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Governance and the coastal condition: Towards new modes of observation, adaptation and integration

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ABSTRACT

The conceptual framework of evolutionary governance theory (EGT) is deployed and extended to rethink the idea of coastal governance and the possibilities of a coastal governance better adapted to challenges of climate change and intensified use of both land and sea. 'The coastal condition' is analysed as a situation where particular modes of observation and coordination were possible and necessary, and those observations (and derived calculations of risk and opportunity) are valuable for the governance of both land and sea. An argument is constructed for a separate arena for coastal governance, without erasing the internal logic of pre-existing governance for land and sea. This entails that coastal governance is destined to be a place of (productive) conflict, as much as of policy integration. Policy integration will be more difficult and more important in coastal governance, as this is an arena where the effects of many land based activities and activities at sea become visible and entangled. Policy integration in coastal governance does, however, require deep knowledge of the governance path and existing forms of integration there (e.g. in planning), and it exists in an uneasy tension with the requirements of adaptive governance. This tension further contributes to the complexity and complex-prone character of coastal governance. Neither complexity nor conflict can be avoided, and coastal governance as an image of balanced decision-making is (positively) presented as a productive fiction.

1. Foreword

This is the first article in a special issue on governance for land-sea interactions. It is intended as a 'framing paper', a paper which presents the general perspective on governance for land-sea interactions. The issue and the paper have an analytic and normative aspect. The normative side is a plea for policy attention to coastal areas, and more specifically a set of arguments for coastal governance, for the delineation and governance of a zone spanning land and sea. Why and how this is to be done, emerges from the analytic angle, where the paper and the special issue deploy and develop the perspective of evolutionary governance theory (EGT), a perspective on governance which places governance in the context of social-ecological systems and which understands governance and governance transformation against the background of co-evolutions of all constituent parts of governance: actors, institutions, power, knowledge and narrative.

This paper therefore aims to give a broad picture, yet a new picture, of coasts, and especially coastal communities, reinterpreted through the lens of EGT. Other papers in the issues locate themselves against this background, expand the landscape, give more detail, and find their own balance between normative and analytic angles. The new picture emerging in this framing paper is already a validation of the perspective, yet this is not enough. The new understanding of what will be called 'the coastal condition' is a stepping stone for a new reflection on improved modes of governance for that newly understood condition. It's not a disease, but it is a state of affairs which embodies both unforeseen problems and unexpected ways out of bigger, i.e. not merely coastal, problems. Many of the problems and solutions emerging out of a coastal EGT perspective will reappear in the other papers, yet in this framing paper, the argument is laid out for the value of the perspective,

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before additional forms of validation, and new insights, emerge in the other papers.

The nature of this enterprise thus necessitates some broad strokes here and there, some unfamiliar technicality elsewhere. The broad strokes are part of the effort at reinterpretation of a large issue, and the technicality comes with the relative novelty of EGT. Thus, arguments are first presented for a rethinking of coastal management and governance, then arguments for adopting an EGT perspective, and this is followed by an introduction of selected and partly adapted concepts from that theory. Next the reasoning is enriched by harking back to the (mostly European) experiences with ICZM, or integrated coastal zone management, an earlier form of emphatically coastal governance, linking social and ecological systems, aiming at ambitious policy integration. The very limited success of such endeavour seemingly similar to what is proposed in this paper, prompts both a critique of ICZM and a further refining of our conceptual tools and practical recommendations. The subsequent analysis of the 'coastal condition' then enables us to discern both governance gaps and possible solutions to them.

2. Introduction

The coast is, in its very basic sense, a place of contact and intensified interaction, between ecosystems, between groups of people, trade flows, bacteria, and epistemic lenses onto the world. It is these diverse forms of interaction that together define the terrestrial-marine boundary scape: the coast. Besides, the interaction of tangible entities, the interaction, cross-fertilisation and distinct separation of different modes of organising, decision-making, of governance play out along the coast, challenged by population density, shifting materialities and weak, partly outdated or little enforced governance mechanisms. Indeed, the distinction between governance and government has been made and remade naturally in coastal environments, as coasts often represent borders of political entities. Polities can focus on the sea, or turn their back to it, but can never ignore the, in times of rapid environmental change, decreasingly reliable boundary between land and sea. Coasts are therefore places of institutional rupture and consecutive co-evolution.

The (co-)evolution of formal/informal institutions for the governing of coastal waters and lands, as well as the mechanisms and organisational bodies enforcing them, relate to the overarching topic of ocean governance, internationally identified as one of the key environmental and development challenges of the 21st century. To date, the international ocean governance system is based on the United Nations Convention on the Law of the Sea (UNCLOS). Legal responsibility and right to safeguard, exploit and in general govern coastal waters (12 nm off the coast) here clearly lies with the nation states. However, diverse coalitions of regional and global actors argue that the prevailing governance framework, including the diversity of instruments and enforcement mechanisms employed by nation states, are insufficient to ensure the sustainable use of coastal and marine resources, and to safeguard the global commons for human wellbeing and intergenerational equity [1]. In addition, more recent developments along global coasts, steadily increasing population pressure, expanding tourism industries, but also increased risks resulting from climate change inducing more frequent storm surges and sea-level changes, further challenge the governance mechanisms and the need for regionally, cross-border coordinated efforts. Both looking from land and sea, the coast thus represents not only a boundary but a liminal space where the effects in two directions are not easily grasped.

2.1. A new focus on marine governance reveals the importance of the coast

The discussions towards more integrated coastal governance mark a relatively recent shift in policy discourse [2]. Whilst substantially more knowledge and experience in the governance of land-based/terrestrial socio-environmental systems have been amassed over centuries, the regulation of marine and coastal systems - combined with related anthropogenic activity - remains a more recent phenomenon. To this end, there is much debate among scientific and policy circles on effective policy mixes and regulatory instruments that facilitate integrated forms of multi-scalar and cross-sectoral governance across ecologically diverse marine spaces [3,4].

Therefore, in order to safeguard and achieve the sustainable use of coastlines, future ocean governance frameworks are faced with a two-directional challenge. The first is to integrate a range of crosscutting local, regional and global concerns, often associated with unsustainable production and consumption practices, an increasing world population in the face of planetary resource boundaries (the UN predicts a world population of 9billion in 2050), the weakening resilience of natural ecosystems, combined with anthropogenic climate change and variability. The second challenge rests on how to address the complexity of an already overburdened and fragmented ocean governance system, especially with emerging developments such as deep-sea mining, and more remote and environmentally sensitive areas such as the Arctic being accessed for new activities. The questions coastlines pose to governance on land are similarly complex: many things which happen at several places on land have effects on the coast, while the coastlines themselves are under pressure of competing land uses [5]. The issue of scale is also visible on the land side.

At a regional level, Europe for instance is witnessing a shift towards a transformative policy approach in the way our oceans, seas and coastlines are managed. To enable the flourishing of a Blue Economy while protecting natural resources and safeguarding sustainable livelihoods, a more inclusive, nuanced and context-specific governance approach of oceans and coasts has been assessed as being necessary (Joint Communication of EU Commission, Council & Parliament 2016/49, Commission Implementation Decision 2014/1447; COM, 2012/494 final; COM, 2014/86 final). Consequently, the European Commission has embarked on a consultative process to consider how best to strengthen policy coherence and comprehensiveness on improving its marine international governance framework (European Commission, 2015). Among these are the more recent shifts towards international ocean governance ("016/49), a new marine spatial planning approach (Council Directive 2014/89/EU) and the Marine Knowledge 2020 initiative (European Union Maritime Affairs, 2012).

These steps on the European level are accompanied by a rapidly transforming post-2015 Development Agenda as well as ongoing dialogues of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) on the one side and the uprise of nationalistic populism in many parts of Europe and the United States, on the other side leading to the renegotiation of the terms of international cooperation. The universal set of Sustainable Development Goals (SDGs), combined with climate action, have revitalised debates ranging from the primacy of Blue Carbon and the sustainable use of marine biodiversity in the Areas Beyond National Jurisdiction (ABNJ) Programme, to the development of international exploitation rules for deep-sea minerals within the aegis of the International Seabed Authority (ISA), as well as territorial disputes as exemplified in the South China Sea. The ocean thus increasingly becomes object of territorial disputes – in some cases linked to nationalist reasoning.

Looking from the land towards the sea, the multiplication of boundaries one often finds on coast lines, as well as the wide diversity of networks, from local to global, which use the coast as base, pose very similar issues of policy coordination and integration. What makes the challenge for actors in land-based governance harder is that they often do not observe the effects of their activities and (lack of) coordination on the marine environment. And that few marine areas have the same density of (de facto) governance systems and layers as the coastal land regions, since that's where most people live and work, including the decision-makers on the sea.

2.2. Governance challenges amplified: arguments for Evolutionary Governance Theory (EGT)

A challenge to all these regional and global discussions is the balance between global and trans-regional perspectives, and on the other hand local-level governance capacities for their implementation. Despite the existence of excellent marine sciences in Europe for instance [6], scientific organisation and expertise representation on oceanic and coastal governance and the expertise-based, while politically and societally viable transformation of ocean and coastal governance regimes remains a challenge [7,8].

From these initial observations on the current challenges facing coastal areas, and the demands on coastal governance, one can distill three areas of concern:

- The recognition of the coast as an area by itself, more than a boundary
- The difficulty of observation in governance in two directions, between land and sea
- The difficulty of policy coordination and integration, on land, at sea, between land and sea

It is this situation that encourages the authors of this contribution to reflect on coastal governance and its challenges ahead out of an evolutionary governance theory (EGT) inspired perspective. The aim is to (a) contribute to a better understanding of the current coastal challenges at hand by reflecting them through the conceptual lens that EGT offers; as well as (b) to advance EGT as a conceptual tool for assessing governance challenges in motion with reference to marine and coastal conditions.

Evolutionary governance theory (EGT) offers a framework which leaned initially on social systems theory, post-structuralism, and institutional economics, but which recently has been expanded to account more fully the roles of materiality, of the co-evolutions of social and ecological systems [9]. EGT has not been applied yet to the analysis of coastal governance, the aim of the special issue, this paper is embedded in. In the following sections, a selection of key concepts from the theory is presented, selected with the vantage point of coastal analysis, and with the aim of building on the theory as much as applying it.

EGT pays special attention to the roles of knowledge and narrative in governance, and the links between the formation of discursive objects (such as 'the coast') and the evolution of organisational forms. For EGT, new observations can lead to new objects, from there to new problem definitions and possible solutions. Most likely, new linkages between existing policies and policy domains have to be formed, and EGT can shed a light there on both the need and the limits of reform and integration. For those reasons, EGT looked promising for a re-description of coastal governance.

Our aim is a re-interpretation of what makes coastal areas unique, a uniqueness which is called here t*he coastal condition*, and which will be translated into governance terms. The main reason for this is our view that an interpretation of the coastal condition in EGT terms can open the door for a re-interpretation of problems of policy and planning for coastal areas, where EGT can shed a light on new modes of adaptation to changing circumstances, and on the limits of adaptation and institutional design to deal with emerging issues - declarations of the need for new organisations, plans, policies. A co-evolutionary view of coastal communities and their governance can bring us a step closer to solutions for pressing problems across the world. It can discern which solutions are more promising than others, and which promises to believe more than others, when looking at practical suggestions on governing the coast [2]. It is that promise which will be articulated and argued in the following paragraphs.

In the next sections, first, a selection of EGT concepts is introduced, after which a reflection on earlier solutions to coastal management is presented, in particular the experiences with Integrated Coastal Zone Management (ICZM). After this, a new image of the coastal condition is built, leaning on EGT, and the problems encountered by ICZM. Then, possible roads towards coastal governance are considered which can be better adapted to current problems, more adaptive overall. EGT sees problems and solutions differently, and discerns also boundaries in the pursuit of particular solutions.

3. Evolutionary governance: Mutual interdependence of the elements of governance

Evolutionary governance theory understands governance as radically evolutionary [10]. Governance, the making of and living by collectively binding decisions in any community, is a processual amalgam of the continuous, ever changing, and thus evolutionary interplay of actors, institutions, knowledges and systems of sense-making, (natural, technological, infrastructural) materialities and interest formations in any community, in any location and at any point in time. All elements are heterogeneous in themselves. Different actor groups are guided by different belief systems or stocks of knowledge, confirm or contest a particular set of institutions, while establishing new ones, adapting to changed materialities (due to technological advances or environmental change processes etc.) or fostering exactly the change processes that alter the given materialities.

3.1. The elements

One is thus confronted by a continuous interplay of not only a range of different elements, or types, crucial in any governance process, but furthermore by the interplay of these very diverse forms of each element, thus sub-types. The often drawn distinction between 'the formal' (often associated with the state and the doing of its legislative body) and 'the informal' (often associated with non-state, civil society, 'on the ground' systems of cognitive and institutional orders) spheres of governance offers another level of analytically sorting these elements constitutive to governance processes. Empirically nevertheless 'the formal' does not exist without the constant interplay with the informal [10,11]. Instead, also formal & informal are inseparably tied to each other – not as distinctly separate binaries, but as interdependently linked, two sides of the same coin.

Natural resources governance in general, and marine and coastal resource governance in particular, empirically illustrate this and therefore have to be understood as an interdependently linked interplay of

(a) its constituting elements and types, namely actors, institutions, knowledges, materialities and strategic interests;
(b) their heterogeneous sub-types, namely the diverse actor groups involved, the diverse, possibly competing, mutually undermining or reaffirming, institutional frameworks, diverse stocks of knowledge, systems of sense-making and their respective degrees of epistemic authorities, the diverse coastal, marine, terrestrial, hard infrastructural or technological materialities, as well as strategic, economic, political or social interests; and
(c) the different formal, informal and in-between institutional levels acting as framework conditions

It thus becomes important to acknowledge contingency as a key aspect of governance evolution, in the sense that the next step in the evolution of a governance system, and hence the result of many steps, is a possible but not necessary outcome [12]. The more actors and institutions co-evolve, the more rigidities, i.e. constraints, but also potentials for co-evolution, arise. The recognition of contingency is not a trivial matter, as it points out that, neither in the effects of problems, nor in the search for governance solutions, one can expect enough similarity of conditions to allow for one size fits all analyses [13].

When considering coupled social-ecological systems of coastal

communities, the EGT concept of dependencies looms large. EGT distinguishes between path dependencies, interdependencies and goal dependencies, together making up the rigidity in contingent governance paths. Flexibility stems from the interplay between the different dependencies, from creative choice in the process, and from unexpected events in social or ecological environments.

3.2. Dependencies

Path dependencies are legacies from the past which influence the current reproduction of governance. These dependencies can have many forms, as has been recognized in economics, political science and other disciplines. For current purposes, and inspired by earlier analyses, one can distinguish here between cognitive, organizational and material path dependencies [14]:

- *Cognitive path dependencies* are a matter of concepts, narratives, ideologies inherited from previous states of the governance system, either through actors believing in them, or through embedding in policies, plans, laws, and in informal institutions. They are a conservative manifestation of power/knowledge, where the knowledge is not always susceptible to manipulation by actors, where the stories embedded in governance exert their hold over actors and their interactions to a degree they can never be fully aware of.
- *Organisational path dependencies* are referred to as the legacies imbued by inherited actors and institutions: the previous inclusion/exclusion of actors, the previous choice for this or that institution as tool of coordination shapes what can happen next.
- Finally, *material path dependencies* stem from both natural, technological and cultural factors, from features of natural systems (rough coastlines), social systems (producing, for example, concrete or nature based coastal protection) and from particular interactions between social and ecological systems (say, the emphasis on mining in a particular community).

Goal dependencies are impacts of visions for the future on the current reproduction of governance. (The sustainable development goal 14 (Life below Water) in the United Nations Sustainable Development Agenda 2030 would be one of those goals influencing todays' governance decisions.) Those visions can be previous plans, directly deliberating a preferable future, but also policies, laws and informal institutions which implicitly rely on images of a particular future, either a desirable or an undesirable one. Goal dependencies can be the various effects of goals in the narrow sense (as targets), but, more commonly, the effects of previous choices hoping to bring a preferred future closer. A plan e.g. might have targeted more sustainable fisheries, but might have produced the opposite effect, for a variety of reasons described by others in the policy literatures [15,16]. One can refer to the goal set by the Convention of Biological Diversity to protect 10% of coastal marine areas by 2020. No matter if the goal is reached or not, many of the parks will be ineffective paper parks and there is a discussion about the sometimes competing goals of nature conservation and human well-being [17]. Translated in terms of environmental feedbacks, Valentinov (2015) [18] would argue, and this paper concurs, that negative feedback from the environment (e.g. 'the plan doesn't work') can cause a reorientation (a second order goal dependency) yet this does not exclude further unobserved effects of subsequent decisions in the environment.

Finally, *interdependencies* are dependencies in the present, between actors and institutions, between actors, and between institutions. A policy relies on a law to have an effect, an NGO depends on a University to make its argument, a plan relies on key actors for its implementation (or formation). In a broader social-ecological systems perspective, a perspective needed to analyse the coastal condition, one has to add interdependencies between social and ecological systems: elements and features of ecological systems become natural resources in a particular interplay with social systems, their mode of organisation, or, on the contrary, obstacles, problems, limits to development [19].

3.3. Co-evolution and system creation

All three dependencies play out at the same time and influence each other. Interdependencies right now are shaped by a variety of path dependencies, while they create new path dependencies. Path dependencies and interdependencies shape goal dependencies, while goal dependencies can only be understood as properties of the whole governance system, including its path and interdependencies. The effects of an existing future-oriented policy on current governance, or a discursive frame such as the UN Sustainable Development Agenda 2030, can only be explained by taking into account how actors and institutions relate right now, and to what extent they reproduce older configurations of ideas, of actors, of institutions, revolutionize or develop these further.

The three dependencies, seen through the lens of social systems theory, in particular Nikolas Luhmann's theory [20], can also be analysed in their system-building effects. If one sees coastal communities as marked by different dependencies, internally, and with their ecological environment (see below 'Coastal condition'), then the dependencies of evolving governance can be seen as shaping all systems involved, and reducing the unpredictability in the behaviour of all for all. Local organisations are formed as social systems form, as social systems, endowed with knowledge and coordinative capacity to work in the boundary-spanning environment of the coast, and allowing to couple politics, economy and law in a localised way [21].

Actors are formed by power/knowledge interactions and they alter power/knowledge relations through their actions, e.g. their use, interpretation and creation of institutions. Power/knowledge, for Foucault and in EGT, is the material for strategy, yet the strategist can never escape from power/knowledge [9]. He or she uses self-definitions and views of others associated with discourses which then whisper strategies, inspire to see problems and solutions, hint at the inclusion of particular narratives in governance, at the exclusion of particular forms of expertise, e.g. by dismissing them as folklore or irrelevant or as used for mere manipulation by other actors [22]. Narratives, knowledge and expertise are all considered knowledge in this view, with different forms of knowledge underpinning, producing and conditioning others [23]. In governance, where competition between understandings of the world is the name of the game, knowledges necessarily entangle, are excluded and exclude others and other things, and this dynamic is often utterly productive: new objects and subjects are created which can provide common ground between actors and discourses, or ammunition in further clashes [24].

These notions from EGT hope to enable a first articulation of the coastal condition, to be addressed with the tools of governance.

4. Previous attempts at coastal governance: Integrated Coastal Zone Management

There are previous attempts to look at the coast as a unit for policy-making of course [25–28]. Countries have their own approach, some coming in the direction advocated above, but there is the special case of Integrated Coastal Zone Management (ICMZ), an approach which explicitly tries to address coastal zones as unities, and delineated areas with a land and sea part, aiming for new forms of policy integration at that level. A brief analysis of the experiences with ICZM can help us to sharpen the image of the coastal condition, and start from ICZM to move in the direction of adaptive coastal governance.

4.1. A brief genealogy of ICZM

The history of ICZM starts after the UN Earth Summit of Rio de Janeiro in 1992. At European level, the European Council adopted two

resolutions, in 1992 and 1994, acknowledging the challenges in coastal zones and calling for an integrated approach for sustainable management. Between 1996 and 1999, a Demonstration Programme, consisting of 36 projects, was expected to provide technical information and to stimulate debates among the various actors involved in the planning, management or use of European coastal zones. In 2000, the Commission adopted two documents based on the experiences of the Demonstration Programme: a communication titled "Integrated Coastal Zone Management: A Strategy for Europe"; and a European Parliament and Council Recommendation concerning the implementation of ICZM in Europe. This Recommendation was adopted by the European Parliament and Council on 30 May 2002 (2002/413/EC) and aimed at sustainable development based on eight common principles defining ICZM. National ICZM strategies were called for. Exchange of knowledge and best practices were stimulated especially under INTERREG programme [29].

In 2006 an external evaluation of EU ICZM recommendation was performed. The national strategies deadline was February 2006, but none of the twenty members, plus Romania had strategies at implementation stage. The evaluation confirmed (in its own eye) the validity of the ICZM principles and concluded that implementation should further progress on the basis of the EU ICZM Recommendation [30]. The 2007 Green Paper “Towards a future maritime policy for the EU” stayed close to the content of the 2000 communication.

On 12 March 2013 the Commission adopted a proposal for a directive establishing a framework for maritime spatial planning and integrated coastal management (Directive Proposal for MSP and ICZM, 2013). This initiative was aiming to help the implementation of several other EU policies relevant for marine and coastal areas like the Marine Strategy Framework Directive, the Water Framework Directive, the Natura and Habitats Directives and the Biodiversity Strategy, the Integrated Maritime Policy, the Strategy on Climate Change Adaptation, the Renewable Energy Directive, the Motorways of the Sea Initiative and the Common Fishery Policy. The proposal became a directive on 23 July 2014 (MSP Directive). But the link with ICZM was mentioned only in Article no. 6 (2), as follows: “aim to promote coherence between maritime spatial planning (…) and other processes, such as integrated coastal management (or…)”.

4.2. Assessment of ICZM

Academic assessments followed in recent years [31–36]. O’Hagan et al. [37] (this special issue) assess the implementation challenges for land and sea, focusing on how legislation and organisations responsible for implementation have evolved in the context of European Union regulations envisioning either land or sea. Mazé et al. [38] examined to what extent the implementation difficulties resulted from knowledge/power issues at the core of interactions among multiscalar networks and actors which are also usually tied to either land or sea. The underlying rationalities of ICZM as a global paradigm for coastal governance were analysed by Zinzani [39], who linked ICZM emergence and relative weakness to unstable discursive coalitions and shifting development paradigms.

In policy terms, it seems that the delineation of a coastal unity for governance present in ICZM was erased in the new policies aiming at marine spatial planning. At the same time, the level of ambition in terms of policy integration in the new MSP approach was even higher than in the ICZM paradigm and documents, while that policy integration very rarely took place. Little policy learning took place apparently at the EU level. The emergence and evolution of ICZM and the more recent move towards marine spatial planning can be understood with an EGT lens: goals formulated in the UN Earth Summit led to the development of ICZM. Unintended consequences (in this sense a second order goal dependency) and interdependencies – the rather strict separation of actors and institutions of land and sea – have led to a reorientation towards less integration between the land and the sea, namely marine spatial planning. One can argue that a lacking understanding of the coastal condition is part and parcel of the problem (together with the usual business of shifting discursive coalitions in EU policy making). Hence the attention will be turned to EGT and its image of that coastal condition.

5. The coastal condition

Since people cannot live in the water, and certainly not in salt water, any coastal community is predicated on risk [40]. From that, one can deduce, and observe, an importance of the stories and knowledges which underpin risk calculation, which explain risks of coast and sea to the community itself. Dealing with the coast, using the locational advantages (for trade, fishing) necessitated forms of organisation, tools of governance otherwise not common - one can think of the development of insurance industries in medieval Europe, co-evolving with international trade.

5.1. Patterns of interdependence produce unique modes of observation

Interdependence asserts itself as the key dependency in coastal governance [41]. Knowledge of the tight coupling between social and ecological systems becomes essential in steering the community away from danger, and enabling it to see opportunities. The behaviour of the sea, the connection to the sea, the buffer from the sea (dunes, wetlands), the state of the connection inland (complementing the sea connection, making it functional), all these things become central to strategising in coastal communities. The interdependence between community and environment tends to create tighter interdependencies within the community [42]. New forms of cooperation, new specialised roles, new tools of coordination have to arise to deal with the challenges posed by the location.

Coastal communities are constantly reminded of their place in the social-ecological system, of the power of nature over their welfare and prosperity [40]. They are forced to make choices early on, adapt their governance structures and physical infrastructures to their location and economic objectives, and these create material, organisational and, material *path dependencies*. The tight relationship with the physical environment makes for strong *material path dependencies,* which refers both to direct impacts of the environment, as impacts of physical infrastructures which responded previously to that environment. Think of expensive harbour infrastructure, think of highways connecting ports to capitals, and think of costly dredging and land reclamation histories and routines [9].

Coastal communities are situated on an edge, a social-ecological boundary. They straddle that edge in a way never fully understood by others [43,44]. They developed not only forms of organisation enabling this, but also forms of observation making it possible to understand what's happening on and under water and relating it to potential activities and to the organisation of their settlements on land. Think of the South Pacific, where people perceive the coral reef as their garden. The ecological boundary can be described as a mosaic of ecosystems, ranging from various types of dunes, cliffs and coastal wetlands and estuaries, to the shallows, reefs and islets on the side of the water [41]. Water and land interpenetrate, also through groundwater flows, while freshwater and saltwater create complex gradients defining a myriad of ecosystem and vegetation types. The coast itself can be described as a meta-ecosystem, not a border but a boundary zone, a zone of more complex and dynamic exchanges and dependencies [3].

What looks like a hard line for many outsiders, in other words, tends to look like a zone for insiders [44,45]. The insider observation therefore has a value for larger scale governance systems, with a relation to the sea. This constitutes in our view an argument for inclusion of local coastal perspectives in higher level governance affecting the coast, and it is an argument for the formation of governance configurations embodying the zone, rather than the boundary.

5.2. Marginality and centrality in multi-level governance

Slow effects of human action, slow since buffered by the mass of the sea, makes collective action rather difficult being achieved and more immediate pressing issues are coming to the fore [46]. This makes the experience and observation of coastal communities all the more valuable, while also posing limits to their observation, and a need for other forms of knowledge (expertise), likely associated with higher level administration, to enrich coastal governance locally. This too, forms an argument for calling into existence arenas for coastal governance. Such arenas can, in Luhmannian terms [20], never take away the blind spots in the observation of environment and self, thus in the environmental effects of local action and action elsewhere, therefore they are not a guarantee for long term sustainability, but through institutionalising second- order observation, it is likely that the blind spots will be reduced and amenable to ongoing management. Indeed, the observation of observation (second order observation), of distinctions made by other systems (and actors associated with or representing them) can make a difference when managing environmental risk, and the possibility for actors to play a slightly different role in a new arena can help by further diversifying perspectives, by loosening couplings between organisations, function systems, episodes [47].

This is all the more necessary because coastlines often come with the additional problem of multiplication of administrative/political boundaries, a phenomenon stemming from the need of different levels of governance and the easy choice for the coast as a boundary (because of the material dependencies mentioned above). In a modern nation state, a coastal community easily sits on three political/ administrative boundaries, linked to local, regional and national administrations. Overlapping boundaries create more complex dependencies on the centre [48]. The land might have regulations on the communal governance level, plus laws which might be associated with a national boundary or national interests. The sea is much more influenced by national legislation [37,49]. Multi-level governance is thus a natural given in many coastal communities, yet the coupling will differ from the situation in other communities, with central influence asserting itself in more unpredictable manners, more likely to disrupt local governance. While the social-ecological interdependency, important locally and not fully understood centrally, will put an additional pressure on the functioning of multi-level governance, causing locally unpredictable behaviour in the eyes of the centre.

The marginal position on the coast simultaneously allows for more contact with everything outside the nation state, with escape routes, communication routes; exposure to foreignness can cast a doubt over prevailing rules and belief systems promoted by the centre [50,51]. Places of foreign trade were not only breeding grounds of democracy (and merchant aristocracy), but also places of hybrid beliefs, of cynicism and worldly wit - 'they've seen it all [52]. Which reminds us that an overlapping of boundaries creates its own spaces of freedom (just as complex legal systems offer a myriad of loopholes), while the relative smooth space of the sea offers, following a Deleuzian perspective here, the virtuality of new connections and flows, of goods, people and ideas, a partial escape from the control mechanisms of the state [12,51].

The particular complexity of coastal communities, their boundary and observation issues, bring particular problems with them for *policy integration.* While both old issues (e.g. erosion, pollution, salinisation) and emerging issues (sea level rise, weather variability, energy transitions) make it all the more necessary.

5.3. Specific need and specific obstacles for policy integration

Full policy integration is not possible without losing the specificity of different policy domains and spatial territories [53]. Moreover, many institutional designs are possible when aiming at a form of policy integration, and each choice implies a prioritising of this expertise over that, this actor over that one, this institution over another [11]. Policy integration also has the potential to undermine checks and balances, and to reduce flexibility and institutional experiment - therefore adaptive capacity [54]. For coastal areas, the observation and boundary issues described, the dependency on an unpredictable environment, the evolution of layers of actors and institutions associated with either land or sea, add problems.

This *tension between need for and obstacles for policy integration* is a feature of the coastal condition, partly underpinned by the other features. The experiences with ICZM point in the same direction. Material and other dependencies intertwine, make certain observations easier, make at the same time forms of coordination harder. Coastal communities might be better able to observe the sea. They also are in a good position to observe the compounded coastal effects of different activities (and policies governing them) on land, but are not in the best place to grasp the interrelations between the land based activities, and certainly not to manage them. The argument for a delineation and governance of the coastal still stands, but now is specified: coastal governance has to observe in all directions, to grasp the interplay between actions, between policies, on land, at sea, at the coast, which all effect the coast. A high degree of coordination is thus required, a high degree of policy integration, while the identities to be coordinated (actors in and outside administrations) shall not and cannot be erased by the process of governing together. The ICZM experiences highlight both the difficulty of creating coastal governance entities and the difficulties to come to real policy integration in such context. MSP is more ambitious with policy integration, and its chances have to be doubted, at least when the goals are taken literally.

The standard recommendation to prescribe policy integration [55], in the form of a more comprehensive form of planning, conservation, development, or more expertise-heavy governance procedures [4] is thus on the one hand very rational for coastal conditions, and on the other hand subjected to the particular pressures and complexities of the coast. The reasons to delineate a coast (as line, boundary) are still there and therewith the reasons to govern the land and the sea in their own ways. The actors which have evolved to play a role in the governance of land tend to be more numerous, powerful, and stabilised in their identity than the ones associated with the sea. Coastal actors tend to be absent from higher level governance, with the exception in some places of large port cities and their lobbies, representing a narrow set of goals which cannot be represented as the collective goals of the coastal communities.

5.4. The coastal condition asks for coastal governance

For EGT, prior modes and sites of policy integration enable further policy integration in that frame, and have to be explored first as possible arenas for and forms of new strategy formation, as places where policy integration can be rejuvenated [56]. Not doing this, would create a problem similar to that of direct import of policy solutions: they would not be adapted neither to the governance system nor to the ecological system, and therefore, in most cases they would not be able to provide a sustainable governance solution [9].

To radically restructure policy integration it would have to be linked to new and accepted governance arenas, their actors and institutions. ICZM taught that they cannot simply be mandated, and certainly not by means of blanket rules [57]. The arguments for delineating a coastal zone, as site of more complex observation and policy integration, are strong, yet in EGT perspective will take time to be made and remade. The more sensitive the actors arguing are for existing governance configurations, the more likely there will be real impact [58]. If coastal communities are not organised, if the coast as discursive object is not widespread in society, if the coastal effects of many land issues are not observed, the case for coastal governance is more difficult to make in a particular governance context. Conversely, if the object is there, if actors can align around the object, and a relatively decentralised form of multi-level governance exists, chances are higher for it

to come into existence [56].

The coastal condition in EGT perspective thus revolves around different patterns of dependencies, observational complexity, and multiplicity of boundaries, reinforcing each other into a need and a problem for policy integration. The coastal condition requires a coastal form of governance, associated with the coast as boundary zone, as impact zone, as launching base. Processes of object and subject construction can partly be steered, and shape the chances of what is possible for new governance arenas. Similarly important is the context of multi-level governance which allows for certain modifications, not others. Finally, the governance path itself requires scrutiny, has to be a source of inspiration for any attempt at new adaptivity and sustainability [9].

If coastal communities are thus per definition adapted in a particular way to a particular coastal condition, if their diversity is a reflection of different positionalities and choices within such coastal condition, one can nevertheless not claim that all communities are perfectly adapted. Old phenomena intensified (tourism effects, agricultural and industrial pollution), increased linkage between places (globalisation), and new sources and forms of change (climate change, sea level rise), as well as an increasing complexity of policy goals (e.g. associated with intense multi-use situations) bring along new requirements for adaptation. New forms of adaptive governance are needed, in other words, and it is known by now that these forms have to take into account the coastal condition and the governance path. New reasons for new forms of coordination arise, and, with them, new forms of observation and policy integration. In the next section, this overarching issue will succinctly be analysed in terms of different existing gaps in coastal governance, and possible ways forward, both observed through the lens of EGT and our conceptual frame under construction.

6. New forms of adaptation to new and intensified governance problems

Ports and other coastal towns learned from each other, and competed avidly for ages, learning new techniques of navigation, shipbuilding, fishing, trading, planning, yet, as with other places, not all survived. Specialisation is always a risk, and a tight coupling with a particular ecological system, too. Governance is always adaptive in the sense that what is not adapted, perishes. The following paragraphs distinguish between different sorts of gaps, associated with different dimensions. Working on these gaps can, in our view, help to move coastal governance towards sustainability. Adaptation is linked to learning, response and observation.

6.1. Gaps in the 2 dimensional map

Globalisation and new technologies have made more parts of the seas useful for someone [59]. While the system of nation states and their seaward boundaries, and the weak state of international marine treaties make it hard to coordinate action and response to unwanted action [60]. Many parts of the open sea are harder to manage than before, because there is more to manage, and because there are more boundaries to observe for state actors. Other actors, especially illegitimate ones, do not have that problem. So, de facto new gaps emerge in the map of spaces that ought to be governed [61].

These are not coastal places, but for the coast, these gaps in observation and governance produce the most immediate effects. The legitimate local activities will combine and compete on the high seas in less predictable ways, and some will affect the activities closer to home - fishing by more players far out, places more pressure on coastal communities, and reveals more clearly existing governance gaps. It also reveals the limits to previous observations of the resource, where observation of critical limits in the past was not possible but also not necessary, while today it's still impossible but more and more needed. The co-evolution of community, coast and sea thus becomes more problematic, due to increased interdependencies [41].

6.2. Gaps in the 3rd dimension

The third dimension is of particular importance in the marine environment. The seafloor is a two dimensional space to be governed. Due to new economic activities and new technological possibilities, actors arise, who want to have privately assigned property rights. Wind or wave power farms need governance securing their rights. Mariculture has clear space requirements, but already moves clearly into the third dimension, having strong implications on the water column. Fishing rights, marine protected areas, or effluent discharges are all in particular relevant for the water column. Here fluidity becomes an important characteristic of marine governance: the columns and layers of water can be home to different activities, which nevertheless affect each other. Moreover, water moves, and neither columns nor layers are delineated in a stable manner. Governance predicated upon stable spatial boundaries in two dimensions misses thus the point, i.e., does not observe problems and opportunities [45].

New technologies and scarcities led to exploration of deeper water and of the deep seafloor itself. Economic interests of the previously disregarded deep sea emerge strongly. Most likely due to the lack of economic interest, it was politically feasible that the deep ocean became at least formally, with the help of the law of the sea, designated as a common good, a joint heritage of human kind. However, in the 80^{s}, when the convention was first issued many of the potential uses of the deep sea resources could not be envisaged. Narratives regarding their good governance remain underdeveloped. Now, formal institutions are tested and fail [26]. New forms of governance have to emerge. This might not be coastal governance itself, but these developments at sea add to the reasons for new adaptation on the coast: what happens at sea can end up at the coast (e.g. pollution from mining, drilling, effects of killing), and, positively, the new activities most likely require a coastal base, changing the balance of governance in coastal communities as well (think of power relations around the Gulf of Mexico).

Gaps in the 2nd and 3rd dimension reinforce each other, and the complex movements of water render the governance challenge even harder. Similarly to the previous point, this is not a coastal matter immediately, but a matter which affects coastal communities in their livelihoods far more directly than any other place. The entwined gaps create new opportunities for some coastal communities (benefiting from loose regulation), have the potential to change the identity of some, especially those coming first and close to a resource (as offshore oil development did some decades ago), while increasing inequality and unpredictability. One could say that the new governance gaps represent a loss of adaptation between the international governance order and the global marine environment as encompassing ecosystem. Or, the new opportunities and risk map threatens to throw back the governance system into an older, less developed state, meaning less capable of managing complexity, less capable of promoting whatever common good is observed [20].

6.3. Gaps in the 4th dimension

Coastal and marine ecosystems are notoriously hard to model, hard to predict, and neither science (in its current state) nor local knowledge (in its diversity), are capable of avoiding surprises. With the increased effects of human activity in and on the sea, and the increased demands on the sea (see above), new time horizons require observation and governance. Observation is not easy, as the sea and its creatures respond slow to many things, while even without human disturbance, many ecological, biological and geo-chemical cycles are very slow and complex, and influence each other through still unobserved feedback loops [62].

New issues require new time horizons, and, as with the 2nd and 3rd dimension, what remained unobserved and unproblematic can now be observed and becomes problematic. Climate change adaptation is felt most directly on the coast as a problem, and the new observations, the

emergence of a picture, might occur later than the actual need for coordination, for governance [63]. The current rising temperature of the ocean is caused by emissions since the industrial revolution and would have required a governance change long time ago. Even if governance systems are abruptly changed now, trends will be reversed many decades later [64].

The previous governance configuration, a limited understanding or the inability to measure might not have enabled the timely production of narratives, expertise, and associated observation, to allow for timely adaptation [65]. For EGT (following systems theory here), it is not only that perfect adaptation of governance systems to social and ecological systems is not possible, there is also a real risk of catastrophe, as one can never know for sure whether the quality and timing of our observation and our capacity of coordination are in sync with changes in the material environment [62]. Even if some of those changes are man-made. In tightly coupled coastal communities, the effects are most pressing.

Actors have their own time horizons, but so have institutions. And the narratives, expertise, and ideologies used by and shaping actors and institutions are affected by time in various ways: the cycles of change reshaping them, the histories constructed by them, the time horizons embraced by them. What is decided upon in governance, and the tools constructed for coordination in and towards the future are per definition imperfect in this sense too: the time horizons and time effects in all the participating actors, discourses, institutions, forms of knowledge, can never be fully grasped, let alone coordinated, let alone matched to imperfectly observed and non-linear phenomena in nature [57].

New stories can make a difference though. New stories can be written, told, retold, performed, and old stories can be unveiled and examined [23]. Discourses can find a place in new discursive coalitions. New stories can lead to the emergence of new actors, of new institutions, of new objects (the coast, climate change, fish stocks) of governance [65]. EGT would add that, besides scrutiny of present/absent visions for the future in governance, also the effects of old futures and their time horizons on current governance require analysis - the goal dependencies - similar to Jasanoff and Kim [66] and Beckert [67] in this regard. Reconstructing goal dependencies can help to see how series of previously imagined futures exert influence on the reproduction and evolution of governance. This effort can assist in finding and filling gaps in a discursive sense, but also in understanding how new versions of the future could possibly have different effects on the self-transformation of governance.

7. Conclusion

Coastal communities across the world face problems that current governance systems cannot cope with easily. This paper argued that understanding the coastal condition through the lens of evolutionary governance theory (EGT) does not produce immediate answers to those issues, but that it can help to reframe both the bigger issues and the options available at the local level to coordinate action, to adapt governance in new manners.

7.1. Governance for the coastal condition under new conditions

It was argued that, given the unique patterns of co-evolution in coastal communities, the particular forms of coupling between social and ecological systems and within social systems, they have been adapted for a long time – since they had to. The materiality of the ecosystem has been felt for a long time, very directly, but some of the core material challenges arising (sealevel rise, cliff erosion, proliferating plastic, dwindling stocks, changing temperatures) require new forms of attention. Recent evolutions in the global socio-ecological system have left the local coastal communities particularly vulnerable, and having to rethink their mode of adaptation. New forms of governance, new modes of observation, of coordination are needed, at different scales.

The presence of the sea always made coastal communities places adept at risk and opportunity calculation, and acute observation. They invented forms of governance based on actors and institutions not present elsewhere, relying on observation, knowledge, response capacity hard to grasp for outsiders. All these aspects of governance are tested however by the new challenges, the material ones mentioned, and challenges of globalisation, scarcity and technology. The same environment, the same technological progress, and even the same scarcity, however, can also be sources of inspiration and solutions. What has to be rethought is the series of interconnected practices of learning – observation – risk calculation – response – adaptation. If one can see better, aided by EGT, how these linkages worked in a particular governance path, how governance configurations enabled and disabled forms of observation, of learning, of constructing futures (both desired and feared), then it is easier to see how new governance configurations can accommodate new forms of learning etc. The governance path also shows mechanisms of self-transformation which come in handy anyway, for whatever form of change one aspires to.

In a globalising context, still dominated by nation states, the diagnosed governance gaps can only be filled by analyses and strategic thinking in multi-level governance. More and more issues are connected, and solutions similarly have to take into account that connectivity, and the relations and resources of different levels of governance. Purely local solutions cannot exist. However, the local is conspicuously absent from much strategising about changing coasts, and so is the coast itself. That is, rarely, a form of governance exists which represents 'the coast', as boundary zone, as place of linkages and observation of linkages, as zone of potential boundary crossing, as zone burdened by a particular layering of boundaries and particular forms of escaping them.

From our reconstruction of the coastal condition through an EGT lens, and the diagnosis of governance gaps, follows a strong argument for a recognition of the coast as an object of governance, deserving a site of governance. In that site of governance, an arena, policy integration is both more necessary and more difficult than for other areas. Yet, not doing this makes the challenge even greater, makes the unobserved impact of various overlapping boundaries and coupling even more problematic.

7.2. ICZM, seen through EGT: points of attention for coastal governance reform

The experiences with ICZM, which followed roughly the same reasoning, and our analysis of the coastal condition, show however a few other things which EGT elucidates:

- New forms of governance (coastal governance) cannot disregard existing forms and their evolutionary path
- New forms of policy integration (in coastal governance) cannot disregard existing forms of policy integration
- If object formation ('the coast') is weak, governance around it is likely weak
- Policy integration has to be flexible, to allow for adaptive governance
- Stories about the coast, about risk and opportunity, shape observation, calculation, governance
- New forms of coastal governance will require a balancing act between new and old modes of observation, forms of coordination which will not disappear (pertaining to land, sea, coastal governance).
- New time horizons have to be introduced, and require re-examination and likely re-organization of the whole governance system in steps.

In other words, coastal governance in a delineated arena, and multiplication of perspectives, stories, modes of observation in that arena are highly desirable, as is their coordination and integration, while it is at the same time extremely difficult, and also risky in itself – as policy integration in a particular form introduces a rigidity, a limit to new adaptations. Coastal governance is therefore very likely to be a place of conflict, of necessary conflict. Understanding not only a multiplicity of interests and perspectives, but also an unpredictable environment, and the need for understanding land and sea as systems requiring their own governance, has to rub against a perspective on the coast as a boundary zone, an area with different observational possibilities. This creates conflict, and avoiding such conflict can only be detrimental in the long run. Coastal governance then appears as a productive fiction, an essential one, as a site of productive conflict, just as important.

8. Post-script: materiality and sustainability under the coastal condition

Coastal communities have to engage with their material environment in a different way than most others. Following the evolutionary theory of Maturana and Varela [62,68] this paper recognises that the structure of a system does not follow entirely from an optimisation of its function (an adaptation to the internal environment), nor from direct adaptation to external environments, e.g. in terms of Darwinian adaptation or in terms of the carrying capacity concept from environmental studies and evolutionary economics [63,69]. Community structures (including its governance, enabling self-transformation of structures) do not follow from either internal or external environment, although the coast does show that material environments place constraints on and co-determine the evolution of governance (compare [64,70]. Communities however do not know exactly how they are shaped by their environment [39,44], what the precise relation is between adaptation and purposive goal setting, the balance between adaptation to internal and external environments. Importantly, they are only partially aware (in line with [20]) what extent their current functioning (including governance) is shaped by adaptations to previous environments or states of the environment. This applies all the more to individual actors, or organisations as actors, which have an even more partial perspective of environmental and environmental imperatives than the collective of the community, ideally embodied in its governance system.

Sustainability, following Valentinov [65,71] is jeopardised by some of the same mechanisms of community formation and community governance which evolved to deal with environmental complexity. Societal complexity allows for more different responses to environmental change, adaptations to more aspects of the environment, and the aspect of cognitive complexity renders it possible to entertain different options as scenarios, before choosing a course. Yet, this complexity creates new blind spots, and therefore environmental risk. In addition, the coupling of a multitude of social systems in complex society makes them dependent on each other, thus shocks reverberate everywhere, and larger changes towards environmental adaptation (and sustainability) become harder to coordinate. Coastal communities affected by globalised problems, become visible then as subjected to another, not yet mentioned paradox: their particular internal complexity, evolved out of a tight coupling with a material environment, favoured sustainability under a range of conditions in the short to medium time frame, yet outside that range, in environmental conditions and in time horizon, the coastal condition made them less sustainable, and their governance systems less able to deal with change.

The degree to which they have been incorporated in nation states, in the realities of culture and governance, not on paper, and 'normalised' in the sense of incorporation into patterns of multi-level governance reigning elsewhere in the state, can signify a measure of re-introduction of broader perspectives, of other options for long term sustainability. Yet, as was pointed out earlier, both complexity and adaptation come at a cost. Simply erasing the specificity of the coastal condition (if at all possible), reducing coastal communities to any other (if at all possible), would generate as many sustainability problems as it portends to solve. The tight coupling with the material environment served purposes. Hence our argument, not against local governance nor against multi-level governance, but for coastal forms of governance, coastal arenas of decision-making which embody new couplings between social and ecological systems, and new couplings between levels of governance.

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References

[1] E.M. Borgese, Global civil society: lessons from ocean governance, Futures 31 (9–10) (1999) 983–991.
[2] J. Pittman, D. Armitage, Governance across the land-sea interface: a systematic review, Environ. Sci. Policy 64 (2016) 9–17.
[3] J.G. Álvarez-Romero, R.L. Pressey, N.C. Ban, K. Vance-Borland, C. Willer, C.J. Klein, S.D. Gaines, Integrated land-sea conservation planning: the missing links, Annu. Rev. Ecol., Evol., Syst. 42 (1) (2011) 381–409.
[4] K.K. Arkema, G.M. Verutes, S.A. Wood, C. Clarke-Samuels, S. Rosado, M. Canto, A. Rosenthal, M. Ruckelshaus, G. Guannel, J. Toft, J. Faries, J.M. Silver, R. Griffin, A.D. Guerry, Embedding ecosystem services in coastal planning leads to better outcomes for people and nature, Proc. Natl. Acad. Sci. USA 112 (24) (2015) 7390–7395.
[5] C. Walsh, M. Döring, Cultural geographies of coastal change, Area 50 (2) (2018) 146–149.
[6] UNESCO-IOC, Global Ocean Science Report, in: U. IOC (Ed.) Paris, 2017.
[7] T. Markus, H. Hillebrand, A.-K. Hornidge, G. Krause, A. Schlüter, Disciplinary diversity in marine sciences: the urgent case for an integration of research, ICES J. Mar. Sci. 75 (2) (2018) 502–509.
[8] J.P.Mv Tatenhove, H.A.C. Runhaar, H.J. v.d. Windt, Special issue: organizing productive science-policy interactions for sustainable coastal management. Lessons from the Wadden Sea, Environ. Sci. Policy 55 (3) (2016) 377–472.
[9] K. Van Assche, R. Beunen, M. Duineveld, M. Gruezmacher, Power/knowledge and natural resource management: Foucaultian foundations in the analysis of adaptive governance, J. Environ. Policy Plan. 19 (3) (2017) 308–322.
[10] K. Van Assche, R. Beunen, M. Duineveld, Evolutionary Governance Theory: An Introduction, Springer, 2014.
[11] K. Van Assche, A.-K. Hornidge, Rural Development, Knowledge and Expertise in Governance, Wageningen Academic, Wageningen Google Scholar, 2015.
[12] A. Pottage, Power as an art of contingency: Luhmann, Deleuze, Foucault, Econ. Soc. 27 (1) (1998) 1–27.
[13] E. Ostrom, A diagnostic approach for going beyond panaceas, Proc. Natl. Acad. Sci. USA (PNAS) 104 (39) (2007) 15181–15187.
[14] K. Van Assche, L. Deacon, M. Gruezmacher, R. Summers, S. Lavoie, K. Jones, M. Granzow, L. Hallstrom, J. Parkins, Boom & Bust. Local strategy for big events, A community survival guide to turbulent times, Planning and University of Alberta, Faculty of Extension, Groningen/Edmonton, Alberta, 2017.
[15] C.L. Tam, Timing exclusion and communicating time: a spatial analysis of participation failure in an Indonesian MPA, Mar. Policy 54 (2015) 122–129.
[16] G. Weber de Morais, A. Schlüter, M. Verweij, Can institutional change theories contribute to the understanding of marine protected areas? Glob. Environ. Change 31 (0) (2015) 154–162.
[17] N.J. Bennett, H. Govan, T. Satterfield, Ocean grabbing, Mar. Policy 57 (2015) 61–68.
[18] V. Valentinov, Kenneth Boulding's theories of evolutionary economics and organizational change: a reconstruction, J. Econ. Issues 49 (1) (2015) 71–88.
[19] C. Folke, T. Hahn, P. Olsson, J. Norberg, Adaptive governance of social-ecological systems, Annu. Rev. Environ. Resour. 30 (2005) 441–473.
[20] N. Luhmann, Social Systems, Stanford University Press, 1995.
[21] S. Nooteboom, Impact assessment procedures for sustainable development: a complexity theory perspective, Environ. Impact Assess. Rev. 27 (7) (2007) 645–665.
[22] M. Alvesson, H. Willmott, Making Sense of Management: A Critical Introduction, Sage, 2012.
[23] M. Bal, Traveling Concepts, New Haven, Yale, 2002.
[24] H.T. Miller, Postmodern Public Policy, Suny Press, 2002.
[25] J.P. van Tatenhove, Transboundary marine spatial planning: a reflexive marine governance experiment? J. Environ. Policy Plan. 19 (6) (2017) 783–794.
[26] J.P. van Tatenhove, The environmental state at sea, Environ. Polit. 25 (1) (2016) 160–179.
[27] J. Raakjaer, J. Van Leeuwen, J. van Tatenhove, M. Hadjimichael, Ecosystem-based marine management in European regional seas calls for nested governance

structures and coordination—a policy brief, Mar. Policy 50 (2014) 373–381.
[28] H.M. Toonen, J.P.M. van Tatenhove, Marine scaping: the structuring of marine practices, Ocean Coast. Manag. 75 (0) (2013) 43–52.
[29] European Commission, The history of EU Integrated Coastal Management Policy, ⟨http://ec.europa.eu/environment/iczm/background.htm⟩, (Accessed on 19 March 2018).
[30] European Commission, Evaluation Report on EU ICZM Recommendation, ⟨ec.europa.eu/environment/iczm/pdf/evaluation_iczm_report.pdf⟩(Last accessed on 19 March 2018).
[31] T. Birch, E. Reyes, Forty years of coastal zone management (1975–2014): Evolving theory, policy and practice as reflected in scientific research publications, Ocean Coast. Manag. 153 (2018) 1–11.
[32] L. Garten, The Coastal Zone Management Act, Consilience 16 (2016) 1–13.
[33] B. Breen, S. Hynes, Shortcomings in the European principles of Integrated Coastal Zone Management (ICZM): Assessing the implications for locally orientated coastal management using Biome Portfolio Analysis (BPA), Mar. Policy 44 (2014) 406–418.
[34] L. Celliers, S. Rosendo, I. Coetzee, G. Daniels, Pathways of integrated coastal management from national policy to local implementation: enabling climate change adaptation, Mar. Policy 39 (2013) 72–86.
[35] R. Ballinger, A. Pickaver, G. Lymbery, M. Ferreria, An evaluation of the implementation of the European ICZM principles, Ocean Coast. Manag. 53 (12) (2010) 738–749.
[36] A. O'Hagan, R.C. Ballinger, Implementing Integrated Coastal Zone Management in a national policy vacuum: local case studies from Ireland, Ocean Coast. Manag. 53 (12) (2010) 750–759.
[37] A-M. O'Hagan – this SI, Marine Policy.
[38] C. Mazé, T. Dahou, O. Ragueneau, A. Danto, E. Mariat-Roy, M. Raimonet, J. Weisbein, Knowledge and power in integrated coastal management, a Political Anthropol. sea Comb. Sci. Mar. Environ., Comptes Rendus Geosci. 349 (6) (2017) 359–368.
[39] A. Zinzani, International development policies and Coastalscape metabolism: the case of the Mekong Delta, Vietnam, Social. Sci. 7 (2) (2018) 19.
[40] W.N. Adger, T.P. Hughes, C. Folke, S.R. Carpenter, J. Rockström, Social-Ecological Resilience to Coastal Disasters, Science 309 (5737) (2005) 1036–1039.
[41] A. Schlüter, S. Partelow, M. Fujitani, Coastal systems in transition: from a 'natural' to an 'anthropogenically-modified' state, Ocean Coast. Manag. 162 (2018) 1–5.
[42] J.E. Cinner, Ö. Bodin, Livelihood diversification in tropical coastal communities: a network-based approach to analyzing 'livelihood landscapes', PLoS One 5 (8) (2010).
[43] N. Djanibekov, K. Van Assche, V. Valentinov, Water governance in Central Asia: a Luhmannian perspective, Soc. Nat. Resour. 29 (7) (2016) 822–835.
[44] J. Jacobs, K. Van Assche, Understanding empirical boundaries: a systems-theoretical avenue in border studies, Geopolitics 19 (1) (2014) 182–205.
[45] R. Shields, Spatial Questions: Cultural Topologies and Social Spatialisation, Sage, 2013.
[46] N. Cerutti, A. Schlüter, ResourceChanges: Exogenous or Endogenous, Gradual or Abrupt. Experimental Evidence Available at SSRN: ⟨https://ssrn.com/abstract=2918924orhttp://dx.doi.org/10.2139/ssrn.2918924⟩.
[47] D. Seidl, Organisational Identity and Self-transformation: An Autopoietic Perspective, Routledge, 2016.
[48] P. Sahlins, Boundaries: The Making of France and Spain in the Pyrenees, University of California Press, 1989.
[49] S.J. Boyes, M. Elliott, Marine legislation–The ultimate 'horrendogram': International law, European directives & national implementation, Mar. Pollut. Bull. 86 (1–2) (2014) 39–47.
[50] K. Van Assche, M. Duineveld, R. Beunen, P. Teampau, Delineating locals: transformations of knowledge/power and the governance of the Danube delta, J. Environ. Policy Plan. 13 (1) (2011) 1–21.
[51] R. Shields, Places on the Margin: Alternative Geographies of Modernity, Routledge, 2013.
[52] H.K. Bhabha, The Location of Culture, Routledge, 2012.
[53] K. Andersson, E. Ostrom, Analyzing decentralized resource regimes from a polycentric perspective, Policy Sci. 41 (2008) 71–93.
[54] N. Djanibekov, K. Van Assche, I. Bobojonov, J.P. Lamers, Farm restructuring and land consolidation in Uzbekistan: new farms with old barriers, Eur.-Asia Stud. 64 (6) (2012) 1101–1126.
[55] J. Friedmann, A response to Altshuler: comprehensive planning as a process, J. Am. Inst. Plan. 31 (3) (1965) 195–197.
[56] K. Van Assche, N. Djanibekov, Spatial planning as policy integration: the need for an evolutionary perspective. Lessons from Uzbekistan, Land Use Policy 29 (1) (2012) 179–186.
[57] G. De Roo, E.A. Silva, A Planner's Encounter with Complexity, Routledge, 2016.
[58] M. Gunder, J. Hillier, Planning in Ten Words or Less: A Lacanian Entanglement with Spatial Planning, Routledge, 2016.
[59] S.W.K. van den Burg, M. Stuiver, B.C. Bolman, R. Wijnen, T. Selnes, G. Dalton, Mobilizing investors for blue growth, Front. Mar. Sci. 3 (2017).
[60] O.R. Young, International Governance: Protecting the Environment in a Stateless Society, Cornell University Press, 1994.
[61] A. Schlüter, S. Wise, K. Schwerdtner Mánez, G. de Morais, M. Glaser, Institutional Change, Sustainability and the Sea, Sustainability 5 (12) (2013) 5373–5390.
[62] N. Luhmann, Ecological Communication, University of Chicago Press, 1989.
[63] M.J. Vink, A. Dewulf, C. Termeer, The role of knowledge and power in climate change adaptation governance: a systematic literature review, Ecol. Soc. 18 (4) (2013).
[64] J. Hinkel, J.C.J.H. Aerts, S. Brown, J.A. Jiménez, D. Lincke, R.J. Nicholls, P. Scussolini, A. Sanchez-Arcilla, A. Vafeidis, K.A. Addo, The ability of societies to adapt to twenty-first-century sea-level rise, Nature Climate Change 8 (7) (2018) 570–578, https://doi.org/10.1038/s41558-018-0176-z.
[65] D. Boezeman, M. Vink, P. Leroy, The Dutch Delta Committee as a boundary organisation, Environ. Sci. Policy 27 (2013) 162–171.
[66] S. Jasanoff, S.-H. Kim, Dreamscapes of Modernity: Sociotechnical Imaginaries and The Fabrication of Power, University of Chicago Press, 2015.
[67] J. Beckert, Imagined Futures, Harvard University Press, 2016.
[68] H.R. Maturana, F.J. Varela, Autopoiesis and Cognition: The Realization of the Living 42 Springer Science & Business Media, 1991.
[69] W.E. Rees, Ecological footprints and appropriated carrying capacity: what urban economics leaves out, Environ. Urban. 4 (2) (1992) 121–130.
[70] M. Duineveld, K. Van Assche, R. Beunen, Re-conceptualising political landscapes after the material turn: a typology of material events, Landsc. Res. 42 (4) (2017) 375–384.
[71] V. Valentinov, The complexity–sustainability trade-off in Nikolas Luhmann's social systems theory, Syst. Res. Behav. Sci. 31 (1) (2014) 14–22.