anoxia and reduction in faunal abundance and diversity.

### **3.1.14 Other Issues – Antimicrobial Resistance (AMR) Bacteria in Waste Water**

Further understanding is needed on the prevalence of AMR bacteria in wastewater in addition to the pathways through which they can present a public health threat – e.g. contamination of drinking water, bathing/recreational waters, etc. A One Health approach<sup>44</sup> is required to reduce both water contamination risk from wastewater treatment discharge and public health risk from contact with contaminated waters. Both the One Health approach and the FILLM require multidisciplinary, integrated cooperation of multiple stakeholders across human and animal health sectors, agriculture, environmental management and water and wastewater services.

## **3.2. SWMIs Not Identified in the Public Consultation Document**

It is considered that some important items are omitted from the SWMI public consultation document:

1. **Governance.** Delivering water resources management through clear, transparent and integrated governance is essential. Section 2.1.1 of this submission briefly details how aspects of governance can be improved for the 3<sup>rd</sup> RBMP. Considering that the 2<sup>nd</sup> RBMP introduced a new governance structure, and that a current review of governance is being undertaken by

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<sup>44</sup> <https://www.who.int/news-room/q-a-detail/one-health>

the IPA-EPA Experimental Governance project, it is surprising that governance did not feature prominently within the SWMI public consultation document. The FILLM provides a governance approach to land and landscape management through broadening Integrated Catchment Management. And this should be incorporated into the 3<sup>rd</sup> RBMP.

2. **Coastal Issues.** The WFD includes transitional and coastal waters to one nautical mile, yet coastal issues are poorly represented within the SWMI public document. The non-land-based pressures on our coastal zone in particular need to be addressed.
3. **Forestry.** Page 17 of the SWMI public consultation document identifies Forestry as a pressure acting on Ireland's waters, yet linkages to this pressure are limited throughout the document. Forestry is included as a sector in the sector-pressure-stressor approach described in Section 2.2 of this submission (Appendix 1).
4. **Microplastics.** There is mounting evidence that our river catchments and transitional and coastal waters are heavily impacted by microplastic pollution from a number of sources including wastewater treatment plants, road run-off, industry, agriculture, aquaculture and domestic appliances. Yet there is no reference to this issue in the SWMI public consultation documents. Microplastics are included as a stressor in the sector-pressure-stressor approach described in Section 2.2 of this submission (Appendix 1).
5. **Water level and water availability.** These are likely to be impacted by factors such as climate change and abstraction and will in combination manifest issues in relation to water quality, ecological status, drinking water quality and availability, irrigation and flooding. Water level and water availability are included as a stressors in the sector-pressure-stressor approach described in Section 2.2 of this submission (Appendix 1).
6. **Peat extraction.** The extraction of peat is detrimental to the ecosystem functioning of peatland environments and can impact on a number of aquatic stressors as identified in section 2.2, including sediment and organic matter. These stressors have implications for environmental condition of aquatic ecosystems as well as for drinking water treatment processes and drinking water quality, and consequently public health.
7. **Unregulated wetland/peatland drainage.** Planning permission is required to drain or reclaim a wetland for the purpose of agriculture where the impacted area exceeds 0.1 hectares or the works may have a significant effect on the environment. The drainage or reclamation of wetlands below the planning threshold at not addressed in the SWMI public consultation document.

## Appendix 1: Background information and justification for selection of stressors

Section 2.2 of this SWMI submission provides a reconceptualization of Ireland's SWMIs within the Framework for Integrated Land and Landscape Management (FILLM) presented in PART ONE. This reconceptualization identifies the sector-pressure-stressor approach as an alternative to addressing Significant Water Management Issues, identifying eight stressors which, either singularly or acting in multiplicity, can result in unsatisfactory water quality and WFD status.

The information on, and the rationale for selecting each of these eight stressors is provided below.

### Sediment

Work being carried out by LAWPRO during the 2<sup>nd</sup> RBMP Cycle has identified sediment in streams as a significant stressor on the water environment. Sediment is derived from weathering and erosion of bedrock and stream banks. Sedimentation impacts on the biodiversity of the river by reducing habitat diversity within the stream channel and preventing the establishment or persistence of sensitive macro-invertebrate species, resulting in an overall reduced ecological status.

Pressures acting on water resources which can result in increases in sediment include wetland degradation, hydro-morphological modification, run-off from agriculture and urban areas, historically polluted sites, industrial discharge, land management and non-indigenous species.

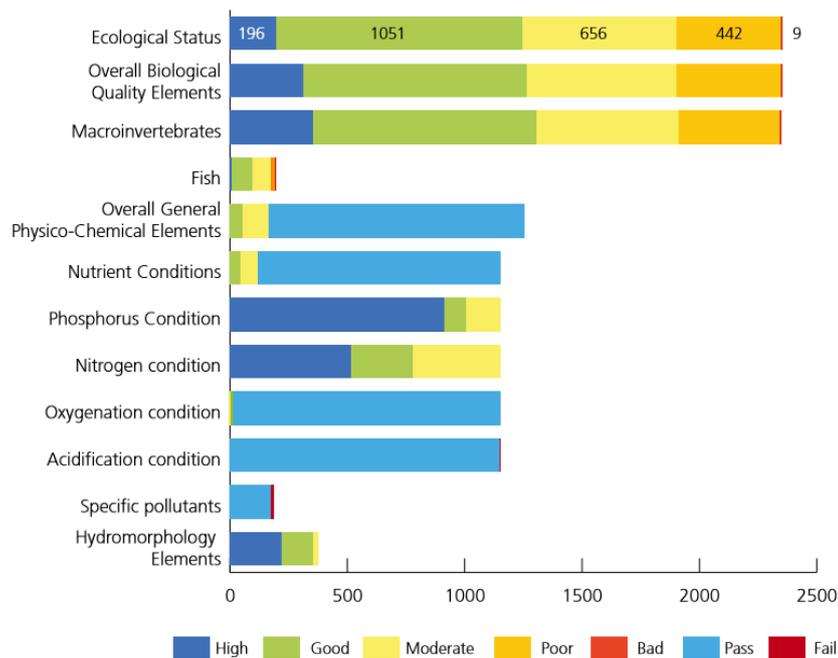
Sediment fingerprinting research undertaken by Teagasc, as outlined in the SWMI public consultation document, has identified the primary sources of sediment as being channel banks, roads, and runoff from agricultural land. Additional sources of sediment include poorly managed forests, peat extraction, and land management actions such as livestock poaching, riverbank erosion and runoff from ploughed fields. Management of poorly drained land is also important with regards to sediment loading in water as land drainage and channelization can be responsible for 86% of hydro-morphological pressures.

Land management practice is therefore key to reducing sediment loading in waters, with management actions such as planting deeper-rooted grasses, fencing and riparian buffer strips and planting hedgerows helping to intercept the pathway for sediment entering water courses. Some land management actions, such as the establishment of wetlands, can also provide additional co-benefits to reducing sediment loads, such as carbon sequestration and increasing biodiversity.

Recent EPA research projects such as (COSAIN, DETECT, and SILTFLUX) will help identify potential actions to minimise sedimentation pressures on water bodies. ASSAP and Teagasc advice to farmers to manage sedimentation issues will be important as part of the third cycle RBMP.

## Nutrients (NO<sub>3</sub>, P, NH<sub>4</sub>)

Excess nutrients in waterways result in eutrophication of ecosystems resulting in the growth of algae and plants that can lead to a reduction of oxygen levels in the water. Nutrient enrichment is also a potential human health indicator in drinking water. Nutrient enrichment impacts negatively on fish and macroinvertebrates that could otherwise potentially thrive. Macro-invertebrates as an individual element or in combination with others are responsible for determining ecological status in 91% of monitored river waterbodies. This assessment method (Q-value) is most sensitive to ecological changes caused by organic pollution and nutrient enrichment. As shown in Figure 5 of the EPA Water Quality Report 2013-2018<sup>8</sup>, nutrient conditions, phosphorous and nitrogen were responsible for moderate or less water quality (unsatisfactory) in a significant number of monitored waterbodies. For Phosphorus, 45.8% of monitored sites (260 rivers) were less than satisfactory, and for N 42.8% of monitored sites (239 rivers) were less than satisfactory.



**Figure 2.3:** Ecological status and condition of individual biological quality elements, physico-chemical elements and hydromorphological quality elements in river water bodies in 2013-2018. The hydromorphological element is broken down at site level.

*Figure 5: Nutrient conditions, phosphorus and nitrogen were responsible for less than satisfactory ecological condition for a large number of monitored water bodies<sup>8</sup>.*

Pressure acting on water resources which can result in excess nutrients include diffuse sources from agriculture (overland flow and leaching), and point sources including urban and domestic wastewater treatment plants. Diffuse-source pressures are not uniform across the country as a result of being associated with soil type and topography. For example, nitrogen levels are a particular issue for water bodies in the south east of Ireland; whereas phosphorous is more of an issue in the north-midlands where soils are more clay-rich.

Excess nutrients in rivers also impact on coastal areas causing enrichment in transitional zones.

Wastewater treatment systems (domestic and urban) can release nutrients into our waterways and continued investment in wastewater treatment systems and networks is required to mitigate this issue.

An additional long term goal to help achieve the Circular Economy and to help address the limited global supply of rock phosphorus, is for measures and legislation to encourage the recovery, and recycling of nitrogen and phosphorus from wastewater back to agriculture without the presence of toxic metals or pharmaceuticals.

### **Microbes, Bacteria, Parasites and viruses**

Pathogens microbes such as bacteria, parasites and viruses are organisms capable of causing infection or disease in other organisms, including humans, wild and domestic animals, and plants. Several pathogens naturally occur in livestock and poultry manure and under certain circumstances may pose a risk to human health. Many water-borne parasites are often present in animal manure, such as *Cryptosporidium*, and *Giardia*.

Contamination of drinking water supplies by microbes, parasites and bacteria is a risk to human health. Bacteria such as *E. coli* can cause illness, and in a small number of cases it can result in severe and long-term kidney failure with older people and young children being particularly vulnerable to infection. Reported cases of VTEC1, a dangerous form of *E. coli*, increased in 2018. Public water supplies are regulated for such contaminants but one million people in Ireland obtain their water from private supplies many of which are unregulated and unmonitored. Of these supplies that are monitored private supplies have the lowest adherence to drinking water regulations compared to public water supplies and publicly-sourced and privately-sourced Group Water Schemes.

In 2018, commercial businesses (e.g. hotel, B&B, pub), or public buildings (e.g. schools, crèches, campsites) that obtain their water from a well or other private source are at greater risk of being contaminated than public water supplies<sup>45</sup>. More than 60 of these private supplies were found to be contaminated with human or animal waste at least once during 2018. Cases of VTEC infection – which can be contracted due to consuming water contaminated by animal waste – has continued to rise with over 1,000 reported cases in 2018. Ireland continues to have the highest incidence of VTEC infection in Europe.

Recent research by NUI Galway<sup>46</sup> suggests that current monitoring programmes need to be expanded to include other substances and parameters. Of 75 tested samples from recreational bathing areas (seawater, lakes and rivers), 65% were positive for genetic markers for pathogenic *E. coli* (STEC) that can cause severe intestinal infection and potentially renal failure. River samples recorded the highest

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<sup>45</sup> <http://erc.epa.ie/safer/resourcelisting.jsp?oID=10206&username=EPA%20Drinki ng%20Water>

<sup>46</sup> <https://www.nuigalway.ie/about-us/news-and-events/news-archive/2020/april/study-detects-presence-of-disease-causing-ecoli-in-recreational-waters-including-in-bathing-waters-rated-excellent-und-1.html>

prevalence of 93% of samples (14/15 samples) contaminated with STEC at. All bathing waters monitored in this NUI Galway study had been identified as being of high or good ecological status. The research highlighted the ‘limitations of only assessing the total number of *E.coli* as an indicator of water quality without taking into consideration the pathogenicity of some variants’.

**Manure management to reduce pathogen populations:** Pathogens are most likely to be transported to water through surface runoff and erosion or by direct animal access to surface water<sup>47</sup>. Streams and lakes used for drinking water supply and recreational purposes provide the greatest opportunity for transporting these pathogens to humans. Pathogens usually do not move through soil profiles and reach groundwater because of the filtering capabilities of soil. Exceptions to this occur adjacent to poorly maintained well casings.

Most human pathogens do not multiply outside their host but can survive from a few days to several months depending upon environmental factors including temperature, moisture, pH, and oxygen. Composting livestock manure for several weeks prior to application to the land significantly reduces the risk of exposure to these pathogens.

## Chemicals

Good chemical status means that no concentrations of priority substances exceed the relevant Environmental Quality Standards (EQS) established in the Environmental Quality Standards Directive 2008/105/EC. EQS aim to protect the most sensitive species from direct toxicity, including predators and humans via secondary poisoning. Under the WFD, losses, discharges and emissions to water of a particularly harmful subset of these, priority hazardous substances, should be completely phased out within 20 years, and uses of these substances have been significantly restricted.

Chemical pollutants are or have been emitted into water bodies through a range of pathways and from a variety of sources, including industry, agriculture, transport, mining and waste disposal, as well as from homes. Significant levels of some priority substances have built up from historical use and this legacy pollution may persist in water bodies long after pollutant discharges and inputs have ended.

Of the thousands of chemicals in daily use, relatively few are reported under the WFD<sup>48</sup>. There is a gap in knowledge at European level over whether any of these other substances present a significant risk to or via the aquatic environment, either individually or in combination with other substances. In addition, information on the sources and emissions of many pollutants remains incomplete, limiting the scope for identifying and targeting appropriate measures.

The main pressures leading to failure to achieve good chemical status are atmospheric deposition and discharges from urban wastewater treatment plants. Reducing hazardous substances in water requires implementation of the current legislation but also adopting more sustainable production and use of chemicals<sup>47</sup>.

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<sup>47</sup> <https://water.unl.edu/understanding-water-quality-issues-pathogens-and-organic-matter>

<sup>48</sup> European Waters Assessment of status and pressures 2018 <https://www.eea.europa.eu/themes/water/european-waters/water-quality-and-water-assessment/water-assessments/pressures-and-impacts-of-water-bodies>

The National Aquatic Environmental Chemistry Group (NAECG) are reviewing hazardous chemicals in the aquatic environment and are identifying new monitoring programmes for new compounds and a more strategic approach to the management of hazardous chemicals.

Chemicals such as pesticides are impacting our aquatic plants and wildlife and are contaminating our drinking water supplies. The EU Biodiversity Strategy has identified that pesticide use will be reduced by 50% by 2030. The herbicide MCPA, used to kill weeds and rushes, has been detected by the EPA in over half of all rivers monitored. In 2018, MCPA was responsible for three quarters of drinking water quality standard failures due to pesticides. As it is very difficult to remove MCPA from water it is a priority that its use is reduced or eliminated.

The National Pesticides in Drinking Water Action Group are a collaborative group set up to address the issue of Pesticides in Drinking water however more widespread targets are needed to achieve the Biodiversity Strategy goal of a minimum 50% reduction in use by 2030.

In addition to the training and registration of professional users of pesticides, guidance is needed for retailers including more detailed labelling to address use and storage requirements.

A public information and awareness campaign is recommended for the wider public on the labelling, identification and impact of hazardous chemicals to the aquatic environment, water quality and biodiversity.

## **Invasive Alien Species**

Invasive Alien Species (IAS) are one of the top five threats to the natural environment worldwide. IAS are species that have moved outside of their natural range and negatively affect native biodiversity, ecosystem services and public health, through predation, competition or by transmitting disease<sup>49</sup>.

A project funded by the EPA Research Programme<sup>50</sup>, identified 40 species likely to arrive, establish, spread and cause impacts to biodiversity on the island of Ireland and of these top 40 species, 18 were freshwater species, 7 of which were placed in the top 10 for impact (Table 2). Pathways of introduction were also identified to inform on biosecurity strategies. The recommended biosecurity actions include effective risk assessment, improved detection, recording and inspection at ports and airports, full implementation of the Habitats Regulation in the ROI and the Wildlife and Natural Environment Act (Northern Ireland), to include management of trade including internet trade.

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<sup>49</sup> <https://www.researchgate.net/project/Prevention-control-and-eradication-of-invasive-species/update/5e99c7ef4f9a520001e07f67>

<sup>50</sup> <https://www.researchgate.net/publication/298559361>

Table 2: Horizon Scanning for Invasive Alien Species in Ireland<sup>51</sup>



Horizon scan of invasive alien species for the island of Ireland

**Table 1.** Top 40 species emerging from horizon scan for Ireland. Species were scored according to their likelihood of arrival (A), their likelihood of establishing in the wild (B), and their impact on biodiversity (C). They were then ranked according to the product of those scores, taking uncertainty (UNCERT) into consideration. Prioritisation of species was based on the highest scoring paired with the highest uncertainty. For full list of Pathway Codes, see Table 2.

Rank	Species	Common name	Taxonomic Group	Functional Group	Environment	Native Range	Pathway of Arrival	A	B	C	PROD	UNCERT
1	<i>Pacifastacus leniusculus</i>	Signal crayfish	Crustacean	Omnivore	Freshwater	North America	M/E/FB; M/E/A; V/T/S/FE	5	5	5	125	Low
2	<i>Capreolus capreolus</i>	Roe deer	Mammal	Herbivore	Terrestrial	Europe, Middle East	M/R/HW	5	4	5	100	Low
3	<i>Dikerogammarus villosus</i>	Killer shrimp	Crustacean	Predator	Freshwater	Ponto-caspian	V/T/S/FE	5	4	5	100	Low
4	<i>Gyrodactylus salaris</i>	Salmon fluke	Monogenean	Parasite	Freshwater	Baltic Sea	V/T/S/FE	4	5	5	100	Low
5	<i>Hesperibalanus fallax</i>	Warm-water barnacle	Crustacean	Filter feeder	Marine	Atlantic coast of tropical Africa	V/T/S/BW; V/T/S/HF	5	5	4	100	Medium
6	<i>Hydrocotyle ranunculoides</i>	Floating pennywort	Plant	Primary producer	Freshwater	North and South America, Africa	V/T/S/S	5	5	4	100	High
7	<i>Dreissena rostriformis bugensis</i>	Quagga mussel	Mollusc	Filter feeder	Freshwater	Ponto Caspian	V/T/S/S	4	4	5	80	Low
8	<i>Caulacanthus okamurae</i>	Pom-pom weed	Alga	Primary producer	Marine	Japan, NW Pacific	M/E/A	5	5	3	75	Low
9	<i>Eriocheir sinensis</i>	Chinese mitten crab	Crustacean	Predator	Freshwater	Eastern Asia	V/T/S/S	5	3	5	75	Low
10	<i>Pseudorasbora parva</i>	Topmouth gudgeon; Stone moroko	Fish	Predator	Freshwater	NW Pacific	V/T/S/FE	3	5	5	75	Medium
	<i>Omelatza</i>					North						

A recent UK House of Commons Environmental Audit estimated the cost of INNS poses to the British economy at £1.3 billion a year; £125 million in Wales and £250 million in Scotland<sup>51</sup>. The report also stated that it is immeasurably more cost effective to prevent the establishment of INNS through biosecurity measures such as closing arrival pathways than through eradication programmes once they become established<sup>38</sup>. Public awareness campaigns are key to prevent the introduction of INNS and the Environment Committee propose training approximately 2% of the UK population as biosecurity volunteers (1.3million people) to help eradicate priority invasive species<sup>51</sup>.

Codes of practice for pathways and INNS, similar to Check-Clean-Dry, need to be developed and promoted, and more training and citizen science events are needed to reach all ages and sectors in society. The UK recommendations include that emergency funds are made available to tackle and control pathogens once they are identified.

<sup>51</sup> House of Commons Environment Audit Committee Invasive Species  
<https://publications.parliament.uk/pa/cm201919/cmselect/cmenvaud/88/88.pdf>

## Microplastics

Plastic production has increased exponentially since the early 1950s and reached 322 million tonnes in 2015, this figure does not include synthetic fibres which accounted for an additional 61 million tonnes in 2015<sup>52</sup> It is expected that production of plastics will continue to increase in the foreseeable future and production levels are likely to double by 2025<sup>53</sup>. Inadequate management of plastic waste has led to increased contamination of freshwater, estuarine and marine environments.

Microplastics are usually defined as plastic items which measure less than 5 mm in their longest dimension, this definition includes also nanoplastics which are particles less than 100 nanometres (nm) in their longest dimension. Microplastics are largely resistant to biological degradation and may also act as vectors for bacteria and viruses as well as persistent, bio-accumulative and toxic contaminants (PBTs) from the environment.

Microplastics can be directly emitted by land-based sources to the aquatic environment but may also result from poor waste management or the degradation of larger plastic waste (littering). Directly emitted microplastics can be primary microplastics, such as from personal care products (also called 'microbeads'), industrial abrasives, paints and coatings and detergents, or secondary microplastics originating mainly from tyres, road markings, textiles and building paints, and/or pre-production pellets unintentionally emitted through accidental spills. On the European scale, a UK based research consultancy, Eunomia, estimates direct secondary microplastics emissions from land-based sources to the environment at about one million tonnes per year, with about half of it stemming from automotive tyre abrasion. It is also estimated that 28% of all microplastics released from products may end up in surface waters<sup>54</sup>.

A University College Cork research project estimates that the island of Ireland emits 5,700 kg of microplastics per year through industry, landfill, waste water, domestic sources and road surfaces. These microplastics often make their way into our waters, entering the food chain and also our drinking water<sup>55</sup>.

With regard to the impact of microplastics on freshwater ecology, some studies already indicate their detrimental impact on fish productivity and physiological processes for fisheries and aquaculture.

Microplastics contain a mixture of chemicals added during manufacture and efficiently sorb (adsorb or absorb) persistent, bioaccumulative and toxic contaminants (PBTs) from the environment. The ingestion of microplastics by aquatic organisms and the accumulation of PBTs have been central to the perceived hazard and risk of microplastics in the marine environment.

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<sup>52</sup> Microplastics and the water sector Briefing Note EurEau <http://www.eureau.org/resources/briefing-notes>

<sup>53</sup> Food and Agriculture Organisation of the United Nations Microplastics in fisheries and agriculture Technical paper 615 <http://www.fao.org/3/a-i7677e.pdf>

<sup>54</sup> Investigating options for reducing the release to the aquatic environment of microplastics emitted by products [https://www.eunomia.co.uk/case\\_study/measuring-impacts-of-microplastics/](https://www.eunomia.co.uk/case_study/measuring-impacts-of-microplastics/)

<sup>55</sup> UCC Project Impacts of microplastics on the freshwater environment <https://ecotoxicology.ucc.ie/microplastics/>

Microplastics are widespread in the air we breathe, in some of the food we eat (shellfish, honey, salt), and liquids we drink<sup>52</sup>. The potential impact of microplastics on public health and ecosystems is a growing public concern and has been high on the agenda of decision makers for some time<sup>52</sup>. With growing global use of (micro-)plastics, their release to the environment is expected to increase and microplastic contamination of aquatic environments will continue to increase for the foreseeable future.

## Organic Matter

The term “natural organic matter” (NOM) refers to a wide spectrum of carbon-based compounds that result from natural processes in the environment. It originates from living and dead plants, animals and microorganisms and from the degradation products of these sources<sup>56</sup>. The presence of NOM causes many problems in drinking water treatment processes, in addition to aesthetic problems such as colour, taste and odour, it contributes to the fouling of membranes and serves as a precursor for the formation of disinfectant by-products (DBPs).

NOM rich in aromatic structures has been found to be highly reactive with chlorine, with a higher potential to form DBPs<sup>35</sup>. Large molecular hydrophobic humic substances are enriched with aromatic structures and are easily removed by conventional drinking water treatment consisting of coagulation, flocculation, clarification (CFC) and filtration.

However, non-aromatic NOM can also form trihalomethanes (THMs). Low molecular weight hydrophilic and less aromatic NOM is more problematic to remove and is a major contributor of easily biodegradable organic carbon, which promotes microbiological regrowth in the distribution system. An understanding of the behaviour of different fractions or constituents of NOM present in water is crucial to understanding their fate and impact during water treatment and in water distribution systems. Therefore, accurate characterisation of NOM in raw water and along the treatment process would be an important basis for the selection of water treatment processes, monitoring of the performance of different treatment steps, and assessing distribution system water quality.

Successive Environmental Protection Agency (EPA) reports<sup>57</sup> have shown that Ireland has an unacceptably high number of drinking water supplies exceeding the parametric value of 100 µg L<sup>-1</sup> for average total trihalomethanes (TTHMs). Guidance issued by the HSE<sup>58</sup> states that THMs ‘are possibly carcinogenic to humans’. In 2010, Ireland had the highest non-compliance with respect to TTHMs in drinking water across the 27 EU Member States (Figure 6).

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<sup>56</sup> O’Driscoll, C. *et al.* An assessment of Natural Organic Matter and Ptaquiloside in Irish waters and references within [http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/EPA%20RR%20231\\_web.pdf](http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/EPA%20RR%20231_web.pdf)

<sup>57</sup> Drinking water quality in public supplies 2018 [http://www.epa.ie/pubs/reports/water/drinking/EPA%20DW%20Public%20Supplies\\_web.pdf](http://www.epa.ie/pubs/reports/water/drinking/EPA%20DW%20Public%20Supplies_web.pdf)

<sup>58</sup> Health Service Executive (2016). Trihalomethanes in drinking water. Information for consumers. <https://www.hse.ie/eng/health/hl/water/drinkingwater/information-for-consumers-trihalomethanes-in-drinking-water.pdf>

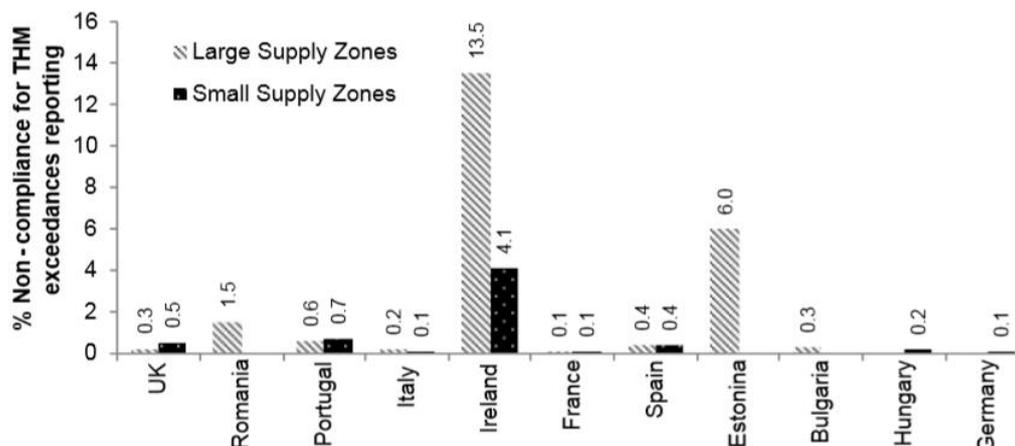


Figure 6: Non-compliance for THM exceedances in EU Member States reporting  $\geq 0.1\%$  compliance for 2010. Large water supply zones refer to zones supplying more than 5000 people and small supply zones to those supplying fewer than 5000<sup>45</sup>.

On 14 May 2020, the European Commission provided a reasoned opinion to Ireland regarding its failure to fulfil its obligations under the Drinking Water Directive with regards to Trihalomethane (THM) levels in drinking water supply zones and schemes<sup>59</sup>. This follows on from an infringement case brought against Ireland by the EU in August 2018 for persistent exceedance of THMs in drinking water.

The majority of THM failures identified by the EPA were caused by either the absence of adequate treatment to remove organic matter or the presence of treatment that is incapable of removing high levels of organic matter<sup>60</sup>.

Increases in NOM from peaty catchments have been attributed to global warming<sup>35</sup> and changes in land management practices, such as peat harvesting, peatland forestry and agriculture can change aquatic NOM quantity and character<sup>61</sup>.

With Ireland struggling to adhere to the Drinking Water Directive as a result of its persistent high levels of THMs in its drinking waters over the past 20 years, there are significant implications of future climate change on the potential for THM formation in Irish drinking water supplies.

## Water Level and Flow

Flow levels in are influenced by climatic factors: precipitation, temperature, evapotranspiration; by non-climatic factors such as land use, urbanisation, water withdrawals, industry; and catchment

<sup>59</sup> [https://ec.europa.eu/commission/presscorner/detail/en/inf\\_20\\_859](https://ec.europa.eu/commission/presscorner/detail/en/inf_20_859)

<sup>60</sup> EPA Drinking water report for public supplies  
[http://www.epa.ie/pubs/reports/water/drinking/2015%20DW%20Report%20Public%20Supplies\\_web.pdf](http://www.epa.ie/pubs/reports/water/drinking/2015%20DW%20Report%20Public%20Supplies_web.pdf)

<sup>61</sup> Jones et al., 2001. Global Biogeochemical Cycles 1: p863-87

storage capacity (geology and soil type). Climate change can negatively impact on freshwater ecosystems by changing streamflow and water quality.

Mean annual temperatures in Ireland have increased by 0.7°C over the past century (Figure 7)<sup>62</sup>. Winter rainfall is projected to increase by 10% with summer reductions of 12%-17% with the most extreme reductions in the south and east<sup>63</sup>. Changes in the frequency of extreme events is also to be expected. Hydrological modelling shows that catchments dependent on groundwater are most vulnerable to longer soil moisture deficits; slower groundwater recharge; and increased risk of drought when a dry summer follows a dry winter. In catchments where surface run-off is more dominant changes in summer flow levels are more pronounced. Significant changes in stream flows are also projected with up to 20% increases in springtime and significant reductions in summer and autumn<sup>63</sup>.

In terms of high flows, the 10-year flood is expected to become a 3-7 year event<sup>63</sup>. Increases in the magnitude and frequency of flood events are likely to impact on water quality. Flooding increases sedimentation and suspended loads that are problematic for aquatic life and can overwhelm foul sewer systems and the effective functioning of water treatment plants adding suspended solids and nutrient loads to rivers.

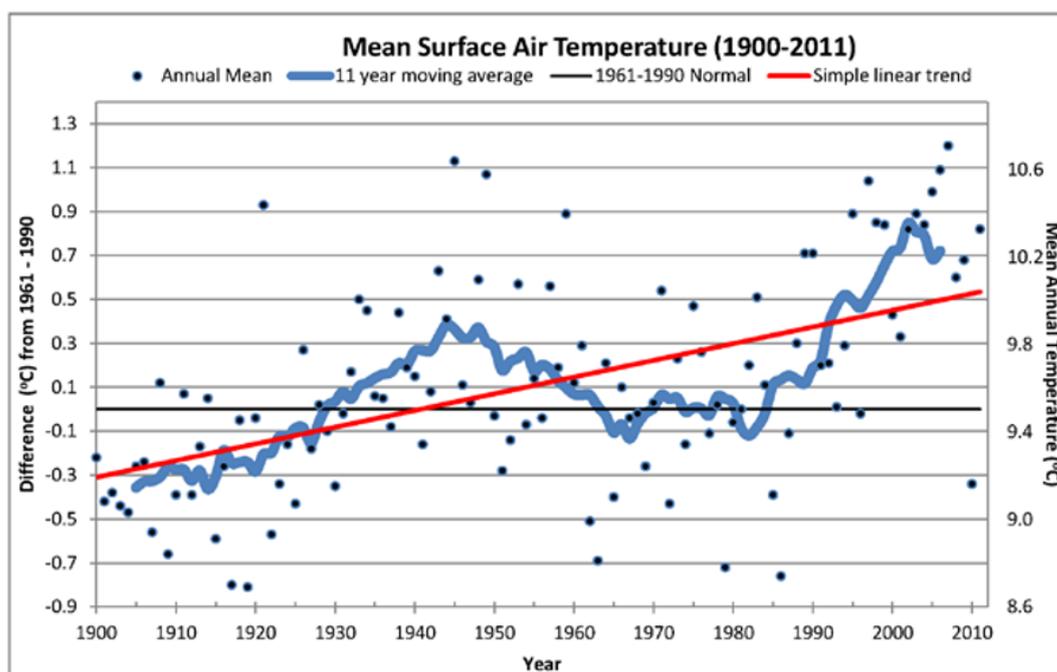


Figure 7: Annual mean surface air temperature (1900-2011)<sup>62</sup>

<sup>62</sup> Dwyer, N. (2012). The status of Ireland's Climate, 2012. Report for the Environmental Protection Agency of Ireland, Wexford, Ireland.

<http://www.epa.ie/pubs/reports/research/climate/CCRP26%20-%20Status%20of%20Ireland%27s%20Climate%202012.pdf>

<sup>63</sup> Sweeney, J et al. 2001 Climate Change, Refining the impacts for Ireland

Climate change is projected to reduce raw water quality, posing risks to drinking water quality even with conventional treatment<sup>64</sup>. The sources of the risks are increased temperature, increases in sediment, nutrient and pollutant loadings due to heavy rainfall, reduced dilution of pollutants during droughts, and disruption of treatment facilities during floods<sup>64</sup>. Anthropogenic impacts such as increased abstractions and wastewater discharges also put further stress on the system particularly in low flow conditions.

Predicted changes in flow levels and regional variations in water availability and demand poses challenges for the management of water resources in particular matching supply and demand across the island. The Greater Dublin area is the most susceptible to drier conditions in the future yet has the greatest projected anthropogenic demands owing to projected population growth.

Drought management is an essential element of water resource policy and strategies. Drought management plans, based on the characterisation of possible droughts in a catchment, their effect, and possible mitigation measures, should be prepared on a river catchment scale and before emergency schemes need to be applied. Drought management plans, by promoting sustainable water use, are closely linked with the WFD objectives.

Land management and land use planning are essential to the management of water resources in water-scarce areas. Important wetlands, which help to store water, have been degraded or destroyed. One priority should be to retain rainwater where it falls, enabling water infiltration through the re-establishment of wetlands and the increased recharge of aquifers.

## Temperature

Rising water temperatures will affect aquatic habitats and cause species migrations. Cold water fish species such as salmon and trout are particularly susceptible to increasing water temperatures. Water temperature is an important factor in determining whether a body of water is also acceptable for human consumption and use:

- The temperature in water governs the kinds and types of aquatic life that live in it.
- Temperature influences the rate of chemical and biological reactions.
- It affects the dissolved oxygen levels in water, photosynthesis of aquatic plants, metabolic rates of aquatic organisms, and the sensitivity of these organisms to pollution, parasites, and disease.

### Temperature and drinking water

The temperature of drinking water is largely determined by the raw water source or by the depth of the intake. Rates of chemical reaction increase with increasing temperature. The relative

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<sup>64</sup> Jiminez Cisneros, B.E., Oki, T.E., Arnell, N.W., Benito, G., Cogley, P., Doll, P., Jiang, T. and Mwakilila, S.S. (2014). Freshwater resources. In: Climate Change 2014: Impacts, Adaptation and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. [http://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap3\\_FINAL.pdf](http://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap3_FINAL.pdf)

concentrations of reactants and products in chemical equilibria can also change with temperature<sup>65</sup>. Increasing water temperature will also increase the vapour pressure of trace volatiles in drinking water and can lead to increased odour which can be unpalatable for consumers. Micro-fungi can grow inside plumbing systems of buildings, leading to musty or mouldy tastes if the temperature rises above 16°C. Temperature therefore can affect every aspect of the treatment and delivery of potable water.

The viscosity of water decreases with increasing temperature so the rate of sedimentation increases. Warm water stratifies over cooler water such that a small increase in temperature <1°C in raw water can decrease the efficiency of the flocculation-sedimentation process in treatment. Studies have also found that the rate of chloroform formation in raw water treated with chlorine doubled at higher temperatures and the rate of trihalomethane formation increases at higher temperatures.

### Temperature and water quality

Climate change impacts how much water is available in the water cycle to refill lakes and rivers. Increased temperature increases evaporation of surface water and a warmer atmosphere can hold more moisture. This can cause lower water levels in some areas in summertime and enhanced precipitation during warmer winters and projections for Ireland are for warmer, dryer summers and warmer wetter winters<sup>66</sup>.

Temperature is a critical water quality parameter as it regulates the dissolved oxygen concentrations in aquatic environments. Organisms within ecosystems have preferred temperature regimes that change as a function of season, organism age and life cycle and other environmental factors<sup>67</sup>.

Higher water temperatures can impact on metabolic and chemical reactions. The physical features of a stream impacts on water temperature such as vegetation cover and physical aspects like channel width and land use (such as urban runoff) with increasing water temperature most impactful during low flow conditions.

Temperature impacts on lakes and reservoirs with lower dissolved oxygen coupled with nutrient concentrations often leading to algal blooms. In summer the top of the lake becomes warmer than lower layers, leading to thermal stratification that can result in anoxic conditions in the bottom layers. As seasons change, when the surface water cools and becomes denser, it sinks placing stress on biological communities within the water body.

Between 1973 and 2014, the annual minimum lake surface temperature across eight European Lakes (including Lough Feeagh, County Mayo) has increased at an average rate of +0.35 °C per decade<sup>68</sup>. The

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<sup>65</sup> <https://www.safewater.org/fact-sheets-1/2018/8/15/water-temperature-fact-sheet>

<sup>66</sup> O'Dwyer et. al., 2017. The Development of Irish Climate Information Platform ICIP Phase 3 2015-2017 EPA Report 258 [http://www.epa.ie/pubs/reports/research/climate/Research\\_Report\\_258.pdf](http://www.epa.ie/pubs/reports/research/climate/Research_Report_258.pdf)

<sup>67</sup> <https://www.water-research.net/index.php/stream-water-quality-importance-of-temperature>

<sup>68</sup> Woolway, R.I. et al. (2019). Substantial increase in minimum lake surface temperatures under climate change. *Climatic Change*. <https://doi.org/10.1007/s10584-019-02465-y>

drought period between May-July 2018 was bisected by Storm Hector in late June 2018. The storm quickly and abruptly altered the temperature depth profile of Lough Feeagh, before the lake restabilised following the storm. The changes in lake physics as a result of these two extreme climate events had a significant impact on the lake ecology, highlighting the importance of temperature in aquatic systems and the implications of future climate change<sup>69</sup>.

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<sup>69</sup> Caldero-Pascual, M. (2020). Effects of consecutive extreme weather events on a temperate dystrophic lake: A detailed insight into physical, chemical and biological response. *Water* 12: 1411.