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Kelly, C., Ellis, G., & Flannery, W. (2019). Unravelling Persistent Problems to Transformative Marine Governance. *Frontiers in Marine Science*, 6, [213]. <https://doi.org/10.3389/fmars.2019.00213>

Published in:
Frontiers in Marine Science

Document Version:
Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

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Unravelling Persistent Problems to Transformative Marine Governance

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Specialty section:

This article was submitted to
Marine Affairs and Policy,
a section of the journal
Frontiers in Marine Science

Received: 26 November 2018

Accepted: 04 April 2019

Published: 24 April 2019

Citation:

Kelly C, Ellis G and Flannery W
(2019) Unravelling Persistent
Problems to Transformative Marine
Governance. *Front. Mar. Sci.* 6:213.
doi: 10.3389/fmars.2019.00213

Coasts are dynamic socio-ecological systems, subject to increasing anthropogenic pressures that present complex challenges for the design of effective coastal and marine governance systems. There are many contributing factors to the unsustainability of the marine environment, including weak governance arrangements. Typically, the management of coastal and marine ecosystems is undertaken in a fragmented way, with responsibilities dispersed across a number of bodies. 'Integrated management' is often proposed in normative approaches to marine management as a mechanism for securing more sustainable outcomes. The implementation of integrated management, however, tends to occur within existing governance structures and fails to address deep-rooted issues such as path dependency, institutional inertia, and policy layering. These barriers to transformative marine governance are re-framed in this paper as 'persistent problems' which inhibit more holistic approaches to achieve effective integrated management. Using insights from two Irish case studies to show how the implementation of innovative local initiatives for sustainable coastal and marine management are constrained by persistent institutional problems, it is concluded that an alternative management paradigm is required to understand and address the complexities involved in the design and delivery of an integrated management regime.

Keywords: coastal management, marine governance, integration, coastal transitions, persistent problems, Ireland

INTRODUCTION

Ineffective governance of estuarine, coastal, and marine resources is leading to over-exploitation, habitat destruction, and species loss (Elliott, 2013; Pinto et al., 2014; EPA, 2016; European Environment Agency [EEA], 2017). Sectoral and fragmented governance approaches are ill-suited to managing the complex interrelationships among human activities and ecosystem components. Integrated management practices, such as ICZM, MSP, and EBM, are regularly advanced as longstanding issues that have arisen from previous approaches (e.g., Kidd and Shaw, 2007; Leslie and McLeod, 2007; Ehler and Douvere, 2009; O'Hagan and Ballinger, 2010; Van Tatenhove, 2011; Portman et al., 2012; Elliott, 2013). By facilitating a transition from sectoral to more

Abbreviations: AA, appropriate assessment; DAFM, Department of Agriculture, Food and the Marine; DCCAE, Department of Communications, Climate Action and Environment; DHPLG, Department of Housing, Planning and Local Government; EBM, ecosystem-based management; EEZ, Exclusive Economic Zone; EIA, environmental impact assessment; EMRA, Eastern and Midland Regional Assembly; EPA, Environmental Protection Agency; EU, European Union; HOOW, Harnessing Our Ocean Wealth – An Integrated Marine Plan for Ireland; ICZM, integrated coastal zone management; MSP, marine/maritime spatial planning; NGO, non-governmental organisation; NPWS, National Parks and Wildlife Service; SEA, strategic environmental assessment; SIFP, strategic integrated framework plan; SMF, strategic management framework.

holistic governance regimes, such innovative practices have the potential to transform coastal and marine governance. Yet, even these are often seen in narrow terms and constructed as end-goals themselves, rather than serving to address deep structural and institutional issues that make regimes resistant to change (Kelly et al., 2018a), or to the unintended consequences that might arise through the governance transformation process (Blythe et al., 2018).

Despite the potential of these integrated approaches, current implementation processes appear to be ineffective for addressing some of the very problems they were established to address, such as, conflicting objectives, ‘silo-thinking,’ and power imbalances, diluting their transformative capacity (Johnson et al., 2012; Flannery et al., 2016; Jones et al., 2016; Jentoft, 2017; Smith, 2018). These have been identified for why ICZM has failed to live up to expectations in the EU, with vested interests and political influence weakening policy commitments arising from EU recommendations, and innovative practices failing to take hold due to short-lived financial support (Falaleeva et al., 2009; O’Hagan and Ballinger, 2010). EBM approaches have also struggled to deal with the complexities of coastal and marine management, due to a “perceived lack of knowledge, conflicting interests, lack of organisational/legal framework, and lack of communication” (Leslie and McLeod, 2007; Marshak et al., 2016, p. 5). Similarly, recent evaluations of MSP suggest that it has been hampered by “power, exclusion and antagonism” (Tafon, 2017, p. 7), prioritisation of economic growth over environmental and social objectives (Qiu and Jones, 2013; Domínguez-Tejo et al., 2016; Jones et al., 2016), and tokenistic participation (Lieberknecht and Jones, 2016; Flannery et al., 2018).

The EU Maritime Spatial Planning (MSP) Directive is a legislative act for all EU member states to follow European Commission (2014). Specifically, it establishes a MSP framework aimed at promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources. However, it is up to the individual Member States to ‘remain responsible and competent for designing and determining, within their marine waters, the format and content of such plans, including institutional arrangements and, where applicable, any apportionment of maritime space to different activities and uses, respectively’ (MSP Directive, L 257/136). In this context, the MSP Directive does not specify or provide guidance on how Member States develop their own MSP systems. Consequently, different jurisdictions have designed their own unique arrangements for marine governance with some being more innovative than others, i.e., designing distinct primary legislation, establishing new organisations, developing new spatially specific policies, investing in resources including multi-disciplinary skill sets and encouraging a change in behaviour, culture, and practice. In Ireland, the transposition of the MSP Directive has been through revisions to the Irish planning system under the *Planning and Development (Amendment) Act 2018*.

Recent assertions that MSP is failing to achieve integration are unsurprising given that the MSP Directive poses a risk of further fragmentation by failing to address integration with the coastal zone, i.e., land/sea interface. For example, the MSP Directive specifies that the legislation shall only apply to marine

waters and not apply to coastal waters or parts thereof falling under a Member State’s town and country planning. This omission of ICZM may have negative implications for Irish estuarine and coastal environments given that this is where many activities overlap creating environmental pressures (Meiner, 2010) and their management currently operates within a policy vacuum (O’Hagan and Ballinger, 2010).

We argue here that there is a need to understand the ‘persistent problems’ that repeatedly undermine transformative marine governance. Persistent problems may be regarded as the governance equivalent of Rittel and Webber (1973) ‘wicked problems’ as they are deeply embedded in societal structures and institutions (Rotmans and Loorbach, 2010), which cannot be solved by simply adopting new policies, but require more innovative approaches to governance reform (Verbong and Loorbach, 2012). Persistent problems arise from system structures that have evolved over decades and cannot be adjusted by market or current policies alone; instead, they require the application of radical and innovative societal governance approaches (Verbong and Loorbach, 2012). Reframing the challenges of sustainable marine management as ‘persistent problems’ facilitates a more critical understanding of how novel marine management initiatives have not resulted in more effective outcomes and highlights the need for more radical conceptualisation of how we should transform coastal and marine governance. This paper focusses on the challenges of ‘integrated’ management in the marine environment, which is a common normative goal of contemporary coastal and marine governance reform and, therefore, provides a useful heuristic for exploring common persistent problems. By asking *Can an ‘ideal’ type of integrated management address longstanding problems of fragmented governance?* We start to unravel more deep-rooted, unresolved and recurring problems which have manifested and continue to inhibit a transformation in marine governance.

In the next section, we outline current integrated management concepts, common implementation challenges and argue that these emerge from a failure to adequately respond to persistent problems. Section “Study Area and Methodology” describes our methodological approach and provides a context for our empirical findings from the Republic of Ireland. Section “Persistent Problems and the Failure to Transition to Integrated Management in Ireland” discusses barriers to effective implementation of integrated management in Ireland. Our analysis raises questions about the implementation of contemporary management approaches within prevailing governance arrangements, which often fail to address these underlying problems. The paper concludes with a call for the development of alternative management and research paradigms which can address persistent problems and instigate transformative marine governance.

INTEGRATED MARINE MANAGEMENT AND PERSISTENT PROBLEMS

‘Integration’ is regularly used as a normative – and perhaps naïve – concept in environmental management, often used to signify more effective, holistic, efficient and sustainable

approaches. However, ‘integration’ is often proposed with a lack of critical reflection of what exactly is being ‘integrated,’ and what is being left unchallenged (Portman, 2011). The term ‘integration’ is used widely, but loosely, in ocean management, and the complex societal and political aspects of its implementation are often overlooked (Grip, 2016). For instance, ‘integration’ and its related terms¹ have positive connotations of completeness and impartiality (Scrase and Sheate, 2002), yet is mostly understood in relation to its opposite (i.e., by being non-fragmented) and, as such, poorly specified when applied to coastal and marine management.

‘Integration’ is used as the normative objective for a number of processes, which are often bundled together with poor appreciation of the complex socio-political and institutional context in which they take place. There are, for example, calls for ‘sectoral integration,’ which would facilitate the knitting together of policies covering different resources (e.g., fishing and minerals); ‘territorial integration,’ which aims to harmonise management of different administrative areas or across the land–sea boundary (Smith et al., 2011; Van Tatenhove, 2011); and organisational integration which is expected to address the complex coastal and marine administrative and organisational structures that evolved with marine governance regimes (Boyes and Elliott, 2014, 2015; Grip, 2016). Effectively undertaking these integrative processes, however, requires complex socio-political and institutional re-ordering, including: the reconstitution of policy sectors and organisations; reformatting and reorganising environmental and socio-economic data; broadening the range of stakeholders engaging with management processes; undoing established methodologies and decision-making processes; and in some cases challenging entrenched cultural behaviours and the framing of ‘conventional wisdom.’

Instigating such wide ranging transformations in the pursuit of integration is a “methodological and value-laden process” (Fidélis and Carvalho, 2014, p. 1175) and needs to be implemented through system-wide processes (Kelly et al., 2018b). Marine governance reform, however, is seldom undertaken in such a systematic manner, with new management approaches usually being implemented within current regimes. Consequently, many of the issues that stimulate calls for integrated management, such as fragmentation, are not addressed within new integrated initiatives due to the stickiness of existing regimes and the failure to address issues through system-wide transformation processes (Kelly et al., 2018a). The *ad hoc* implementation approach means that the shift to new governance arrangements often fails to address persistent problems within existing structures which, ultimately, hampers attempts to instigate transformative governance change.

Persistent problems are characterised by: “significant complexity, structural uncertainty, high stakes for a diversity of stakeholders involved, and governance problems” (van der Brugge et al., 2005, p. 165). They have multiple causes and consequences covering several societal domains and are rooted

in societal structures and institutions making them difficult to overcome without a system-wide approach. They consist of features that represent strongholds of the current system that systemically reproduce negative side effects of that system, i.e., an enduring problem, *in combination* with the features and mechanisms causing reproduction (Schuitmaker, 2012). For instance, systemic or institutional reform can also produce risks and side effects. For example, path dependency and institutional inertia are two persistent problems which undermine efforts to transition to new governance arrangements.

Path dependency relates to processes through which options about future management directions are selected on the basis of those that most closely resemble “existing practice or previous choices” (Kirk et al., 2007, p. 252). Path dependency means that new integrated coastal and marine management initiatives are made to fit with past decisions and existing institutional frameworks. Within new initiatives, fragmentation continues due to institutional and policy ‘layering.’ These forms of layering describe “gradual institutional transformation through a process in which new elements are attached to existing institutions and so gradually change their status and structure” (Van der Heijden, 2011, p. 9). Path dependency and institutional and policy layering represent persistent problems that are deeply entrenched in institutional arrangements, making it increasingly difficult to challenge the ‘business as usual’ or ‘*status quo*’ approach that often prevails. These issues result in system ‘lock-in’ with inherent flaws being transmitted into the ‘transformed’ regime.

Due to these forms of system lock-in, new integrated initiatives are often layered on top of existing policies, practices, and institutions without considering broader consequences and often systematically reproduce the issues they seek to resolve. Many governance ‘transformations’ to facilitate coastal and marine management do not materialise from a critical and holistic appreciation of the key limitations of *ad hoc* incremental integration. Rather, such governance reforms are often the result of unchallenged conventions and improvisations, which are routinely reproduced to create path dependencies that impose limitations on future decisions. These limitations means that other issues emerge as a result of systemically reproduced negative side effects of the incumbent system and become irresolvable or accepted as part of the *status quo*. These include, *inter alia*: failure to address conflicting priorities; uncertainty of resources; bounded rationality; inability to address complexity; deficient stakeholder engagement; and inability to tackle demands of vested interests.

While these problems could *possibly* be overcome through conventional policy approaches, efforts to do so are inevitably stymied by persistent problems. For example, path dependency often constrains the fundamental institutional restructuring necessary to introduce legislative, economic and cultural changes needed to address conflicting management priorities, as, once regimes are locked into a particular path, it requires a significant effort to re-route them on to another path (Greener, 2005). The intertwined complexity between persistent problems and issues which *should* be resolved through the adoption of integrated management approaches, means that fragmented governance

¹These include ‘joined up,’ ‘holistic,’ ‘co-ordinated,’ ‘interrelated,’ ‘balanced’ as well as ‘comprehensive’ and ‘integrative’ with a focus on ‘connectiveness’ and ‘relations.’ See Healey (2006) and Mitchell (2005).

arrangements and the sub-optimal management of marine resources often endure after governance regimes have been 'transformed.' Marine governance reform must, therefore, be conducted in a manner which allows for persistent problems to be identified and addressed.

STUDY AREA AND METHODOLOGY

Ireland was selected as a study site for this research as, like many other European coastal states, it has a range of expanding maritime sectors (Vega and Hynes, 2017) and has recently introduced a number of integrated management policies and initiatives. In Ireland, there are at least 34 different government departments, agencies, and bodies with responsibility for estuarine, coastal, and marine management across different territorial scales (Kelly, 2017). This level of fragmentation has, more or less, persisted, despite EU drivers to instigate integrated approaches and local-level governance innovations. Our study examines the persistent problems that undermined these integration efforts, and highlights how failing to address persistent problems reproduces the issues integrated management should address.

The research design draws on Schuitmaker (2012) framework for identifying persistent problems, which combines historically informed system analysis with actor-guided system analysis. Our study included: (a) mapping and analysing the development of integrated marine policy, legislation and governance arrangements at national and local levels through the development of an Irish 'horrendogram' and 'organogram' (see **Supplementary Material**); and (b) engaging with local actors to analyse and evaluate local governance innovations within two in-depth case study areas: the Shannon Estuary and Dublin Bay.

Our case studies focused on the development of an integrated management framework for each area. Both case study areas are multi-functional, with the waters and adjoining lands supporting a range of uses and activities, managed by a plethora of government departments and agencies. In 2013, the SIFP was developed for the Shannon Estuary. The SIFP sets out an integrated marine and land use planning strategy. The SIFP was overseen by a multi-agency Steering Group² comprising local councils and other key estuary stakeholders.

This contrasts with the other case study, where there is no organisation with sole responsibility for Dublin Bay and there is no integrated plan for the bay area. This case study instead focuses on the work carried out by the EMRA in association with the Celtic Seas Partnership³ to develop a SMF for Dublin Bay. Both case study initiatives represent typical attempts at transforming coastal and marine governance through

incremental reform, rather than deeper regime change, and afford an opportunity to evaluate persistent problems that undermine governance transformation, with high potential for transferable insights.

A detailed historical review of relevant legislation and policy relating to coastal and marine management in Ireland was conducted, including an examination of international, European and the current national planning and policy frameworks in Ireland including: proposed legislative and regulatory changes; emerging MSP processes; and recent innovative practices in coastal and marine management in the Shannon Estuary and Dublin Bay. Interviews and stakeholder workshops were conducted as part of this research to facilitate actor-guided analysis of attempts to instigate integrated management in each area. Relevant individuals and organisations were invited to participate using a snowball-sampling technique. Snowball sampling is a non-probability sample which uses recommendations from a small group of informed participants to identify people who are relevant to the research as primary data sources (Bryman, 2012). This is particularly useful when potential stakeholders are difficult to identify, such as in the marine environment, where stakeholders are wide-ranging. It is also a cost effective and efficient means of identifying stakeholders within a limited project timeframe. Snowball sampling can, however, result in shortcomings such as oversampling of a particular group resulting in bias. With snowball sampling, there is no guarantee of the representative of samples and it may not be possible to determine the sampling error and make statistical inferences due to the absence of random selection of samples. These shortcomings were addressed, however, through triangulation, reflexivity, peer review by a research Steering Group, an audit trail through publication of research working papers and peer debriefing. These procedures addressed any issue of trustworthiness or credibility (Lincoln and Guba, 1985). The research Steering Group was established during the initial start-up phase and consisted of key users of the research including representatives from a range of estuary and marine sectors such as the Department of Transport, Tourism and Sport (DTTS), the EPA, the Marine Institute, the regional assemblies, local authorities and a national non-governmental organisation. The group met on a bi-annual basis to review progress of the research against its objectives and provided advice on the implementation issues. The group was also instrumental as a gatekeeper in identifying and providing access to key stakeholders to be involved in the research.

The research team arranged and conducted a workshop in each of the case study areas during the summer of 2015. These were attended by fifty eight stakeholders from a range of backgrounds including: government departments; local authorities; environmental, energy, fishing, transport, and agricultural agencies; NGOs; local industry and business; and local community associations. A summary of the organisations represented is included in **Table 1**.

The workshops were designed around a range of innovative tasks which involved stakeholders discussing how local initiatives were formed, what were the aims and objectives, who was

²SIFP Steering Group members: Clare County Council (lead authority); Kerry County Council; Limerick County and City Council; Southern Regional Assembly; Department of the Environment, Community and Local Government (DHPCLG); Shannon Group PLC (formerly Shannon Development); Shannon Foynes Port Company; National Parks and Wildlife Service; Marine Institute; Environmental Protection Agency; Office of Public Works; National Monuments Service; Limerick Clare Energy Agency; Inland Fisheries Ireland; EirGrid; Shannon Airport Authority; Shannon International River Basin District Project.

³<http://celticseaspartnership.eu/>

TABLE 1 | Summary of workshop attendees by organisation (number of participants in brackets).

Shannon Estuary workshop attendance – 25/06/2015	Dublin Bay stakeholder workshop – 09/09/2015
ADCO – Archaeological and Diving Company Ltd. (1)	Department of Housing, Planning and Local Government (2)
Bord Iascaigh Mhara – Ireland's Seafood Development Agency (1)	Department of Transport, Tourism and Sport (1)
Celtic Seas Partnership in Dublin Bay (1)	Dublin City Council (2)
Clare County Council (3)	Eastern and Midland Regional Assembly (3)
Department of Agriculture, Food and the Marine (1)	Electricity Supply Board (1)
Environmental Protection Agency, Ireland (4)	Environmental Protection Agency, Ireland (1)
Galway-Mayo Institute of Technology (1)	Fingal County Council (1)
Geologist/local citizen (1)	Howth Fishery Harbour (1)
GKinetic Energy Ltd. – local industry (1)	Irish Water (1)
Kerry County Council (1)	Local Councillors – Dublin Bay region (2)
Limerick City and County Council (2)	Marine Institute (1)
Local Community Development Committee/Environmental Pillar (1)	Natura Consultants (1)
National Parks and Wildlife Service (1)	Queen's University Belfast (5)
Office of Public Works (1)	Sustainable Water Network Ireland (1)
Oyster Farmer/local citizen (1)	Trinity College Dublin (1)
Queen's University Belfast (5)	
River Shannon Protection Alliance (2)	
RUSAL Aughinish – local industry (1)	
Shannon Airport (1)	
Shannon Foynes Port Company (1)	
Southern Regional Assembly (1)	
Southern Waste Region (1)	
University of Liverpool (1)	

involved, who made decisions within the initiatives, which aspects were successful and which needed improvements. Participatory workshop techniques included briefing and plenary sessions and interactive exercises comprising backcasting and scenario development. Through facilitated round-table discussions and tasks, stakeholders were given the opportunity to consider and reflect on local management arrangements and to consider how it might be possible to achieve integration over the long term. All data collated were arranged into digital files. Interview recordings were transcribed verbatim and stored as text files. Detailed workshop notes were also saved as text files. All data were analysed using the software, Atlas TI. Qualitative codes were manually assigned to selected texts and then categorised, sub-categorised and organised into themes to provide the basis for a theoretical understanding of the data (Bryman, 2012). Analytic memos were composed to capture thoughts regarding the different codes and themes. An 'analytic memo' is similar to a code but usually contains longer passages of text and has been compared to a researcher journal entry or blog (Saldaña, 2016). The coding, use of themes and analytic memo writing were important activities in the recognition of a pattern system and in the understanding and development of a sense of conceptual and/or theoretical organisation. This was necessary to interpret the large volume of data collated from the different sources and link to key themes, i.e., governance barriers. The identification of these themes are illustrated below by stakeholder quotes retrieved from the primary documents.

PERSISTENT PROBLEMS AND THE FAILURE TO TRANSITION TO INTEGRATED MANAGEMENT IN IRELAND

The findings from: the review of current literature, mapping; analysis of integrated marine policy, legislation and governance arrangements proposed national-level policy innovations; and from the local case studies highlight how persistent problems impeded the implementation of an integrated management approach in Ireland. Findings from the analyses are combined under the following themes, which emerged from the transcripts: path dependency; institutional inertia and policy layering; conflicting sectoral priorities; uncertainty of resources and bounded rationality; failure to understand complexity; and deficient stakeholder engagement and obstructive vested interests.

Path Dependency

In *Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland* (Marine Coordination Group, 2012) the government highlighted the need to transition to an integrated management approach. Reflecting path dependent decision-making, recent legislative interventions have, however, failed to address the issue of fragmented governance. For example, the Irish Government has proposed legislative changes under the *General Scheme of Maritime Area and Foreshore (Amendment) Bill 2013* with the overall aim of ensuring development applications

are considered in a streamlined manner. As such, the Bill presents an opportunity to address the current fragmented approach in Ireland through innovative re-structuring of consenting procedures. However, if this Bill is enacted, it will entrench a number of proposals that will reproduce discrete sectoral approaches.

Rather than streamline consenting, under the Bill, marine planning and licensing competencies will continue to be spread across a number of government departments and agencies (see **Table 2**), with four government departments still sharing responsibility for marine consenting.

Furthermore, the Bill proposes to create a new nearshore area in which development not considered 'strategic infrastructure' or requiring an EIA⁴ or AA⁵ would come within the remit of local planning authorities. New decision making responsibilities would also be assigned to An Bord Pleanála (the Planning Appeals Board) for developments classed as 'strategic infrastructure' and/or subject to EIA/AA within this nearshore area as well as developments beyond the nearshore, i.e., within the foreshore, EEZ and continental shelf. These proposed legislative changes reflect path dependency where incremental changes are made to previous arrangements.

Both stakeholder workshops emphasised how existing governance structures tend to foster 'silo-thinking' in terms of problem identification and capacity to offer holistic responses. The term 'silo effect' denotes those conditions in which management is fragmented among sectors and institutions with little attention to conflicts or complementarities among social, economic, and environmental objectives (Mitchell, 2005; Holden, 2012). The proposed changes under this Bill are unlikely to address these issues. As highlighted by one stakeholder, government department staff were already finding it difficult to work holistically within their own specialised organisations:

It's hard enough to send it [management framework] around the silos in one organisation. ... I said, 'But they are all in your Ministry?' and they said, 'Oh yeah, I'm in the same division of the planning people and I don't know their names and they don't know mine.' It becomes a thing of coordination and about integration and they are easy words to say and harder words to achieve (Stakeholder No. 1).

Path dependency also characterises efforts to address fragmentation within the local case study initiatives. For example, the SIFP was developed within the current fragmented framework and, as a result, is limited to the management of marine-related land uses under the responsibility of the relevant local authorities above the mean high water mark

⁴Environmental Impact Assessment (EIA) Directive (85/337/EEC) codified and amended Directive (2014/52/EU) requires an EIA and a public consultation document, an Environmental Impact Statement (EIS) to be submitted for certain projects considered likely to have a significant impact on the environment. Annexes I and II of the Directive specify the type of projects which require EIA. Examples include oil and gas pipelines, harbour and port construction, marinas, intensive fish farming, offshore renewables.

⁵Article 6(3) of the EC Habitats Directive (92/43/EEC) requires that any plan (or project), which is not directly connected with or necessary to the management of a European site, but would be likely to have a significant effect on such a site, either individually or in combination with other plans or projects, shall be subject to an 'appropriate assessment' of its implications for the European site in view of the site's conservation objectives.

(MHW). The estuary below the MHW will, however, continue to be regulated by various statutory agencies, including: DHPLG; DCCAE; DAFM; EPA; Marine Institute; and Shannon Foynes Port Company.

It could be argued that although marine and coastal competencies remained fragmented in the Shannon, the development of the SIFP created a structure for collaborative governance. However, according to workshop participants, the negative impacts of fragmented governance were still present under the new governance arrangements. Some workshop participants felt that the different organisations were still working separately:

It's amazing – there's so many different people have little bits of information but there is no actually joined up picture of what happens (Stakeholder No. 2).

The endurance of fragmented governance arrangements at both national and local levels is a result of path dependency. Path dependent decision-making results in system 'lock-in' where problematic elements, such as structures and roles, get embedded in the system, making it harder to implement transformative change and the *status quo* largely remains intact. While 'integration' is advanced as a normative policy goal for Ireland, the path dependent nature of marine policy and legislation development means that little has been done to address the underlying fragmented regime. By constraining policy and legislative innovations to fit within the existing fragmented regime, the culture of 'silo thinking' continues to hamper the holistic management of coastal and marine resources.

Institutional Inertia and Policy Layering

The obligation to implement MSP in line with EU Directives afforded the Irish government another opportunity to reformat marine governance in Ireland. The Irish Government first transposed the MSP Directive through the adoption of the *European Union (Framework for Maritime Spatial Planning) Regulations 2016* [MSP Regulations] (Department of Environment Community and Local Government [DECLG], 2016). However, the MSP Regulations did not address longstanding fragmentation issues and MSP has been introduced to the Irish marine governance regime through policy layering. Under the new regulations, no new MSP body has been established, instead MSP will be delivered by the DHPLG with assistance from the Marine Institute with marine licensing, enforcement, and conservation management remaining the responsibility of a range of government departments, as outlined in **Table 2**.

This 'institutional and policy layering' approach is further entrenched in primary planning legislation which was amended to address a number of issues, including the introduction of MSP. Institutional and policy layering is a process of gradual transformation in which new elements are attached or added on to existing institutions and legislation (Van der Heijden, 2011). As part of revisions to the Irish planning system under the *Planning and Development (Amendment) Act 2018*, provisions were included for the adoption of a Marine Spatial Plan (Government of Ireland, 2018). These provisions, which

TABLE 2 | Overview of current and proposed marine consents and licensing arrangements in Ireland.

Current consenting responsibilities in accordance with Foreshore Acts 1933 and Planning and Development Acts 2000		Proposed consenting responsibilities under Draft Maritime and Foreshore Amendment Bill 2013	
Department/agency	Functions/responsibilities	Department/agency	Functions/responsibilities
Agriculture, Food and the Marine	<ul style="list-style-type: none"> ● Sea fisheries policy and management ● Fishery harbours ● Aquaculture licensing 	Agriculture, Food and the Marine	<ul style="list-style-type: none"> ● Sea fisheries policy and management ● Aquaculture
Culture, Heritage and the Gaeltacht	<ul style="list-style-type: none"> ● Nature conservation – European sites 	Culture, Heritage and the Gaeltacht	Licence may be required from NPWS to disturb or interfere with protected plant and animal species under Habitats Directive (in addition to planning consent)
Communications, Climate Action and Environment	<ul style="list-style-type: none"> ● Petroleum exploration and development ● Offshore renewable energy ● Offshore gas storage ● National oil reserves ● Energy interconnectors (electricity/gas) ● International telecoms cables ● Pollutant Release and Transfer Protocol ● Dredging/dumping at sea 	Communications, Climate Action and Environment (Formerly Communications, Energy and Natural Resources)	<ul style="list-style-type: none"> ● Petroleum exploration or prospecting (not development) ● Maintenance dredging and dumping at sea (EPA) ● Offshore natural gas storage (maritime option)
Housing, Planning and Local Government	<ul style="list-style-type: none"> ● Maritime spatial planning (MSP) ● Marine environment/MSFD ● Shellfish waters ● Marine protected areas (MPAs) ● Dredging/dumping at sea (DHPLG/EPA) ● Terrestrial planning ● Foreshore consenting for developments with land connection 	Housing, Planning and Local Government (formerly Environment, Community and Local Government)	<ul style="list-style-type: none"> ● Petroleum production (ABP) ● Strategic Infrastructure (ABP), e.g., extractive industries, new port development, renewable energy projects ● Developments subject to EIA/AA (ABP), e.g., marina developments ● Developments beyond the outer limit of the foreshore (ABP) ● Developments located beyond the nearshore area (ABP) ● Planning permission for developments within the nearshore but not subject to EIA/AA or classed as Strategic Infrastructure (CLA) ● Developments subject to S. 225 of the Planning and Development Act, e.g., pier and marina developments ● Shellfish waters designation ● MPAs designation

ultimately revoked the MSP Regulations, assign the DHPLG as competent authority for delivering MSP; determine the statutory requirements of MSP and the marine plan-making process, i.e., the inclusion of MSP objectives, public participation as well as presenting the draft marine plan to Parliament for approval; and compliance by public bodies. There are no provisions in the Planning Acts for marine licensing and consents, enforcement or for the designation of marine protection areas. Responsibility for these matters will remain spread across a number of government departments and agencies.

The addition of MSP to the primary Planning Act is further evidence of institutional and policy layering wherein changes are simply stitched onto amendments from previous layered changes (i.e., the introduction of MSP regulations), thus preserving much of the core (Thelen, 2003), instigating incremental rather than

transformative change through ‘layering of layering’ and failing to address underlying fragmentation issues.

A sectoral approach focuses on achieving specific aims within an established policy field, corresponding to certain institutional responsibilities of individual government departments. Sectoral policy tends to be: short-term; aspect specific; involving a limited number of actors; specific to one-scale level and one sector; and aimed at gradual change (van der Brugge et al., 2005). While this approach may be appropriate in achieving visible short-term gains, it is not fit for purpose when dealing with complex environmental and socio-economic problems over the longer term which require a more integrated approach to management (Rotmans et al., 2001). Integration focuses on the longer term using a holistic approach to management, involving multi-actors, multi-sectors and multi-levels. Sectoral

approaches have long been criticised in areas of environmental resource management for being inefficient as they result in competing and contradictory objectives and duplication of effort (Cairns, 1991; Kidd and Shaw, 2007; Stead and Meijers, 2009; Holden, 2012). They are ineffective as they ignore the complexity of interaction between human activities and the environment, and fail to recognise the potential synergy between different activities, particularly in an increasingly crowded marine environment (Mitchell, 2005; Crowder et al., 2006; De Jonge, 2007). While the need for better policy integration is not new, implementation, however, has clearly been a challenge, particularly in relation to the management of coastal marine waters where there is a growing concern that achieving good status, or higher by 2027 is a long way from being realised in many countries (Carvalho et al., 2019). Fragmented governance arrangements which continue to allow policy and operational responsibilities to be divided up and layered upon existing organisations will result in narrow sectoral decision-making systems with competing and contradictory objectives and a lack of effective planning and management at the ecosystem level.

While the use of existing bodies has some logic in terms of resource efficiency, it may not ensure that the objectives of integration would be adequately fulfilled. For example, analysis of the Clyde marine spatial plan indicates simply ‘grafting’ another initiative onto existing governance structures may serve to frustrate efforts to implement a more coordinated approach due to embeddedness of sectoral thinking (Flannery and Ó Cinnéide, 2012). Issues regarding the addition of new players, organisations and partnerships to current regimes or institutional structures have been referred to as ‘the thickening of actors or government.’ This has a tendency to result in “unclearness of jurisdiction and blurring of responsibilities as a result of overlapping layers” (Van der Heijden, 2011, p. 14) or as Thompson (1980) referred to as the ‘problem of many hands.’

This blurring of responsibilities was clear when workshop participants felt that continued fragmentation within initiatives such as the SIFP made it difficult to determine common goals and balanced objectives, and that the current system enables actors to pursue their own narrow range of interests. For example, one of the environmental regulators when interviewed suggested that while they were willing to facilitate sustainable socio-economic development, they felt that other government departments pursued their own vested interests.

We are aware that there is a requirement for a socio-economic utilisation of the site [Shannon Estuary]. We understand that and we can allow that within our own management of the site. But meeting us halfway hasn't always occurred with other government Departments (Stakeholder No. 3).

This indicates a lack of motivation to challenge and leave behind ingrained thinking and policy-making processes, often the result of institutional inertia and policy layering.

Conflicting Sectoral Priorities

Failure to address the persistent problems that undermine efforts at integrated management results in the development

of conflicting sectoral policies. This is evident in recent Irish marine policy, which fails to reconcile competing and conflicting economic and environmental objectives. For example, HOOW provides a framework for the rapid expansion of the Irish maritime economy. It includes economic targets of doubling the value of ocean wealth to 2.4% of GDP by 2030 and increasing turnover from the ocean economy to exceed €6.4 billion by 2020. This focus on developing a ‘thriving maritime economy’ conflicts with the other HOOW goal for ‘healthy ecosystems,’ where given the growth forecasts, will inevitably result in an exploitation of resources in the pursuit of economic growth. While it is acknowledged in HOOW that the future growth of Irish marine industries depends on protecting the credibility of Ireland’s ‘clean, green image’ through implementation and compliance with environmental legislation, there is no strategy in place for the examination of environmental trade-offs as a result of achieving economic objectives or for the assessment of cumulative impacts arising from marine development. These contradictions at a national level highlight future implementation problems at a local level.

The prioritisation of objectives were regarded a challenge in the workshops and have the potential to result in conflicting outcomes. As noted by one of the Shannon stakeholders, they want to feel that the estuary is a communal resource in terms of local socioeconomic benefits:

You want to get the sense that the estuary is a shared resource and even from an economic point of view it doesn't really matter where the jobs are. It should go to the best location (Stakeholder No. 4).

The notion of shared benefits is an ideal concept, which, in practice is rarely achieved, particularly as priorities seem to be temporal with one Dublin Bay stakeholder emphasising the potential implications of such inconsistency on environmental assets:

At different points in time, different priorities would come to the fore more so than others. You have to be able to juggle the priorities, if you de-prioritise biodiversity, we're talking about ecosystem services, so you are going to actually affect people's quality of life, that's a proven fact (Stakeholder No. 5).

The prioritising or de-prioritising of some sectors over others can have significant trade-off implications as observed by the stakeholder in terms of biodiversity. It is important therefore to have a strategy in place which deals with the potential outcomes of implementing conflicting objectives and the resultant trade-offs, in agreement with a range of stakeholders and interests to avoid unsustainable development. This will ensure greater legitimacy when prioritising objectives as well as assessing cumulative impacts over the longer term.

The current governance system, which prioritises the increasing industrialisation of marine areas over socio-ecological conservation, represents a systemically reproduced negative side effect of the ‘blue growth’ agenda. In the case of the Shannon Estuary while there is a general consensus that objectives should reflect balanced, sustainable development, in reality, this is not being implemented. In the following response it is evident that

some of the stakeholders believe that local politicians only pay lip service to sustainable development when in reality they will not support a plan that restricts economic development.

And I also think that in the background there is also a sense that one of the required purposes of the (Shannon) Integrated Framework Plan is to promote, develop – (...) sustainable development. (If) this project, in any shape or form, leads to lack of development or inhibits development, you won't get a councillor to approve of any part of it (Stakeholder No. 6).

This viewpoint reveals a tension between environmental and economic interests in the Shannon. This persistent problem cannot be addressed using the current paradigm that dominates the system “because the regular solution-producing pathways are also the producers of the problem” (Schuitemaker, 2012, p. 1023). A transformation of governance is required to address these system deficits.

Uncertainty of Resources

Decision-making in the marine environment is a complex process requiring extensive resources for expertise, information and engagement. Uncertainty over the availability and provision of resources (financial, human and infrastructure) was perceived as an obstacle to implementing management in the case study initiatives. It was suggested by the workshop stakeholders that resources should be set aside for the long-term management of estuaries and coasts and should come from committed sources. In the Shannon, one of the SIFP steering group members implied that the opposite was happening where resourcing was unplanned:

It's kind of an ad hoc basis at the moment with a contribution from each agency (Stakeholder No. 7).

This appears to indicate a lack of priority and public and private sector commitment to the long term, sustainable management of the Estuary. To achieve change in environmental governance, resources as well as power and commitment are deemed necessary (Wiering et al., 2018). If resources are not adequately provided, this can have negative implications for decision-making. For example, as a result of limited resources or knowledge, decision-makers have to be pragmatic and have resorted to the use of mis-information and imperfect science (Kirk et al., 2007), which may also lead to an analysis of problems that are factually incorrect. In situations like this, decisions are regarded as ‘satisficing,’ i.e., the closest solution to the problem that fits a certain threshold (Orach and Schlüter, 2016). The problem may also be exacerbated where the non-expert general policy-maker who has to conduct the assessment has to explore the different silos to find relevant information (Russel et al., 2018). The reliance on, and inappropriate use, of ‘imperfect data’ is documented in research on path dependency and the implementation of environmental regulation as leading to an analyses of problems which are fundamentally incorrect (Kirk et al., 2007). The availability of accurate data and scientific information for management and decision-making is vital to ensure sustainability. This constraining of resources

which hampers decision-making is conceptualised as bounded rationality. In the case studies, the use of incomplete data was identified as having potential implications for future marine development proposals.

One of the Shannon stakeholders implied that imperfect data had been used in the SEA of the SIFP:

It didn't have all of the necessary information; even though they had exhausted the searches for all the information they hadn't used that information in a very effective way (Stakeholder No. 8).

The stakeholder stated that, as a result, the guidelines provided were inadequate for the development of strategic infrastructure at the site, i.e., no indication of monitoring requirements and no identification of site sensitivities. The data gaps referred to in the SEA of the SIFP indicate a shortfall in survey information available at the time. This could, however, result in sub-standard decision-making in the future.

While voluntary and in-kind contributions are valuable sources of assistance, many initiatives only endure when dedicated staff are employed to act as co-ordinators, advice-givers, facility managers and/or service providers (Healey, 2015), with workshop participants emphasising the need for this to come from committed, ideally statutory, funding streams. Often in coastal and marine management, managers have to be cost effective in response to the ‘bounded rationality’ of decision-makers with restrictions on the availability of information and staff capacity and time, resulting in limited cognitive ability and the provision of incomplete information (Scrase and Sheate, 2002; Borja et al., 2016; Orach and Schlüter, 2016). This normative behaviour can become ingrained or ‘locked-in’ furthering path dependency and occurring as a result of institutional inertia.

Failing to Address Complexity

The two case study initiatives were ill-equipped to deal with the complexity of truly ‘integrated’ management. The workshops identified a range of key issues overlooked in current arrangements, including: failure to address the complex nature of land–sea interconnections, incorporating the lack of integration between terrestrial and marine consenting systems; and a failure to address cumulative impacts of development on coastal and marine socio-economic systems and biodiversity. During the workshops, stakeholders struggled to identify appropriate regulators and consenting bodies for combined onshore and offshore developments, with one government representative admitting that it was a “grey area” (Stakeholder No. 9). With regards to addressing cumulative effects, one stakeholder noted that the current licensing and regulatory system is inadequate for developments within the coastal zone, which requires compliance with both the terrestrial and marine management systems and believed that none of the bodies involved would consider cumulative or in-combination impacts due to the complexity of such assessments.

Although a lot of data and information had been collated as part of the SIFP and Dublin Bay SME, some stakeholders felt that it was not being used appropriately for analysis and

assessments. For example, when stakeholders were asked to consider management options such as ecosystem-based risk assessment and cumulative assessment some felt that this level of information and expertise was not readily available within these initiatives. It was argued that although much data had been collected, insufficient attention had been paid to how the data could be integrated and that there was a lack of expertise in terms of the initiatives' capacity to analyse, model, and assess the information for management and decision-making purposes. This was noted by one stakeholder who also highlighted the need for competent expertise in terms of data analysis and interpretation:

But that begs the question then about the level of competency of the decision makers, ... there's such a wide range of knowledge that they [are expected to] understand socioeconomics and sociology and modelling and ecology and, I don't know [if they have these skills] (Stakeholder No. 10).

These examples highlight the ongoing failure of the current management system to deal with complex integration issues such as land–sea inter-jurisdictional problems, interconnections amongst users, piecemeal licensing processes and measuring cumulative effects. The inability of new, innovative approaches to address these issues reflects their failure to transform governance so that it can address these complex issues and, as a result, largely propagates the *status quo*.

The transformation of governance requires addressing a wide range of institutional, legislative, social, and economic challenges that have largely been ignored in the existing literature on coastal and marine management (Kelly et al., 2018a). Fundamental to this transformation is institutional restructuring, including: the introduction of new, or the radical modification of existing, legislation, policies, administration; and changes in behaviour, culture, and practice between organisations. This requires a new vision which drives innovation and diversity, strong leadership and policy commitment currently lacking in an Irish context without a dedicated agency with responsibility for, and an overarching policy for marine and coastal issues. To address these barriers, changes to: political priorities, statutory and budgetary remits, organisational policies, time and resources will be necessary. Efforts to bring about these necessary changes, however, tend to be stymied as a result of persistent and ingrained behaviour including path dependency, policy layering, and institutional inertia. If unaddressed, this institutional myopia will continue to hinder local initiatives in achieving the long term and sustainable management of marine resources. For example, in Ireland a number of plans and strategies had been prepared previously for coastal areas around Ireland, i.e., Dublin Bay, Cork Harbour, and Bantry Bay which ultimately stalled (Falaleeva et al., 2009; O'Hagan and Ballinger, 2010) and were "ignored and unexecuted" (Brady, 1987, p. 173) due to a lack of policy commitment as well as a lack of funding and resourcing. There is a significant risk that other integrated initiatives would stall or 'burn out' as a consequence of failing to re-structure or transform governance systems. Similarly, the ongoing failure to address complexity in marine management, e.g., failing to foster integration between land–sea

interconnections and terrestrial and marine consenting regimes, will continue to inadequately assess the potential impacts of human activities on the marine environment. This will result in further degradation and loss of marine resources as well as adverse socio-economic impacts.

Ongoing Lack of Engagement and Obstructive Vested Interests

Participants at the workshops emphasised the importance of stakeholder engagement in coastal and marine management. In particular, they highlighted the complexities associated with identifying and involving key stakeholders which ranged from government departments to local community groups. Some workshop participants claimed that particular groups had been excluded from consultation processes. It was suggested that representatives from the sporting and recreational sectors, local communities and the general public had not been adequately involved in the development of the SIFP. Similarly, a number of stakeholders in Dublin Bay felt that some consultation approaches were designed deliberately to exclude the general public, were tokenistic and gave rise to lobbying opportunities for powerful interests. This type of exclusion and distrust makes outreach to the community difficult, undermines legitimacy and results in important voices being excluded from policy development.

With regards to communication, it was felt by a number of participants that government agencies had little interaction with each other, let alone the broader public and were still operating in silos. This was clear from examples provided at the workshops of opposition to localised projects, which outlined how poor communication and a lack of transparency had inflamed conflicts. For instance, one local politician participating in the Dublin Bay workshop contended that stakeholders were inadequately consulted on marine-related proposals and only informed of developments at the later stages of planning processes. In terms of the statutory obligations of consenting bodies to formally consult with the public on planning applications, this local politician contended that the placing of an advertisement in a local paper did not constitute proper engagement and as the notices were written and published using legal terminology "nobody responds to because nobody understands it in the first place" (Stakeholder No. 11). Furthermore, this politician felt that this was a deliberate attempt to avoid public engagement:

It's not paranoia that these types of structures are designed not to include but they are designed to exclude (Stakeholder No. 12).

Many of the stakeholders involved in the workshops understood the complex web of interests involved in the use, protection and management of estuaries and coasts. As a result, there is a good awareness of the competing agendas and vested interests, particularly where there is an increased emphasis on a 'blue growth' agenda and economic gain (Flannery et al., 2016; Jones et al., 2016). It was suggested at one of the workshops that civil servants made

decisions based on their department's long-term agenda and not in the interest of the environment. As different sectors and organisations have their own objectives and priorities, this can also influence the value they place on certain processes in terms of potential gain. This was noted by one stakeholder particularly in relation to power and access to funding:

If you look at the development plans for the three local authorities, the regional planning guidelines, the NPWS' [National Parks and Wildlife Services] priorities and other published documents, the ports strategy, each sector and agency will have to put forward the primary issues and those all will have to be taken into account. And that's why it's very dangerous to say 'who is funding this?' because then they become the people in charge (Stakeholder No. 13).

One Dublin Bay workshop stakeholder felt that vested interests have had a detrimental impact on decision-making powers in the past:

I don't believe you can govern Dublin Bay ... one of the reasons we're in the mess we're in is because the vested interests, and it includes senior public servants, maybe it includes middle ranking public servants, retained the power, take decisions in the interest...so you have for example, the civil servant of the Department of the Environment who takes decisions in the interest of the department's long-term agenda, not in the service that they are meant to be protecting (Stakeholder No. 14).

Conventional approaches to introducing integrated management therefore appear to poorly appreciate power imbalances, marginalisation of stakeholders and influence of

TABLE 3 | Summary of persistent problems and examples from an Irish context.

Persistent problem	Examples of persistent problems from Irish case studies
Path dependency	<ul style="list-style-type: none"> Marine planning and licensing competencies continue to be fragmented across a number of Irish government departments and agencies in Ireland despite pressure from EU Directives for more integrated management Responsibility for local coastal and marine management in the Shannon Estuary and Dublin Bay continues to be spread across a number of agencies Local stakeholders emphasise the continuance of silo thinking in Irish agencies
Institutional inertia and policy layering	<ul style="list-style-type: none"> Implementation of the MSP Directive in Ireland will not address longstanding fragmentation issues and instead has been introduced to the Irish marine governance regime through the addition of new roles and responsibilities to existing legislation and governance structures Stakeholders in both the Shannon Estuary and Dublin Bay felt that continued fragmentation, 'silo thinking' and blurring of responsibilities made it challenging to determine common goals and balanced objectives
Conflicting sectoral priorities	<ul style="list-style-type: none"> Irish maritime strategy focuses on growing and developing a thriving maritime economy which will inevitably result in an exploitation of resources in the pursuit of economic growth. Local stakeholders see coastal and marine resources as communal assets, however, in reality the prioritising or de-prioritising of some activities over others can have significant trade-off implications in terms of biodiversity. Local stakeholders believe that some politicians only pay lip service to the idea of balanced and sustainable development. When in reality, they will not support a plan that restricts economic development.
Uncertainty of resources	<ul style="list-style-type: none"> Lack of political will, diversity, policy commitment and resourcing have contributed to uncertainty in the past. For example, previous attempts at integrated management in Ireland had limited success, i.e., Dublin Bay, Cork Harbour, and Bantry Bay Uncertainty over the availability and provision of resources (financial, human and infrastructure) was perceived as an obstacle to implementing management in the case study initiatives It was implied in the case studies that funding was being provided on an ad hoc basis
Failing to address complexity	<ul style="list-style-type: none"> Current Irish management approaches fail to address: the complex nature of land-sea interconnections; integration between terrestrial and marine consenting systems; and cumulative impacts of development on coastal and marine socio-economic systems and biodiversity. Local stakeholders struggled to identify appropriate regulators and consenting bodies for combined onshore and offshore developments One local stakeholder believed that none of the bodies involved in terrestrial and marine consenting would consider cumulative or in-combination impacts due to the complexity of such assessments Although a lot of data and information had been collated for the Shannon and Dublin Bay, some stakeholders felt that it was not being used appropriately for environmental analysis and assessments. Despite availability of more information and data, Irish coastal and marine resources are being polluted, habitats are being altered and destroyed and important species are being lost
Ongoing lack of engagement and obstructive vested interests	<ul style="list-style-type: none"> Some workshop participants claimed that particular groups had been excluded from consultation processes in the past A number of stakeholders in Dublin Bay felt that some consultation approaches were designed deliberately to exclude the general public, were tokenistic and gave rise to lobbying opportunities for powerful interests In terms of communication, it was felt by a number of local participants that government agencies had little interaction with each other, let alone the broader public and were still operating in silos. It was suggested at one of the workshops that civil servants made decisions based on their department's long-term agenda and not in the interest of the environment. As different sectors and organisations have their own objectives and priorities, this can also influence the value they place on certain processes in terms of potential gain.

vested interests and this requires far more acknowledgement of the politics and culture of environmental management in such contexts (Tiller et al., 2015).

CONCLUSION: PERSISTENT PROBLEMS AND ALTERNATIVE TRANSFORMATION PARADIGM

The aim of this paper was to explore the potential effect of deeply embedded, persistent problems and how these may hamper the implementation of those initiatives that seek to promote integrated, sustainable management of the marine environment. By asking

Can an 'ideal' type of integrated management address longstanding problems of fragmented governance?, the findings of our study suggest that without systemic assessment and adjustment of wider governance regimes, attempts at reform are likely to fall short of these aspirations.

Despite there being external, top-down pressures for change from international bodies, such as the EU, and 'bottom-up' pressures from local innovations such as the two case studies, there is insistent institutional resistance to transform coastal and marine governance in Ireland. The enduring nature of its inability to respond effectively to these external pressures and move beyond the existing paradigm is regarded a 'persistent problem.' As explored through the case studies, institutional arrangements have a tendency to be constrained by path dependency, institutional inertia, and policy layering. These persistent problems as outlined in **Table 3** have thwarted efforts to transform coastal and marine governance in Ireland, and issues that should have been resolved through integrated management endure, including: persistent silo-thinking and resistance to institutional change; conflicting priorities between economic gain and environmental conservation; restrictions or *ad hoc* availability of financial and human resources; the use of imperfect or mis-information; inability to address complexity; inadequate stakeholder engagement and communication difficulties.

By tracing these issues to underlying persistent problems, marine scholars can start to understand why contemporary integrated initiatives have failed to foster transformative marine governance. Identifying persistent problems that may hinder transformative governance can aid the development of future sustainable management approaches. To resolve persistent problems a process of transformation involving both a change in ingrained patterns of action and in the structures in which they take place (system innovation) is needed. By identifying and addressing persistent problems, we can provide a stronger basis for transformative action.

The sound, normative ideas behind 'integrated management' clearly face major implementation challenges due to such deep-rooted systemic problems. Addressing these issues requires a holistic and interdisciplinary approach incorporating diverse fields of study, disciplines and perspectives. The radical transformation of values, power structures, behaviour,

institutions, legislation, economies and technologies is required (Steffen et al., 2018). 'Transition Management' was developed as a new governance approach to achieving sustainability based on long-term thinking and envisioning; multi-actor, multi-sector and multi-level working; and learning and experimentation (Rotmans et al., 2001; Loorbach and Rotmans, 2010). This has been explored in the Port of Rotterdam using an alternative 'Transition Management' approach with successful outcomes including: co-creating a vision of sustainability; transition arena network with working partnerships (i.e., Floating Pavilion and the Clean Tech Delta partnerships) for realising and delivering aspirations in an innovative and collaborative way; political and policy commitment and support; and the development of strategies and iconic projects to achieve the long term sustainability vision including re-inventing delta-technology, building floating communities and sustainable mobility including river public transport (Frantzeskaki et al., 2014; Hölscher et al., 2019). We must, therefore, adopt alternative research and management paradigms to provide systematic approaches to reflect on, and address, persistent problems and move debates on marine governance toward how to secure a more fundamental transformation.

It is likely that a range of alternative conceptualisations of radical change would emerge from such a debate, and Kelly et al. (2018a) have suggested that an evolutionary framework that draws on the 'Transition Management' approach (Grin, 2010; Loorbach and Rotmans, 2010; Verbong and Loorbach, 2012), could provide a fruitful avenue of exploration. Practical applications of the transitions perspective are already resulting in a transformation of governance approaches to climate change as well as urban and port sustainability (Frantzeskaki et al., 2014; Bosman et al., 2018; Hölscher et al., 2018). In any case, the findings described in this paper have shown that there is a need for a new vision of sustainable marine management that moves beyond reform of existing structures, but whose uncompromising goal should be radical and fundamental transformation of marine governance.

ETHICS STATEMENT

This study was carried out in accordance with the Queen's University Belfast Regulations for Research Involving Human Participants: <https://www.qub.ac.uk/Research/Governance-ethics-and-integrity/Policies-procedures-and-guidelines/>. The research protocol, which included receiving written informed consent from all research participants, was approved by the School of Natural and Built Environment Research Ethics Committee.

AUTHOR CONTRIBUTIONS

CK, GE, and WF conceptualised and designed the study. CK conducted the literature review, stakeholder interviews, stakeholder workshops, qualitative analysis, drafted findings, and wrote the first draft of the manuscript. GE and WF facilitated

stakeholder workshops, contributed to qualitative analysis, and wrote and edited sections of the manuscript. All authors have approved the final manuscript.

FUNDING

This research was funded by the Environmental Protection Agency (EPA) Ireland and Department of Environment, Community and Local Government through

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the Science, Technology, Research and Innovation for the Environment (STRIVE) Research Programme 2007–2013 (Ref: 2013-B-PhD-11).

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fmars.2019.00213/full#supplementary-material>

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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