Adaptive governance of the Baltic Sea – lessons from elsewhere

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Abstract: Governance of marine resources is increasingly characterized by integrated, cross sectoral and ecosystem based approaches. Such approaches require that existing governing bodies have an ability to adapt to ecosystem dynamics, while also providing transparent and legitimate outcomes. Here, we investigate how the Baltic Marine Environment Protection Commission (HELCOM), the international governing body for the Baltic Sea, could improve its prospects for working with the ecosystem approach, drawing from the literature on adaptive governance. We construct an ideal type of adaptive governance to which we compare the way in which HELCOM is operating and relate these dynamics to two other international marine environment governance organizations, the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). We conclude that HELCOM deviates from an ideal type of adaptive governance in several ways but also that the other two case studies provide empirical support for potential ways in which HELCOM could improve its adaptive capacity. Key aspects where HELCOM could improve include increasing stakeholder participation – both in information sharing and decision making. Further, HELCOM need to develop evaluation mechanisms, secure compliance to improve adaptive capacity and organizational effectiveness, which entails the development of structures for conflict resolution. Finally,

HELCOM need to increase communication and harmonization between different levels of authority.

Keywords: Adaptive governance, Baltic Sea, ecosystem approach, HELCOM

1. Introduction

The ecosystem approach to management is increasingly perceived as the desirable approach to govern marine ecosystems (Murawski 2007; Ruckelshaus et al. 2008). This approach was initially developed within the Convention on Biological Diversity (CBD) and involves integrating the management of land, water, living resources and humans (COP5 Decision V/6 2000), which we address as a social-ecological system (Berkes et al. 2003). The ecosystem approach uses the ecosystem as a basis for management actions and, in order to manage complex and dynamic ecosystems, a management approach that is highly adaptive is required (COP4 1998; Malawi Principles, Folke et al. 2005). The ecosystem approach challenges historical command-and-control approaches (Holling and Meffe 1996) and sectoral responsibilities and requires inclusive structures and processes that deliver legitimate outcomes (Holling and Meffe 1996; Crowder and Norse 2008; Aswani et al. 2012).

Pioneering work on increasing the understanding of effective and adaptive governance structures and processes has been developed by Elinor Ostrom and colleagues (Ostrom 1990, 2009; Ostrom et al. 2002). A large number of empirical local case studies have delivered important insights regarding how, and under which circumstances, governance systems are likely to adapt to challenges and complex ecosystem dynamics (Ostrom et al. 2002). Key components of such successful adaptive governance have also generated a widely used framework for the study of common resources (Dietz et al. 2003; Ostrom 2009). Oran Young and colleagues (e.g. Young 2011) have studied governance systems at the international level and analysed many case studies regarding the capacity of international regimes to solve environmental problems. The effectiveness of environmental regimes has been thoroughly scrutinized (Young 1999; Miles et al. 2002; Breitmeier et al. 2006) but this literature has paid a relatively limited amount of attention to the adaptive capacity of international regimes (see, however, Young et al. 2008; Webster 2009; Young 2010).

While Young and others (Young 1999; Miles et al. 2002; Breitmeier et al. 2006) focus on the environmental problem-solving abilities of regimes, the framework developed by Ostrom and colleagues suggests a number of general principles for governance capacity for effectively dealing with change. Although these identified principles are derived from local case studies, three of them are hypothesized to be especially relevant on larger geographical scales, including analytical deliberation, nesting, and institutional variety (Dietz et al. 2003). These three principles are in turn coupled to a set of governance requirements for the establishment of effective adaptive governance in complex systems, including to: provide necessary information, deal with conflict, induce compliance with rules, provide physical, technical and institutional infrastructure and to encourage adaptation and change (Dietz et al. 2003).

In spite of the fact that more than a decade has passed since the publication of Dietz et al. (2003), little emphasis has been placed on explicitly investigating the extent to which the three suggested principles and their links to the governance requirements are, in fact, present and are especially important in international regimes for governing large-scale social-ecological systems. This study therefore poses the question: How well are the three principles and their governance requirements represented in international regimes?

We focus on the Baltic Marine Environment Protection Commission (HELCOM) in the Baltic Sea to study the three design principles and their governance requirements. We address this by developing an "ideal type" of adaptive governance, based on the links between the suggested design principles and their corresponding governance requirements. To generalize our findings from HELCOM we compare this case with the Commission for the Conservation for Antarctic Marine Living Resources (CCAMLR) in the Southern Ocean and the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) in South East Asia. All of these three regimes[1] govern transboundary resources and have implemented the ecosystem approach to management. Coming back to the focus of this study, using empirical information from the case studies, we developed a second question for analysis: How could HELCOM potentially learn from the other examples of marine management systems using the ecosystem approach and adaptive governance?

To address these questions we studied HELCOM's adaptive capacity, and potential ways in which it could be improved. We used the constructed ideal

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[1] Regimes are "social institutions consisting of agreed upon principles, norms, rules, procedures, and programs that govern the interactions of actors in specific issue areas" (Levy et al. 1995, 274). In this definition it is included that regimes should have behavioral consequences – if not it is "pointless /…/ to speak of regimes" (Young 1999, 1). While theories on regimes are interested in how regimes affect actors, the international organizations literature considers organizations as actors in themselves (Tang 2011; Barkin 2013). In this study we therefore use both the terms 'regimes' and 'organizations' when we discuss our cases. 'Organizations' refers to the actors HELCOM, CTI-CFF, and CCAMLR. The term 'regime' addresses the effects of the institutional arrangement embodied within an organization has on other actors.

type of adaptive governance to explore the extent to which HELCOM addresses the design principles and governance requirements in their attempts to apply the ecosystem approach. We then explore the extent to which the adaptive capacity of HELCOM could be improved by comparing HELCOM to the CTI-CFF and CCAMLR that are also applying the ecosystem approach to large-scale marine ecosystems. We end this study with recommendations for how HELCOM could improve its adaptive capacity.

2. Theory and operationalization

2.1. Constructing an ideal type for adaptive governance

The eight design principles for robust governance institutions developed by Ostrom (1990) have been used and tested in numerous case studies, primarily at the local level (Cox et al. 2010). However, applications on international and global commons are becoming more prevalent (Ostrom et al. 1999; Dietz et al. 2003; Marshall 2007; Stern 2011). Three of the eight principles have been suggested to be especially important for governance of common resources on larger scales (Ostrom 1990; Stern et al. 2002; Dietz et al. 2003). These three principles are: 1) analytical deliberation (to involve all interested parties in informed decisions of rules), 2) nesting (to allocate authority to allow for adaptive governance at multiple governance levels), and 3) institutional variety (to employ mixtures of institutional types including both private and public arrangements).

This study explores these three design principles and links them to five governance requirements (Dietz et al. 2003): 1) to provide necessary information, 2) to deal with conflict, 3) to induce compliance with rules, 4) to provide physical, technical and institutional infrastructure, and 5) to encourage adaptation and change. Information sharing within the organization includes that actors should have reliable information about stocks, flows, and processes within the regime (including the resource system and processes within the social system). The information must correspond to the governed area and scale but also to the decision makers' needs. Information should also include how the area and its resources are valued and if there are any uncertainties. Uncertainties can, in turn, be characterized in different types and in different magnitudes. Conflict resolution in intergovernmental collaborations is often passed on to the state level (Shapira 1997). To resolve conflicts within an organization, inclusion of all actors sparks learning and change. Rule enforcement and sanction mechanisms could be either formal or informal (see also e.g. Young 1979) and it is important that enforcement is regarded as effective and legitimate by all actors (Zürn 2004). Physical, technical and institutional infrastructure is important in order to ensure both information sharing (e.g. monitoring) and conflict resolution. Infrastructure is needed for coordination among actors but also between different levels of the governance system (Anderies et al. 2003). Information will never be complete; hence the system needs to allow for adaptability and flexibility (Armitage et al. 2007). Fixed

rules build on a static view of the governed system, which is why these rules are not likely to be complied with if the system changes. By combining the three design principles and the five governance requirements this study builds an ideal type for adaptive governance of large-scale transboundary social-ecological systems. Hence, translating the links between the three design principles and the governance requirements, the ideal type should encompass:

1. All interested parties provide encompassing information in a transparent manner.
2. All interested parties are involved in decision making, monitoring and rule enforcement.
3. All interested parties are involved in making rules that are revisable and in developing tools and strategies that ensure adaptation and change.
4. Different levels of authority are linked but also involved in ensuring rule enforcement, adaptation and change.
5. Different levels of authority provide physical, technical and institutional infrastructure.
6. Conflicts within the organization and between different sectors are handled by a mixture of institutional types.
7. A mixture of institutional types provides physical, technical and institutional infrastructure.
8. A mixture of institutional types is involved in revising and developing tools and strategies for adaptation and change.

This is a first attempt to develop an ideal type for adaptive governance on a larger scale. We recognize the difficulties for an organization to fulfil all eight of the ideal type requirements. However, it is beyond the scope of this study to rank the requirements or even to discuss how many of the requirements need to be fulfilled in order to achieve an "ideal situation". In this study we assume that the requirements in our ideal type create adaptive governance, which is a prerequisite for the ecosystem approach. Having said this, we do not exclude that adaptive governance can be achieved in several other ways.

We then developed indicators to clarify the actual implications of the eight links. By developing a set of indicators to each link we aimed to ensure that our cases were comparable with the ideal type of adaptive governance. The developed set of indicators therefore measures the degree of how the eight links in the ideal type are established within HELCOM, CTI-CFF and CCAMLR.

In order to develop indicators for information sharing we divided the first link into three different domains: the party by whom the information is provided, the type of information that is shared between the interested parties, and how transparent this information sharing process is. The indicators for the second link on compliance include how decisions are made, how monitoring is performed and how rule enforcement is played out. In the third link we evaluated the adaptive capacity by comparing the types of tools that are used within the respective

organizations to encourage adaptation and change, how rules are revised and if the organizations have any long-term strategies to ensure future adaptation and change. The fourth link describes indicators for providing infrastructure. The link was divided between physical infrastructure, technical infrastructure (we include here science and scientific collaborations), and institutional infrastructure. The indicator also includes which level of authority it is that is providing the infrastructure and which type of institution (e.g. private or public) that is providing it. The fifth link is related to the link between authority and adaptation and change and describes how decisions are delegated within organizations and how different levels of authority are linked with one another. The sixth link examines how conflicts are dealt with. The indicators related to this link include how conflicts are handled within the organization and also how conflicts are dealt with between different sectors. The seventh link is related to the fourth link but examines how any eventual institutional diversity is being used in providing infrastructures. The last and eighth link is related to institutional alternatives available within the organization (see Table 1).

2.2. Three cases of international marine governance

This is a first attempt to study the adaptive capacity of transboundary resource regimes using three of Ostrom's design principles. We used a comparative case-study method where we compared HELCOM, CTI-CFF and CCAMLR. These three cases are all well-known examples of international organizations using the ecosystem approach to management, which all have been substantially documented in the scientific literature. We are aware that our cases are not representative for all transboundary marine regimes. However, our three cases, and the comparison between them, represent a starting point for developing an understanding of how to improve transboundary resource management in marine ecosystems around the globe.

HELCOM is the governing body of the Helsinki Convention, which applies to the Baltic Sea. HELCOM is managed through a secretariat based in Helsinki, Finland. The Convention was signed by the states surrounding the Baltic Sea in 1974 and was revised in 1992 by the nine states[2] bordering the Baltic Sea and the European Community. In 2007, the contracting parties signed the Baltic Sea Action Plan (BSAP), whose targets are divided into four parts – eutrophication, hazardous substances, biodiversity and maritime activities – where each of these parts are based on the ecosystem approach. By using ecosystem modelling, targets for, for example, nutrient reduction, are based on a vision of a "good ecosystem state" wherein ecosystem indicators – such as area and length of seasonal oxygen depletion – are developed (HELCOM BSAP; Backer 2008).

CTI-CFF was launched in 2007 with a purpose to govern sustainable usage of the marine ecosystems and coral reefs in South East Asia. The member states

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[2] Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.

Table 1: Indicators derived from the links between the design principles and the governance requirements

Link	Indicator
Involve all interested parties to provide necessary information	Who provides information? What type of information is shared? Is the information process transparent?
Involve all interested parties to induce compliance	How are decisions made? How are rules monitored? How are rules enforced?
Involve all interested parties to encourage adaptation and change	Which tools are used? How are rules revised? Are there any strategies for dealing with change?
Allocate authority to provide infrastructure	Who provides physical infrastructure? Who provides technical infrastructure? Who provides institutional infrastructure?
Allocate authority to encourage adaptation and change	How are decisions delegated? Are there any links between administrative levels?
Employ a mixture of institutional types to deal with conflicts	How are conflicts dealt with within the organization? How are conflicts dealt with between different sectors?
Employ a mixture of institutional types to provide infrastructure	How is institutional diversity being used?
Employ a mixture of institutional types to encourage adaptation and change	What institutional alternatives exist?

are Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands and Timor-Leste. The initiative is a multilateral partnership to address the urgent threats facing the coastal and marine resources of one of the most biologically diverse and ecologically rich regions on earth. CTI-CFF is managed through a secretariat based in Jakarta, Indonesia. A regional plan of action, including the ecosystem approach has been developed and is used for the development of national plans of action in the member states.

CCAMLR is the governing body for the convention with the same name, which was established in 1983. The convention regulates fisheries in the Southern Ocean and has 25 member states[3], with an additional 11 countries[4] that have acceded to the convention. CCAMLR is managed though a secretariat based in Hobart, Australia. CCAMLR has played an important role in using the precautionary approach and the ecosystem approach in the region, by adjusting catch levels of fish stocks in order to account for the needs of dependent predators, protect

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[3] Argentina, Australia, Belgium, Brazil, Chile, China, European Union, France, Germany, India, Italy, Japan, Korea, Namibia, New Zealand, Norway, Poland, Russia, South Africa, Spain, Sweden, Ukraine, United Kingdom, USA and Uruguay.

[4] Bulgaria, Canada, Cook Islands, Finland, Greece, Mauritius, Netherlands, Pakistan, Panama, Peru and Vanuatu.

vulnerable habitat and reduce bycatch of vulnerable species (Constable et al. 2000).

Our three cases are similar in several ways. They all have as explicit aims to conserve and ensure sustainable use of marine living resources, with an explicit focus on a particular ecosystem. The work in all three regimes also explicitly defined their work as being based on an ecosystem approach. All three regimes also govern large-scale marine ecosystems and resources are shared by several states.

There are also important differences between these three cases, including the number of inhabitants and the organizations' scope and age. HELCOM is primarily focused on eutrophication (due to excessive nutrient loadings) and the CTI-CFF is primarily focused on the conservation of biological diversity. CCAMLR in turn is focused on fisheries management, where non-compliance and overfishing has been a key challenge. HELCOM and CCAMLR are more than 40 and 30 years old respectively, whereas CTI-CFF is a relatively new organization with <10 years in operation.

To compare our three cases, we reviewed recent scientific literature and policy documents from the respective organizations. This material was further used to analyse HELCOM against the other two cases but also to compare all cases against the developed ideal type of adaptive governance.

3. Empirical analysis

Our empirical analysis is divided into two parts. First, we review the degree to which the eight links between the design principles and the government requirements are implemented within CTI-CFF, HELCOM and CCAMLR. This part of the analysis is divided into three sections, according to the three design principles. Here we review if and how all parties are involved in information sharing, ensuring compliance and encouraging adaptation; how different levels of authorities provide infrastructure and encourage adaptation; and how a mixture of institutional types deal with conflict, provide infrastructure and encourage adaptation within our three case studies. A summary of the comparison is presented in Table 2. In the second part of our empirical analysis we analyse the degree to which HELCOM fulfils the ideal type and how HELCOM could learn from CTI-CFF and CCAMLR to improve its adaptive capacity.

3.1. Involve all parties in information sharing, compliance and adaptation

Most information on ecosystem management in CTI-CFF is provided by NGOs, such as the WWF, Conservation International (CI) and the Nature Conservancy (TNC). Information is shared at regular meetings that involve a wide range of stakeholders, including NGOs, international donors and development agencies, the private sector, scientists, and conservationists (Fidelman et al. 2012). The CTI-CFF webpage serves as a node for information sharing and there are also various other platforms where information is shared. These include the Coral

Triangle Knowledge Network (promotes knowledge exchange), the Coral Triangle Atlas (a GIS database on fisheries, biodiversity and socioeconomic information), the Coral Triangle Communications Platform (campaign platform for conservation activities), and the Coral Triangle Adaptation Marketplace (tool for projects and funds related to climate adaptation). Most information is publicly available through the CTI-CFF secretariat, but some is only available for CTI-CFF members. The United States Agency for International Development (USAID) also supports the CTI-CFF and has many related documents available on their website.

   The CTI-CFF is a multilateral partnership of six countries. The CTI Regional Plan of Action was signed by the respective governments in 2009. The CTI Monitoring and Evaluation Working Group (MEWG) is responsible for the monitoring and evaluation of the performance of member states according to the Plan of Action. The Regional Plan of Action is implemented in each respective state through National Plans but the CTI-CFF has no sanctioning mechanisms (Fidelman et al. 2012). The program for monitoring and evaluation also includes indicators for improving performance, which opens up for adaptation. Through the US CTI Support Program a toolkit for planning and implementing the ecosystem approach is developed. These tools, such as the Reef Resilience Toolkit and the Marine Protected Areas Management Effectiveness Assessment Tool (MEAT), include several measures to increase adaptiveness (Flower et al. 2013). The monitoring and evaluation program provides updated information to recommendations.

   HELCOM receives most of its information from government agencies in the respective member states. A review of the participation lists from commission meetings and sub-groups 1980–2010 (HELCOM 2014a) reveals that 540 actors from 22 different countries, the EU and several international organizations have attended. Even though participation lists from 208 meetings include a large complexity of actors, only about a fifth (21%) of them have been present at more than 10 meetings (37% of all actors only attended one meeting during the analysed period. 52 actors attended more than 20 meetings.). Actors participating represent all countries around the Baltic Sea and include authorities, ministries, intergovernmental organizations and NGOs. Finland is the dominating actor measured in attendance. Stakeholders of all kinds are invited to the meetings, first and foremost science and environmental NGOs. Information is shared at regular commission meetings and in topic-specific sub-groups. Most information that is shared has its origin in scientific collaborations between member states. A review of the meeting minutes also shows that the nation states have to report back to the commission on implementation and project progresses initiated by HELCOM (often under 'Activity Report'). All meetings are private unless the Commission decides otherwise (HELCOM 2014b, Rule 3.4) but meeting minutes and documents discussed at the meetings become public a few months after each meeting and are available at HELCOM's 'meeting portal' (HELCOM 2014a). HELCOM also hosts several databases and datasets that are available on their website (HELCOM

2014c) on, for example, nutrient loadings to the sea. The HELCOM has 10 contracting parties (the nine states bordering to the Baltic Sea and the European Community) that take all decisions in consensus. Other interested parties can apply for observer status (HELCOM 2014b). Monitoring within HELCOM is performed by the nation states and by one of the sub-groups in HELCOM (The Monitoring and Assessment Group, MONAS) (HELCOM 2014d). All decisions taken in HELCOM should be implemented in national legislation, where compliance is evaluated. No formal compliance mechanism exists, even though informal sanctions can be used. Since the EU is a contracting party and all states, with the exception of Russia are members of the EU (since 2004), the EU has implemented the Helsinki Convention and the BSAP as parts of the Water Framework Directive and the Marine Strategy Framework Directive. These framework directives have not hitherto enforced very detailed obligations within the EU states (Kern 2011). Revision of decisions and recommendations made is unusual and rather it is more common that recommendations are replaced. The BSAP however includes planned revision of targets (HELCOM Copenhagen Ministerial Declaration). No overall strategy of how to deal with change exists except how to respond to events such as oil- or hazardous spills (HELCOM 2014e).

The main providers of information to the commission for the CCAMLR are government agencies and scientists, although environmental NGOs and the fishing industry also contribute to some extent (Österblom and Bodin 2012). The information is shared at regular commission meetings, at scientific workshops and in working group meetings. All meeting minutes and decisions made are publicly available but many of the background documents are only available to meeting participants. CCAMLR also host a publicly available database on all catches of all species from the 1980s until today (CCAMLR 2014a) and a list on illegal, unreported and unregulated vessels (CCAMLR 2014b).

All decisions within the CCAMLR are agreed upon in consensus in the commission. Sanction mechanisms of, for example, vessels and the reduction of fishing quotas, are also agreed upon in the commission. The Standing Committee on Implementation and Compliance (SCIC) meet before the commission meetings where they evaluate compliance and prepare decisions to be taken by the commission. All member states and stakeholders have the opportunity to comment on the material handled by the Standing Committee as they can participate in these meetings the week prior to the meetings of the commission. In order to improve its performance, the CCAMLR carried out an external performance review in 2008 (CCAMLR 2008). Revisions of rules are done annually at the commission meeting and an overall strategy for how to deal with climate change was initiated in 2009 (CCAMLR 2009).

3.2. Allocate authority to provide infrastructure and encourage adaptation

Stakeholders and NGOs of CTI-CFF can provide tools and support for the implementation of the Regional Plan of Action. The CTI-CFF secretariat

provides institutional infrastructure for the individual countries to facilitate the implementation for the member states (Flower et al. 2013). Most adaptation is delegated to lower levels of authority within the CTI-FF. The location of the secretariat is not yet determined, which is hampering the potential role of a bridging organization (Cash et al. 2003) that the secretariat could have. Several organizations are involved in providing the platforms mentioned earlier, such as the Asian Development Bank, which are important for encouraging adaptation by coordinating efforts across scales (Flower et al. 2013).

HELCOM is well developed when it comes to providing different kinds of infrastructure. State led initiatives, bilateral corporation, the EU, investment banks, and private funds all contribute with investments in technical innovations and support, as do science collaborations and capacity building initiatives. Most infrastructure initiatives are steered by the HELCOM secretariat (HELCOM 2014f). HELCOM can only delegate and encourage adaptation initiatives to the member states. It is then up to the nation states to delegate further (if necessary). There are, however, only weak links between and across different levels of authorities in the Baltic Sea regime (Hassler et al. 2013; Valman 2013).

The CCAMLR secretariat provides infrastructure related to, for example, electronic catch documentation schemes (e-CDS) that trace fish products, and also deal with data related to the monitoring of vessels. The secretariat also contributes with capacity building (e.g. workshops). There is no formal allocation that decides what members should contribute with regarding the work of CCAMLR; hence some countries provide substantially more physical infrastructure (e.g. vessels for monitoring and satellite surveillance) than others do. The same goes for investments to ensure compliance (Australia, France, New Zealand and the UK all invest substantial resources in monitoring and enforcement) (Österblom and Sumaila 2011; Österblom and Bodin 2012; Bodin and Österblom 2013).

The CCAMLR commission delegates to the respective member states who can experiment with governance approaches. There are increasing collaborations between members and adjacent organizations (regional fisheries management organizations). The level of coordination between members of the CCAMLR is high, and the secretariat functions as a bridging organization (Österblom and Bodin 2012). Several non-state actors are also well coordinated, for example the fishing industry speaks with one voice through the Coalition of Legal Toothfish Operators (COLTO), and the very diverse NGO network speaks with one voice through the Antarctic and Southern Ocean Coalition (ASOC). Both these organizations also operate as bridging organizations that facilitate adaptive governance.

3.3. Employ a mixture of institutions to deal with conflicts, to provide infrastructure and to encourage adaptation

In the CTI-FF specific committees and working groups exist where conflicts within the CTI-FF can be resolved. However there are no formal conflict resolution mechanisms in place that deal with conflicts within the CTI-FF or with

conflicts with third parties. A mixture of institutional types, including international, bilateral, and national rules and regulations (Fidelman et al. 2012), provide institutional infrastructure for the US Agency for International Development, the Asian Development Bank, NGOs and other key players. There are a great number of these institutions that provide alternatives (or obstacles) for adaptation.

The HELCOM has several working groups, also within the commission itself, where conflicts between members can be resolved (HELCOM 2014f). It is stated[5] that contracting parties should seek a solution by negotiation. Mediation by a third party can also be used. If the contracting parties still cannot agree, an ad hoc tribunal, a permanent arbitration tribunal or the International Court of Justice will settle the case. There is, however, no formal conflict resolution mechanism in place if conflicts between private and public or state and non-state actors should occur. State-led initiatives, EU support and private funds exist for the development of physical, technical and institutional infrastructure (e.g. HELCOM 2014f; EU Baltic Sea Region Programme, NEFCO 2014). EU-regulations and national regulations for respective member states provide alternatives (or obstacles) for adaptation. Since sectoral interests (e.g. agriculture and fisheries) do not regularly participate at HELCOM meetings, they have limited access to, and influence upon, adaptation strategies.

Most conflicts within the CCAMLR are resolved during the annual commission meetings, but some conflicts are unresolved (like the UK/Argentinean dispute about the Falkland Islands/Islas Malvinas) (e.g. CCAMLR 2009). Some disputes related to illegal, unreported, unregulated vessels have been settled in the International Tribunal for the Law of the Sea (ITLOS) (ITLOS 2002).

Global networks, including the International Monitoring Control and Surveillance (IMCS) network and organizations like the Food and Agriculture Organization of the United Nations (FAO), as well as different member states of the CCAMLR have all improved flexibility in CCAMLR, for example by providing knowledge and infrastructure (Österblom and Sumaila 2011; Bodin and Österblom 2013; Österblom 2014). National legislations (including U.S. "long-arm enforcement" – i.e. the Lacey Act), European laws and CCAMLR conservation measures have all been used to address non-compliance. NGOs and the fishing industry have historically been instrumental in dealing with novel challenges, including changes in the ways in which IUU operators operate (see Österblom et al. 2010a). This mixture of institutional types and capacities, and the combination of several levels of authority, has been critical for the adaptive capacity of the CCAMLR (Österblom and Sumaila 2011; Österblom and Folke 2013).

3.4. HELCOM, deviations from the ideal case, and lessons from elsewhere

HELCOM deviates from an ideal case in several ways; Environmental NGOs and the science community are well represented within HELCOM but other

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[5] Article 26 in the 1992 Helsinki Convention concerns settlements of disputes.

Table 2: Summary of comparison between CTI-CFF, HELCOM and CCAMLR

Link	CTI-CFF	HELCOM	CCAMLR
Involve all parties in information sharing, compliance and adaptation	Information sharing is dominated by NGOs. Compliance is regulated at state level. Adaptation plans are developed.	Information sharing is dominated by government agencies and science. Compliance is regulated at state level. Adaptation strategies are not developed.	Information sharing is dominated by government agencies and science, with contributions from non-state actors. Compliance is evaluated annually. Continuous adaptation through annual revisions of rules.
Allocate authority to provide infrastructure and encourage adaptation	Infrastructure contributions are ad hoc by NGOs. Adaptation is steered by non-state actors such as the Asian Development Bank.	Infrastructure is provided by national, bilateral, and regional initiatives. Adaptation strategies are managed at the state level.	Infrastructure is provided by the secretariat and ad hoc initiatives by member states. Adaptation is handled by the commission and at the state level.
Employ a mixture of institutions to deal with conflicts, to provide infrastructure and to encourage adaptation	There are no conflict resolution mechanisms in place. Infrastructure is first and foremost provided by NGOs. Adaptation is steered by the private sector.	There are no conflict resolution mechanisms in place if disputes occur between a contracting party and a non-contracting party. Infrastructure is provided by the secretariat, nation states, the EU, banks and private funds. Adaptation is managed at the state level.	Conflicts are resolved at the commission meetings or in international courts. Infrastructure is provided by the secretariat, and by international, regional and national organizations. Adaptation is steered by the commission and within nation states.

stakeholders, especially from relevant industries, have not been involved in information sharing. All types of stakeholders can, however, apply for observer status and thus provide information that is addressed at official meetings. However, non-state actors have a limited role in decision making and evaluation of compliance, and they lack a formal role as active contributors to the implementation of agreed measures. Stakeholder participation is substantially more developed in both CTI-CFF and CCAMLR, both in national delegations and as observers, where they can have a direct influence on policy development and implementation. Information provided by environmental NGOs and the fishing industry has been instrumental for the outcomes of CCAMLR. In the CTI-CFF there is a wide range of international and national level stakeholders involved in rule development and governance. However, the CTI-CFF has been criticized for a lack of vertical integration of stakeholders, especially regarding the involvement of local organizations and resource users in the governance process (Foale et al. 2013). With inspiration from the CTI-CFF, CCAMLR, and the ideal type, HELCOM could make an effort to involve other stakeholders than environmental NGOs and science. HELCOM should also make sure that

stakeholders are involved at all levels of the decision making process. As of now, observers are only present in the Commission, not in working groups where most of the preparatory work is done.

HELCOM does not have any regular evaluations of performance and there are no mechanisms for burden and benefit sharing between HELCOM members. This is well developed within the CCAMLR, where performance among members is evaluated annually. With the Baltic Sea Action Plan follows that a window for adaptation and change has opened, since the Baltic Sea Action Plan is planned to be revised, in comparison with the more static recommendations[6] that are HELCOM's traditional instrument for steering actions among its members. Hence, HELCOM could be inspired by the CCAMLR and consider annual evaluations to ensure that recommendations and the Baltic Sea Action Plan are constantly revised and complied with. Furthermore, there are no formal forums for sanctioning non-compliance and there are no conflict resolution mechanisms within HELCOM. Also, in this the CCAMLR has progressed further. The annual evaluation ensures that potential conflicts come to light and therefore that rules are complied with.

Links between different levels of authority and between different institutional types are weak within HELCOM. As within many intergovernmental collaborations it is up to the nation states to ensure that information, rule enforcement etc. flows smoothly between authorities and between different sectors (Shapira 1997). HELCOM has little influence on its members' national affairs; however HELCOM could potentially be a bridge between different institutional types in the region (Cash et al. 2003; Hahn et al. 2006), ensuring communication and consequently adaptation within the different sectors.

In comparison with both the CTI-CFF and CCAMLR, HELCOM is well developed when it comes to providing infrastructure. Different levels of authority and different sectors provide physical, technical and institutional infrastructure. In this case, HELCOM fulfils the requirements of an ideal type (see Table 3).

4. Discussion

Our comparison shows that none of our three cases fulfil all requirements of the ideal type of adaptive governance, however all three cases include some components of this ideal type. This is a first pilot study to shed light on the adaptive capacity of transboundary natural resource regimes. In the light of CTI-CFF and CCAMLR we discuss here, first and foremost, how HELCOM could learn from these other two cases and the components of the ideal type of adaptive governance. Other cases that would be interesting to include in future comparisons are the Oslo and Paris Commission (OSPAR) in the North-East Atlantic, the

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[6] Recommendations are developed as measures to address certain sources of pollution or areas of concern and should be implemented within each contracting party's national jurisdiction.

Table 3: Comparison of HELCOM with an ideal type of adaptive governance

Ideal type	HELCOM
All interested parties provide encompassing information in a transparent manner.	Information is first and foremost provided by government agencies from respective member states and science collaborations. Environmental NGOs also have the possibility of providing information. Stakeholders such as agriculture and industry are not adequately represented. All information is publicly available a couple of months after a meeting has been held.
All interested parties are involved in decision making, monitoring and rule enforcement.	Decision making is made by the contracting parties. Monitoring is performed by a special sub-group in HELCOM where scientists and national authorities are represented. Rules are implemented in national legislations where compliance is evaluated.
All interested parties are involved in making rules that are revisable and developing tools and strategies that ensure adaptation and change.	Recommendations are seldom revised, but future revisions of the BSAP are planned. Strategies exist for how to respond to sudden oil spills or spills of hazardous substances, but an overall plan for how to deal with changes does not exist.
Different levels of authority are linked but also involved in ensuring rule enforcement, adaptation and change.	HELCOM can only delegate to the nation states. There are very weak links between different levels of authority within the Baltic Sea regime.
Different levels of authority provide physical, technical and institutional infrastructure.	HELCOM secretariat, state-led initiatives, bilateral cooperation, and EU initiatives are all involved in providing infrastructure.
Conflicts within the organization and between different sectors are handled by and at a mixture of institutional types.	There are no conflict resolution mechanisms in place. Conflicts should be resolved at the different meetings (but these do not include all stakeholders).
A mixture of institutional types provides physical, technical and institutional infrastructure.	Public initiatives as well as private funds and banks are involved in providing infrastructure.
A mixture of institutional types is involved in revising and developing tools and strategies for adaptation and change.	Revisions of rules are regulated by the Helsinki Convention and other national and international agreements. Limited access to and participation by sectoral interests, for example agriculture and fishery.

Coordinating Unit for the Mediterranean Action Plan (MEDU) which is the secretariat for the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention) in the Mediterranean, and the Commission on the Protection of the Black Sea Against Pollution (the Black Sea Commission or BSC).

HELCOM, CTI-CFF and CCAMLR all have clear structures for providing information. Information flow between and among actors can be very different, but this in itself does not mean that a regime is ineffective (or effective) (Breitmeier et al. 2006). However, the information shared must correspond to the decision makers' needs. Decisions are, at the same time, often taken under substantial uncertainties, because of limited knowledge (Haas 1992; Folke et al. 2005). To include all stakeholders in information sharing as well as in the decision making process reduces uncertainties. There are no clear structures for communication between different levels of governance, from the local to the international, in any of the organizations. In fact, all our cases are limited in how they allocate authority and delegate decisions to other levels, primarily to lower levels of authority. All our cases also face problems in ensuring that stakeholders are involved in developing and enforcing rules. Inclusion of non-state actors (including NGOs and the private sector) in the decision making process is important not only for the legitimacy of decisions (Duram and Brown 1999; Pelletier et al. 1999; Hahn et al. 2006) but also for higher levels of compliance (Rivera 2004; Cudney-Bueno and Basurto 2009).

Stakeholder participation is not always free from problems. Influence on decision making processes includes issues of power (Arts 2003), justice (Thomas and Twyman 2005; Lebel et al. 2006), accountability, and effectiveness (Skelcher et al. 2005; Bäckstrand 2006). The study of the CTI-CFF and the CCAMLR show that a mixture of stakeholders is included in the information sharing process, which has substantially contributed to the outcome of the respective organization (novel, or politically sensitive information that governments are unable to provide are instead supplied by non-state actors). In many organizations the incorporation of traditional knowledge, indigenous knowledge and local ecological knowledge is a challenge (King 2004; Tengö et al. 2014). In CTI-CFF, the Coral Triangle Knowledge Network is aimed at supporting knowledge exchange between actors operating at various levels, including local users with substantial traditional ecological knowledge. In HELCOM on the other hand, many observers and guests are invited to meetings, but these guests predominantly compromise member state agencies or science. HELCOM is, in comparison with the CTI-CFF, lagging behind in including other knowledge systems than science in their information process. Industry and actors from local communities are also underrepresented within HELCOM. When comparing HELCOM to the ideal type we find that HELCOM should potentially investigate means to improve stakeholder participation, as well as improve the formal ways in which stakeholders can provide information to meetings. HELCOM should also aim to improve communication between different levels of authorities to

improve rule enforcement and adaptation. Local innovations and pilot projects aimed to develop testing grounds for ecosystem approach to management (in the coastal zone) have been implemented in Sweden (Österblom et al. 2010b), but it is unclear how such innovations can contribute to the adaptive capacity of HELCOM.

There is a distinctive limitation to the mixture of institutional types (public and private) where nation-states dominate decision-making and implementation in all three organizations. This has historical reasons (all three organizations were set up as intergovernmental collaborations), which complicates an alignment to our suggested ideal type of adaptive governance. The regimes today include a diversity of actors (Breitmeier et al. 2006) which may be critically affected by decisions taken by member states. We acknowledge that regimes are rarely "designed", but rather mature and develop as a consequence of multiple factors, including organizational responses to social and ecological perturbations (Olsson et al. 2008; Österblom and Sumaila 2011; Österblom and Folke 2013). Understanding potential areas of organizational improvement is, however, an important step in the development of regimes, as regime change often requires substantial capacity-building efforts. The nine member states of HELCOM differ substantially in their governance capacity and economic ability. Similar differences among member state capacities have also been found within the CCAMLR. Legitimate and adaptive governance often requires clear mechanisms for both burden and benefit sharing (Hanich and Ota 2013). HELCOM could potentially improve if they worked out ways to account for burdens and benefits. The Baltic Sea Action plan divides burdens in relation to nutrient reduction, but does not consider how financial burdens for such nutrient allocation should be distributed (Gren and Destouni 2012). The prospects for understanding benefit sharing of such measures have recently improved as a consequence of financial evaluations of the value of ecosystem services in the Baltic Sea (BalticSTERN Secretariat 2013).

HELCOM, CTI-CFF and CCAMLR all have good structures for providing physical, technical and institutional infrastructure. Especially the 'older' organizations HELCOM and CCAMLR have established routines for involving both non-state and state actors in providing physical and technical infrastructure, which, according to theory, is a prerequisite for adaptive governance (Anderies et al. 2003). HELCOM stands out in comparison to the other organizations as a good example of how both private and public institutions as well as different levels of authorities contribute to the development of physical, technical and institutional infrastructures.

One critical way in which CCAMLR has improved its performance is through clear formats for evaluating compliance and for defining sanctioning mechanisms. HELCOM could consider how analogous mechanisms could be established within this organization. While doing so, HELCOM could also consider how such mechanisms could address potential conflicts between members. CCAMLR is dedicating meetings to ensure that everyone involved is up-to-date with new

rules but also that existing rules are complied with. Experiences from CCAMLR also suggest that HELCOM should consider carrying out an in-depth performance review that consistently and continuously guides HELCOM towards improved performance.

Finally, in our experience, the framework developed by Dietz et al. (2003) substantially lacks one critical component for effective adaptive governance. Eutrophication in the Baltic Sea is the major challenge of HELCOM and represents a substantial environmental problem. However, ecological properties of the Baltic Sea also hamper and delay management actions (Varjopuro et al. 2014). The stratification and low water exchange limits the direct effects of actions taken today. In fact, it may take decades before eutrophication is mitigated, even if radical measures are taken now. The Baltic Sea ecosystem is hence not very likely to directly respond to adaptive governance efforts. This brings us to one important missing piece in Dietz et al. (2003), namely that of political will; The slow response rate of the Baltic Sea requires political commitment over the time period of generations, and it is currently unclear to what extent governments around the Baltic Sea have the appropriate incentives for a substantial development of, and investment in, HELCOM. Political will has been critical for investing capacity in governance efforts within the CTI-CFF and the CCAMLR. Both the Coral Triangle and the Southern Ocean represent areas with high political stakes, for example for their high biological value, but also for reasons of national security (see e.g. Österblom et al. 2011; Liss 2013; Williams 2013). Associated high political will, and incentives to contribute with important capacity (Österblom and Bodin 2012; Rosen and Olsson 2013), are in these regions, combined with an iconic status of the ecosystems, generating an associated high level of public opinion as well as expectations of governments to mobilize the necessary capacity to mitigate environmental degradation (Hughes et al. 2007; Olsson et al. 2008). In addition to, what appears to be, substantial path dependencies and limited political will to invest in further development of the adaptive capacity of HELCOM (Hassler et al. 2013; Valman 2013), HELCOM is also challenged by two additional factors. First, actions in HELCOM are increasingly influenced by European Directives, including the Marine Strategy Framework Directive (Kern and Löffelsend 2004; Österblom et al. 2010b). Better communication between authorities is included in the ideal type, but a missing function in the ideal type is that communication also needs to stretch beyond the regime in question. Other environmental or marine regimes outside the Baltic Sea sphere also influence how and what types of decisions are made within HELCOM. Second, HELCOM, which primarily has a mandate to manage pollution (nutrient and hazardous substances emissions), has a limited mandate to address environmental problems associated with fisheries. The ecosystem approach requires integrated management of land, water and living resources. This tradition of a sector-by-sector type of management hampers the implementation of the Baltic Sea Action Plan in the region and therefore also HELCOM's adaptiveness.

5. Conclusion

The ecosystem approach to management is closely related to the adaptive capacities of regimes (COP4 1998, Malawi Principles). We have studied adaptive capacities within three international organizations via a constructed ideal type of adaptive governance. The ideal type shows the links between three design principles for robust governance and five governance requirements. The first part of our study shows both similarities and differences between CTI-CFF, HELCOM, CCAMLR and the ideal type. All organizations are well developed when it comes to involving parties in information sharing and providing infrastructure within the regime. However, while HELCOM and CCAMLR get most of their information from member states, the CTI-CFF information sharing process is dominated by non-state actors. Also, infrastructure is provided by non-state actors within CTI-CFF while infrastructure within CCAMLR is provided by the member states. HELCOM stands out as a good example in this sense as infrastructure is provided by national, bilateral and regional initiatives that are both state-led and initiated by private actors. Only CCAMLR evaluates compliance at their annual meetings. Both CTI-CFF and HELCOM evaluates compliance at the member state level. As a result, neither CTI-CFF nor HELCOM has any conflict resolution mechanisms in place whereas CCAMLR deals with conflicts at their meetings. Adaptation strategies within the organizations are developed in three different ways; CTI-CFF have developed adaptation plans, but the process has been steered by the private sector, HELCOM has no clear adaptation strategies except for planned revisions of the Baltic Sea Action Plan, and CCAMLR continuously adapts through their annual revisions of rules.

In the second part of our study we focused on how HELCOM deviates from the ideal type and what lessons HELCOM could potentially draw from the CTI-CFF and the CCAMLR. We conclude that HELCOM deviates from this ideal type in several ways. At the same time there are substantial prospects for improving the adaptive capacity of HELCOM. According to the ideal type, the stakeholder participation needs to be improved. Today, stakeholders are invited to share information and they contribute significantly in projects related to infrastructure. However, there are no simple strategies for information sharing beyond what takes place at the annual Commission meetings. Stakeholders need to be more involved in the working groups of HELCOM. Further, it is very unclear how information from other stakeholders than member states feeds into the decision making process. Within the CTI-CFF the various interactive platforms established could facilitate participation. The CCAMLR has developed clear structures for both continued revision of rules, evaluation of compliance and performance and conflict resolution mechanisms. We suggest that HELCOM could be inspired by these structures, especially when it comes to evaluating organizational performance and how well the member states have implemented recommendations and the Baltic Sea Action Plan within their respective national legislations. The ideal type for adaptive governance developed in this study also suggests that a mixture of

both private and public initiatives secures developments of adaptation strategies. We therefore suggest that HELCOM could be inspired by their own organization since infrastructure within HELCOM is provided by multiple actors from both the private and the public sector. If HELCOM could implement the same multitude of actors for developing adaptation strategies as for providing infrastructure, the adaptive capacity would be improved in the region. Finally, HELCOM needs to develop clear links between the different levels of authority. HELCOM needs to strengthen their communication and harmonization with the sub-national levels and the EU (beyond only focusing on the interrelationship between the Baltic Sea Action Plan and the EU Marine Strategy Framework Directive). Many projects related to the Baltic Sea occur and are initiated at the sub-national level and it is important that HELCOM also encourages communication and delegation to levels other than that of the state.

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