



Full length article

‘Hooks’ and ‘Anchors’ for relational ecosystem-based marine management

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ABSTRACT

There remains uncertainty about the legal and policy tools, processes and institutions needed to support ecosystem-based marine management (EBM). This article relies on an interdisciplinary study of ecosystem-based language and approaches in the laws and policies of New Zealand, Australia and Chile, which uncovered important lessons for implementing EBM around the need to accept regulatory fragmentation, provide effective resourcing, respect and give effect to Indigenous rights, and avoid conflating EBM with conventional approaches to marine spatial planning. We suggest a new way of thinking about EBM as a ‘relational’ process; requiring laws, policies and institutions to support its dynamic process of dialogue, negotiation and adjustment. We argue that relational EBM can be best supported by a combination of detailed rule and institution-making (*hooks*) and high-level norm-setting (*anchors*). With its focus on relationships within and between humans and nature, relational EBM may enable new ways to secure cross-government collaboration and community buy-in, as well as having inbuilt adaptability to the dynamics of the marine environment and the impact of climate change at different scales.

1. Introduction

Governments in a number of countries are pursuing environmental reforms that adopt the language of ecosystem-based management (EBM) in response to environmental challenges, institutional fragmentation, and powerful sectoral interests [1,2]. EBM can be summarised as an approach that seeks to integrate regulatory functions and community values and aspirations across multiple sectors and scales in order to manage ecosystem health holistically [3]. Its proponents believe that EBM will enable ‘transformative change’ to mitigate or reverse major environmental, social and economic threats concerning our ecosystems [4].

Despite EBM being mandated at international law since at least the 1990s [5], the health of ecosystems, including marine, continues to experience human-driven decline [6]. This, in part, reflects a mismatch between the goals of EBM and the realities of their implementation across different spatial and temporal scales [7]. EBM approaches acknowledge the need for society to find legal and policy solutions to improve the ecological health and resilience of our oceans [1,6,8].

However, there remains uncertainty about the legal and policy tools, processes and institutions needed to support EBM [1]. It remains unclear, for example, whether implementing EBM requires comprehensive cross-sectoral reform, or ‘tweaks’ to existing legal and policy frameworks.

As EBM is a transnational imperative, there are important lessons for countries embarking on EBM-directed legislative or policy reform from experiences in other places. This article draws on our detailed study of ecosystem-based language and approaches in the laws and policies of three countries (Aotearoa New Zealand (NZ), Australia and Chile). These countries have all tried to implement EBM to better manage marine ecosystems, across various levels of government, and involving multiple government agencies and industry stakeholders. Importantly, these countries all have Indigenous peoples/nations with protected rights in marine and coastal areas, although these rights and their implications for marine regulation have not been comparatively analysed in the existing scholarship. We examined the use of EBM language and approaches in law, policy and institutions in each of the three countries, and their evaluation in the literature, to draw out lessons for the broader

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transnational imperative towards EBM. Our comparative study enabled us to elucidate important lessons for legal, policy and institutional design and implementation.

In [Section 2](#) we provide an overview of our comparative, interdisciplinary research method, including the rationale for the particular attention we pay to Indigenous rights. Although each country has a specific historical, political and social context, in each of these countries the marine environment and its resources and dependent communities are under increasing threat (see summary of OECD country reviews in [Appendix A](#)), posing major policy and governance challenges, and Indigenous peoples seek greater recognition of, and respect for, their rights, knowledge and livelihoods within marine law and policy [\[9,10\]](#).

In [Section 2](#) we consider the dominant conceptualisation of EBM in the existing literature, as a normative goal to be achieved through legal and policy implementation. We hypothesise that policy-makers should move away from conceptualising EBM as a static, end point to be arrived at. As an alternative view, we suggest that EBM should be seen as an ongoing and relational, human-driven process of iteration, adaptation, reflection and reform. Relational EBM is consistent with, yet sits at a higher conceptual level than, well-trodden environmental management approaches relating to integrated and adaptive management.

In [Section 3](#) we identify four synthesised themes emerging from our comparative study of law and experience relevant to EBM implementation. These are, the:

1. need for users and stakeholders to accept and work with the complexity of marine regulatory frameworks;
2. need for governments to commit to and effectively resource EBM;
3. importance of respecting and providing for Indigenous rights in the marine area especially in post-and settler-colonial contexts; and
4. need to avoid conflating conventional approaches to marine spatial planning with EBM.

Our comparative study revealed that attempts to implement EBM via wholesale reform have been unsuccessful, unsustainable, or counter-productive in the three countries. The reflections provided by the study confirmed the need for a new theory of ‘relational EBM’, which focuses on enabling inclusive processes, practices and institutions.

In [Section 4](#) we provide some broad parameters for how policy-makers can implement a more effective, and ‘relational’, EBM approach, which is resilient to political and economic fluctuations. Our comparative study suggested that a relational EBM approach would require effective:

- a. ‘Hooks’ – combinations of new, amended, and (where appropriate) existing rules, tools and processes that reinforce and enable a coordinated approach to EBM across sectoral frameworks, that are properly resourced and mandated by government and supported by effective institutions and community participation; tied together by
- b. ‘Anchors’ - overarching or constitution-level legal and policy objectives involving ecological ‘bottom lines’.

2. Methods

The comparative law method adopted in this research was an interdisciplinary, desktop-based study conducted throughout 2020, in which we examined hundreds of primary legal sources (legislation, case law, government and community policy and planning documents) together with their analysis in secondary sources (commentary, reports, and academic publications that are both practice and theory focused). The framing of research questions and study of documentary sources were triangulated via discussions with legal and policy experts, and government officials, partners and stakeholders involved in marine regulation in each of the comparator countries. The results of the research were recorded in three, detailed country reviews, which are synthesised in this article, together with a tabular summary of key laws

and policies in each country (included in [Appendix A](#)). Synthesised findings are organised as four key lessons in this article, and discussed with reference to significant law, policy, scholarly commentary and interpretation from the country reviews. The article concludes with a suggested approach for policymakers to implement relational EBM via ‘hooks’ and ‘anchors’, also informed by the country reviews.

The comparative study adopted a socio-legal, ‘law in context’ [\[85\]](#), interdisciplinary approach, consistent with our view of marine ecosystems as ‘socio-ecological systems’ [\[16,23\]](#). It drew on the trans-disciplinary expertise of the research team from law, geography, planning, political studies, Indigenous rights, environmental management, ecology and biology to analyse comparative legal doctrine (legislation, case law and policy) in its historical, social, cultural, political, and scientific context. As well as analysing legal and policy documents, the study gave attention to the worldview, goals, assumptions and conditions underlying laws and policies, and identifying who has control to develop those arrangements.

The comparator countries were chosen based on the following broad criteria satisfied in varying respects and ways in each country:

- Ecological scale: a combination of geographical (differing species pools within the EEZ/Continental shelf and the potential for connectivity) and organisation scale (reflecting the number of ecosystem components);
- Range of involvement of/implications for Indigenous peoples and local communities with increasing recognition of Indigenous rights, and inclusion of Indigenous values and knowledge systems, within law and policy;
- Decision-making at multiple and/or nested scales (devolved and multi-layered decision making about marine resources and areas);
- Integrated or cross-sectoral approaches, which coordinate policy and planning across typical boundaries (e.g. terrestrial and marine, freshwater and saltwater, territorial sea and continental shelf, fisheries and marine protection, national and local); and
- ‘Transformative approaches’ – e.g. focus on restoration and not just conservation, focus on resilience and not just sustainability, adaptive/relational as opposed to static/stationary.

There is limited comparative legal research about EBM in Australasia and the Americas [\[86\]](#), thus, this research presents new areas of focus and novel findings and analysis to recognised marine regulation challenges. There are certain, clear distinctions between the comparator countries, which we managed via our contextual approach. These include, one country (Australia) being a constitutional federation, although in practice all countries experienced challenges posed by trans-jurisdictional or multi-level governance at various scales. There were other, acknowledged, constitutional variations amongst the comparators, which produced different and interesting results around environmental management. These include the constitutional protection of public interest, environmental rights or interests, or Indigenous peoples’ rights or interests, with reference to international standards: provided for in Chile [\[87\]](#) and NZ (via the Treaty of Waitangi) but not in Australia (although the CBD as ratified by Australia, promotes sustainable development acknowledging that biological diversity is about more than plants, animals, micro-organisms and their ecosystems).

In carrying out the comparative analysis, we paid particular attention to the rights of Indigenous peoples in each of the comparator studies. Indigenous rights retain prominence in our analysis for the following reasons:

1. Indigenous rights in marine areas have particular status in domestic constitutional and international law in each of the comparator countries [\[48\]](#);
2. The incorporation of Indigenous rights (and traditional knowledge) is one of the key explicit components of EBM approaches [\[88\]](#); and

3. There is an express need for more acknowledgement of Indigenous knowledge, rights and sovereignty in the existing comparative literature on EBM [51].

In paying close attention to the role of Indigenous rights and justice within EBM we have noted situations where local community interests are protected or provided for in governance arrangements. Local or tribal community interests do not typically have the same status as Indigenous rights, but are recognised to an extent in international law [52]. We acknowledge that, in some circumstances, particularly in Latin America, local communities are difficult to distinguish from Indigenous peoples, as there have been historical disincentives to self-identifying as Indigenous [89].

3. Conceptualising relational ecosystem-based management

Despite EBM's prominence in the literature for much of the last two decades, the problems of sectoral management, legislative duplication and institutional fragmentation remain firmly embedded in many jurisdictions [4]. Whole of government cooperation, political consensus between conflicting user and interest groups, and collaboration between government and stakeholders are typically presented as antidotes to fragmentation, and necessary elements of EBM [8].

As a response to the disjunction between the conceptualisation and implementation of EBM, it is suggested in this article that EBM should be framed as a relational process and not merely an outcome to be implemented and then iterated. In hypothesising a new theory of 'relational EBM', we refer to the 'relational turn' in socio-legal theory [11–13], which departs from static notions of law to a focus on the relational processes of dialogue and negotiation between humans and nature in plural, multicultural legal settings [14]. The aim of such relational thinking, 'is not to arrive at a state of finality in the design of formal arrangements, but to create the conditions for an open, inclusive and on-going dialogue', allowing policymakers to concentrate their efforts on institutions and processes, which accommodate a plurality of interests and allow for change over time [12]. Framed thus, EBM in both theory and practice is a dynamic, multi-faceted process of interactions between humans and nature; in the context of a network of rights, interests, practices, law, policies and institutional cultures. EBM as a relational process must be adaptive, flexible, networked, connective and

iterative [90] to respond to anthropogenic stressors [13,15], including resilience to the 'trickster' of climate change [16]. Relational EBM is thereby consistent with understandings of marine spaces as both 'commons' and as 'socio-ecological systems' [14].

Much EBM theory stresses the connectivity of ecosystems across scales and the interconnectedness of people and place [1,17], but there is a need for more discussion of the connections between people/s [18, 19]. Just as we appreciate that healthy and resilient ecological systems are interconnected and interdependent, so too must be effective ongoing collaborative and participatory processes [20,90]. Because EBM is a dynamic, living process, connections between humans are also vital across scales to enable 'communion' between sectoral and competing approaches: including users, rights-holders, managers, regulators, and communities [21].

Relational EBM approaches can exist on a spectrum from sectoral management on one axis to fully-integrated cooperation of the human ecosystem; and from managerial 'command and control' to more collaborative and devolved management on the other axis (Fig. 1). Such an approach allows for different visualisations of EBM in different contexts, and for socio-ecological systems to evolve progressively or transform at their own pace along the spectrum, as supported by governance arrangements and institutions [22,23].

4. EBM – comparative lessons

Our comparative study of EBM in the laws and policies of NZ, Australia and Chile revealed the following four major concerns around the experience of EBM implementation in comparative context.

4.1. Fragmentation is inevitable

Most of the myriad laws, policies and institutions concerned with marine regulation in each of the comparator countries fail to effectively 'speak to each other' (see Appendix A for a summary of marine regulation in each country). There is a tendency for EBM policy approaches to focus on either biodiversity conservation (marine protected areas and spatial planning) or fisheries management, but little integration between regulatory frameworks, and a specific tendency to 'silo' fisheries regulation [24]. Duplication and fragmentation of regulatory institutions and functions complicates shared or common approaches to policy

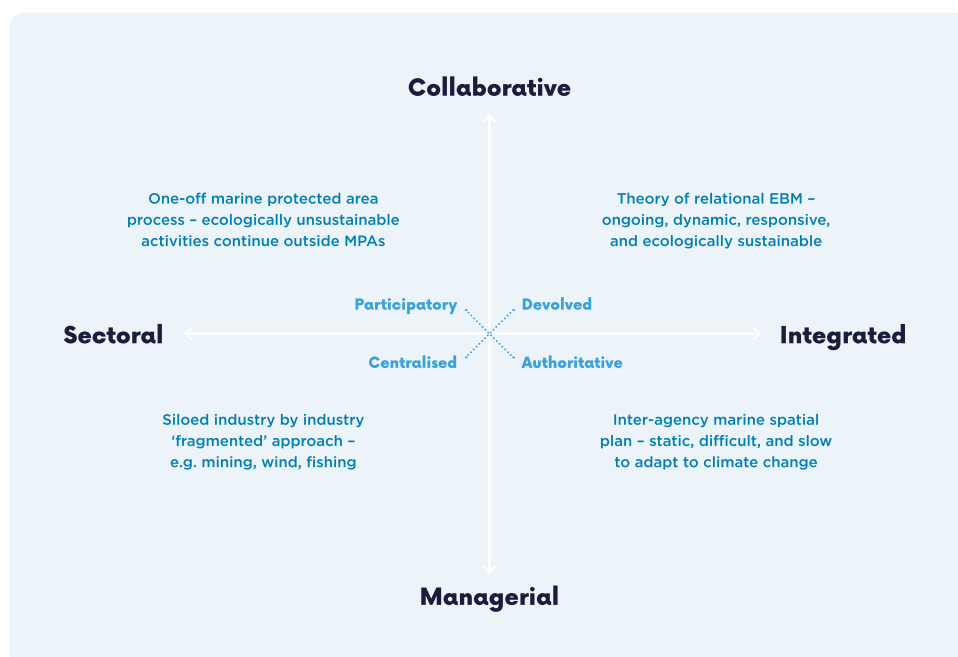


Fig. 1. Simple heuristic depiction of the EBM spectrum acknowledging EBM is a dynamic social process of negotiation, collaboration, co-learning, consensus-building, and ongoing connection between individuals and communities. Illustrative examples are shown. It takes different forms depending on the decision-making responsibility, and the scale at which it is implemented. Managerial encompasses top-down, command-and-control institutional decision-making. The collaborative part of the spectrum is more inclusive, participatory, partnership-based, and flexible. Predominant decision-making power is depicted as the four axes from the centre of the diagram, although these may not be discrete depending on scale and location at which EBM is applied. At any one time, a location or region could be within a particular quadrant, and could shift depending on the political will to devolve, with appropriate national oversight and monitoring.

design and implementation across the regulatory scheme.

In NZ, various attempts were made since the 1970s to establish integrated management of the coastal and marine environment, consistent with international commitments [25]. NZ's main environmental law, the *Resource Management Act 1991* (RMA), was originally purported to facilitate integrated environmental planning as part of a 'one stop shop' approach [26], although in fact excluded fisheries. In the marine context, the RMA sits uneasily alongside the *Fisheries Act*, with its allocation focus on maximum sustainable yield [27]. Marine and coastal policy and planning remains fragmented, ad hoc, and sometimes inconsistent across maritime planning, regional planning and fisheries management [28]. As an example, the definition of 'biological diversity' in the *Fisheries Act 1996* fails to include the habitat reference to 'ecological complexes' drawn from the Convention on Biological Diversity (CBD), although this is included in the RMA. Such definitional disparity may produce confusion and misalignment of regulatory approaches between institutions working on marine biodiversity [29].

Much of the literature on EBM points to marine policy fragmentation as a problem that needs to be resolved [8,30]. Yet, although fragmentation and duplication clearly present challenges for regulators seeking integrated or ecosystem-focused outcomes, it is characteristic of responses to 'wicked problems', which are 'complex, multifaceted, and resistant to resolution because they are ever-changing and because our knowledge about the problem is incomplete or contradictory' [31]. The study revealed that attempts to replace marine regulatory complexity with 'one-stop shop' approaches may have political appeal, but they are simplistic, may risk the abandonment of existing environmental or social 'wins', and have typically proved problematic in practice by failing to solidify trust and cooperation between competing interests. For example, in the late 1990s there was an attempt to coordinate marine regulation in Australia across sectors and scales under a single Oceans Policy, which was originally touted in comparative literature to be an EBM success story [30]. The policy was a 'significant departure' from the single-sector approach to marine regulation towards a more integrated and ecosystem-based approach [4]. However, the States and Territories were by and large unwilling to collaborate with the Commonwealth on a national approach to marine management [30], and the policy was plagued by stakeholder consultation problems [32]. The consensus is now that the Oceans Policy has failed to realise its full potential as an EBM approach, and Australian marine and coastal regulation continues to be described as highly fragmented, ad hoc, inconsistent and inefficient [25,32].

4.2. Regulators must 'walk the talk'

Although the language of EBM may be adopted in international or high level domestic policy documents, in all comparator countries EBM norms, tools and supporting institutions only 'hook' into certain policy sectors or places, contradicting the goals of an EBM approach. The key reasons identified for the failures of effective and lasting EBM development and implementation across the country studies include [4,33]:

- a. inadequate financial resourcing;
- b. inadequate scientific information hampered by inadequate resourcing; and
- c. political and/or institutional capture by vested interests tied to:
 - institutional fragmentation and path dependency;
 - conflict between assumed/perceived and actual rights resulting in existing legislation not being fully and effectively implemented;
 - lack of regulatory and non-regulatory incentives for voluntary EBM; and,
 - lack of strong legal or constitutional imperatives for compulsory EBM or 'anchors'.

The reasons cited for the implementation failure of Australia's Oceans Policy include: the approach being overly ambitious in scope and

scale; a lack of unified government and stakeholder buy-in across jurisdictions; a lack of clarity around objectives; insufficient scientific information to support decision-making; and inadequate legislative 'hooks' [30,32].

In NZ, the RMA's overarching purpose of promoting sustainable management of natural resources incorporates some language consistent with EBM [34], although there has been no high-level policy and overarching legislative compulsion for sector regulators to take an ecosystem approach [25,35]. In practice, implementation of environmental regulation has fallen well short of EBM in the context of institutional conflict and declining biodiversity, and much is left to voluntary approaches [36]. In the context of regulatory complexity, uncertainty and conflict, the NZ courts are often required to clarify the nature of rights and interpretation of legislation affecting marine areas, and it wasn't until 2020 that a judicial decision determined the primacy of the RMA rather than the *Fisheries Act* for managing biodiversity [37]. These judicial developments, poor state of the marine environment [38], and recent authoritative advice to government recommending more integrated and cross-sector approaches [36,39], emphasise the need for marine reform.

Chile has adopted EBM as official marine policy direction since ratifying the CBD in 1994 [40]. Its national *Fisheries Law* [41], Biodiversity Policy [42], and Climate Change Adaptation Plan for Fisheries and Aquaculture [43] all expressly adopt an EBM approach, including recognising the interconnections between environmental components across scales, sectors, institutions and jurisdictions. The *Fisheries Law* provides for a co-management regime involving industrial, artisanal and Indigenous fishers together with regulators and technical scientific committees, signalling hope that a broader set of considerations, knowledge and perspectives would influence regulatory decisions [44]. Yet, in Chile there remains fragmentation and incoherence in biodiversity regulation [45]; fisheries regulation fails to integrate broader stakeholder perspectives [46]; and EBM is constrained by limited resourcing [47], capacity and inter-sector coordination [40], while being vulnerable to political influence [44]. Although Chilean legislation provides for co-management at multiple scales, effective collaboration is hampered by: 'mistrust' between fishers and government; lack of transparency in management committee membership; lack of timely scientific information; and inadequate resourcing [46]. Accordingly, although Chile is arguably evolving towards EBM, without 'sufficient guidance and support to ensure success of the transformation the effort can be undermined' [47].

4.3. Indigenous rights are unfinished business

Indigenous rights in the marine area (including authority over the governance of marine areas as well as distributive entitlements within resource allocation frameworks) have strong legal basis in international and domestic law [48]. There is growing international and domestic awareness about aligning EBM approaches with the protection of Indigenous rights, and integrating transdisciplinary knowledge [49], including Indigenous expertise [50], although controversy remains about the practical and ontological consistency of Indigenous rights and EBM [51]. There is also emphasis on local community or artisanal rights and interests in EBM approaches, and although local communities do not hold the same protected legal status, they sometimes also comprise Indigenous or tribal peoples in comparative contexts [52].

Indigenous ways of knowing the marine environment, which are embedded in Indigenous ontologies that emphasise relationality, the interconnectedness of nature and humans, mutual reciprocity and stewardship, provide important opportunities to better understand the marine environment based on longstanding use [48,53]. Indigenous peoples' fishing practices in Chile, for example, can be dated from 9000 BCE [47], with Indigenous coastal communities centring on the '*caleta*' (fishing village), and having a well-developed body of ecological knowledge about fisheries management [54]. Similarly in Australia,

Aboriginal and Torres Strait Islander nations have exercised holistic natural resource management of marine and connected coastal ecosystems for millennia [55].

In all of the comparator countries, a complex mosaic of Indigenous rights and interests mirrors the complexity and fragmentation of broader marine regulation. However, despite legal protections of Indigenous rights and increasing incidence of Indigenous involvement in legal and policy arrangements [56], governments have largely failed to engage meaningfully with Indigenous marine governance, and often directly ignored or disregarded Indigenous rights and sovereignty [51,55,57]. When efforts are made to include Indigenous peoples in governing 'protected areas' [4,58,59], they tend to be consultation focused, rather than enabling of Indigenous or local governance authority [51,60]. Consultation efforts have been described as 'tokenistic' and failing to reflect legal pluralism, while opportunities for stronger marine rights for Indigenous peoples remain in tenure-based models [55].

Debates and contestation about the protection of Indigenous fisheries continue in Chile, in the context of increasing agitation around the rights of Indigenous peoples to free, prior and informed consent under international commitments [44]. The Chilean Government made some attempt to recognise the marine rights and interests of Indigenous peoples with the 2008 *Lafkenche Law*, which allows Indigenous coastal communities in the south of Chile to obtain administrative concessions to use the marine and coastal area for fishing [61]. However, there are significant injustices in the process for obtaining rights under the Law, which do not reflect the extent of customary interests [57,62]; and are routinely disregarded in planning processes [63]. Some collaborative municipal arrangements co-developed with Indigenous peoples are reportedly an improvement, although such initiatives are ad hoc and limited in scale [64]. Chile has also implemented territorial user rights in the marine and coastal area, combining ecological protections with small-scale community or artisanal fishing and biodiversity management, including schemes involving Indigenous peoples [65].

In NZ, Māori have legally protected rights stemming from *Te Tiriti o Waitangi* (The Treaty of Waitangi), under a complex regulatory scheme combining state legislation and policy, customs and practices [66]. Yet uncertainty remains at the decision-making levels as to how, when and where these tools are to be applied [35]. The Government has recently come under criticism from the Waitangi Tribunal for procedural injustices in the resourcing and determination of marine and coastal rights and title under the *Marine and Coastal Area (Takutai Moana) Act 2011* [67].

Indigenous rights and interests in marine areas continue to be incompletely and inadequately recognised in Australia [68,69], across a range of native title and planning laws [55]. Marine Bioregional Plans, the remnant of Australia's Oceans Policy, engage cursorily with Indigenous values [70]. Marine Protected Areas have historically been established without the consent of local Indigenous peoples, despite the impact of conservation strategies on Indigenous resource use [55,59], a phenomenon sometimes referred to as 'ocean grabbing' [71] or a new type of enclosure of the commons to the exclusion of Indigenous peoples [14]. The recent 2018 Victorian State marine legislation, despite emphasising Traditional Owner interests in its objectives, does not provide any mechanisms for involving Indigenous peoples in marine management.

4.4. EBM is more than marine spatial planning

Although there is some alignment between EBM and marine spatial planning (MSP) in the comparative literature [2,4,17,72,73], there is doubt about the ability of two-dimensional, static MSP to account for the multi-faceted, relational, and mobile nature of the ocean and its resources [14,74,75,90]. The country studies revealed that MSP is often implemented in a way that runs counter to the holistic objectives of EBM, especially: in the absence of high-level or strong overarching legal and policy directives that set 'ecological bottom lines' [76]; and where

there is poor community 'buy-in' or industry-capture evident in planning processes. In NZ, for example, MSP initiatives have typically failed to reflect the interconnectedness of marine ecosystems as 'commons', by only protecting parts of ecosystems while allowing non-protected areas to be degraded, damaged or destroyed via ecologically unsustainable use [29,77].

The country studies show that where EBM is equated with MSP, and in the presence of competing marine interests, EBM efforts have focused on the establishment of marine protected areas. This is often at the expense of environments outside of 'pristine' areas, and of local community or Indigenous rights which could be complementary to environmental objectives [78]. In the face of fierce stakeholder opposition and inadequate government commitment, Australia's Oceans Policy switched focus solely to biodiversity conservation, with marine bioregional planning centred on the establishment of *ad hoc* marine protected areas [4,25], which are poorly coordinated across sectors and jurisdictions, fail to account for cumulative effects, and fail to adequately incorporate and manage 'coastal pressures' [58]. Similarly in Chile, although the scale and number of marine protected areas is impressive, these areas are concentrated in remote and offshore locations where competition for marine use (for fishing, aquaculture, urban use or resource extraction) is less intense and the need for protection is arguably less critical [79]. Many of Chile's marine protected areas are 'paper parks', without effective management regimes [47], while the institutional arrangements for managing marine protected areas are described as weak and inadequately funded [64,80].

5. Hooks and anchors for relational EBM

Our comparative study confirmed that it is unnecessary and undesirable to provide a blueprint for 'arriving at' EBM in one law or policy. Policymakers should embrace the inevitable fragmentation, duplication and polycentricism of marine regulation and institutions and instead focus reform efforts on enabling the relational process of EBM via institutions and processes that subscribe to a common vision and allow for change over time. A relational approach may also align better with Indigenous peoples' aspirations, by enhancing opportunities for the inclusion of Indigenous rights, values and knowledge into policy and practice. Our comparative study has led us to suggest that a relational approach to EBM can be best supported by a combination of detailed rule and institution-making (*hooks*) and high-level norm-setting (*anchors*), an outline of which we provide below as an agenda for further research and policy consideration.

5.1. Hooks

EBM principles must be backed up by clear legislative requirements if they are to support change [32]. A promising example of this is the language of EBM adopted in the 2018 Victorian marine legislation and policy [81], although, there is no clear provision in the legislation for reconciling the multiple uses of the marine and coastal environment, subject to other sectoral legislative and policy frameworks. EBM requires consistent 'hooks' across all regulatory frameworks affecting the marine environment, to enable a common vision between sectoral regulation, and to reduce the likelihood of institutional conflict.

EBM objectives across marine laws must be accompanied by effective and participatory institutions, which requires governments to properly resource the process, including funding research and monitoring to support evidence-based decision-making [58], based on robust science that is shielded from political and industry influence [82,83]. EBM approaches have stronger hooks into domestic law where they are supported by community 'buy-in' to marine regulation and institutions via properly resourced and authoritative, participatory processes [20,65]. Participatory co-management regimes for fisheries exist in all three countries, although there is further potential for creative governance and institutional arrangements (including co-management approaches,

transfers of power to Indigenous peoples, or small-scale MSP initiatives that combine environmental protection with economic and social outcomes) to build legitimacy for EBM reform. This will require (at a minimum) meaningful engagement with and appropriate respect for Indigenous rights [51].

5.2. Anchors

Constitution-strength arrangements (including those that adopt international law standards) [84] offer potential to ‘anchor’ EBM approaches across regulatory regimes. In other words, overarching legal and policy objectives (consistent with protecting and restoring the ‘resilience of coupled socio-ecological systems’ [1] to external stressors, and reflective of protected Indigenous rights and interests), have the potential to integrate management approaches across key areas of fisheries and resources regulation, biodiversity protection, ports and transport, and marine and coastal planning. However, this may require the necessary constitutional hierarchy to transcend siloes and sectoral thinking. MSP, for example, would operate better within an EBM approach where combined with high-level or strong overarching legal and policy directives that set ecological bottom lines, underpinned by multi-scale governance that accounts equitably for Indigenous governance and rights. Examples exist outside the marine context, such as New Zealand’s 2020 ‘*Te Mana o Te Taiao*’ policy, which provides a holistic, integrated, and intergenerational approach to protecting and preserving biodiversity based on *Te Ao Māori* (Māori worldview) [91]. The policy recognises that humans are a part of nature, and have kinship relationships with living natural ecosystems, and seeks to set fundamental objectives and values applying across the regulatory regime.

Establishing anchors for relational EBM may be easier in countries that already have constitutional protections of environmental rights (e.g. Chile and to a lesser degree NZ via the Treaty of Waitangi), with the right to a healthy environment offering further potential for securing environmental bottom lines.

6. Conclusion

Our comparative study of attempts to provide for EBM in law, policy and institutional design in NZ, Australia and Chile has uncovered important, transnational lessons, including the need to accept and work with fragmentation, the importance of effective resourcing, the need to respect Indigenous rights, and the need to do more than just MSP. The comparative study confirmed that a new way of thinking about EBM as a relational process is needed. We have included a simple two-dimensional heuristic representation of where our theory of relational EBM sits on a spectrum of possible EBM approaches in Fig. 1, as an invitation to further discussion, critique and debate around relational EBM. The study also allowed us to make some early suggestions about the sorts of laws, policies and institutions to support its dynamic process of dialogue, negotiation and adjustment. Relational EBM, with its focus on relationships within and between humans and nature, may uncover new ways to secure cross-government collaboration and community buy-in, as well as having inbuilt adaptability to the uncertainty of the marine environment and the impact of climate change.

EBM reform has the potential to impact negatively on the existing rights and interests of marine users [51], and there will be trade-offs required between different marine uses and values. More thinking is needed about potential tools, mechanisms, institutions and processes to protect/restore marine ecosystems in the context of existing and protected rights and interests, in particular, those of Indigenous peoples [51]. However, relational EBM does not necessarily require comprehensive cross-sector reform, but could be achieved via a combination of complementary hooks in existing laws and policies, anchored by overarching ecological bottom-lines instituted (preferably) via constitution-strength arrangements. This is significant, because it means that we can start to ‘do EBM’ for our marine ecosystems now, while

building a long-term vision for more significant legal and policy reform. In doing so, policy-makers must engage meaningfully with communities, especially the protected rights of Indigenous peoples, with the willingness to resource and support ‘just transitions’ towards EBM, before embarking on any process of participatory EBM policy design.

CRedit authorship contribution statement

Elizabeth Macpherson: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing - original draft, Writing - review & editing, Supervision, Visualisation, Project administration, Funding acquisition. **Stephen C. Urlich:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing - review & editing, Supervision, Visualisation, Project administration, Funding acquisition. **Hamish G. Rennie:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing - review & editing, Visualisation. **Adrienne Paul:** Methodology, Validation, Formal analysis, Investigation, Writing - review & editing, Visualisation. **Karen Fisher:** Validation, Formal analysis, Investigation, Writing - review & editing, Visualisation. **Laura Braid:** Formal analysis, Investigation, Writing - original draft. **Jill Banwell:** Formal analysis, Investigation, Writing - original draft. **Julia Torres Ventura:** Formal analysis, Investigation, Writing - original draft. **Eric Jorgensen:** Conceptualization, Validation, Writing - review & editing, Visualisation, Project administration.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.marpol.2021.104561.

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