Environmental Risk Governance of the Baltic Sea (RISKGOV)

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1 EXECUTIVE SUMMARY

Despite substantial (and sometimes successful) efforts made by state and non-state actors on local, national, European and international levels to counteract negative environmental trends in the Baltic Sea, it is evident that human activities still cause severe environmental and human health risks and problems. This means that there is a need to improve environmental governance structures and processes to achieve sustainable ecosystem-based management of the Baltic Sea.

In response to this challenge, the interdisciplinary RISKGOV (Environmental Risk Governance of the Baltic Sea) project was set up to develop a comprehensive understanding of the structures and processes that shape the governance of environmental risks at the regional (Baltic Sea) level and, ultimately, to suggest possible ways for improving environmental risk governance of the Baltic Sea ecosystem.

These aims were addressed by comparing the governance of five severe environmental risks (eutrophication, overfishing, invasive species, chemical pollution and oil discharges linked to marine transports) in terms of three key components of environmental risk governance: ‘Governance structures’ focuses on the policy context, regulatory institutions, forms of decision-making, collaboration and participation. ‘Risk assessment – risk management interactions’ scrutinises processes of interaction between science and policy, risk assessment and risk management, as well as descriptions and management approaches to uncertainties and multiple lines of scientific evidence. ‘Stakeholder participation and communication’ analyses practices and conditions for stakeholder communication and participation.

Furthermore, RISKGOV’s aims were tackled through frequent dialogue with stakeholders (i.e. by arranging a series of roundtable discussions and a final conference with e.g. representatives from IGOs, NGOs, authorities, industry and political parties).

This final report provides a focused account of the main RISKGOV results and their potential implications in terms of suggestions for improvements. The structure of the report is to first describe and motivate the analytical and methodological framework that was developed within RISKGOV to achieve an interdisciplinary and comparative analysis of the studied environmental risk issues. This ‘theoretical’ section is followed by a discussion of key analytical results connected with the cross-case comparisons, as well as a description of implications of these findings in terms of suggestions on possible ways for improving governance structures and processes.

Initially substantial effort was put into developing a common analytical and methodological framework that subsequently was used within RISKGOV to achieve an interdisciplinary and
comparative analysis of the studied environmental risk issues. This theoretical analysis revealed that it is important to combine at least four analytical approaches with varying degrees of basis in natural and social sciences (i.e. ecosystem management, environmental governance, environmental risk governance, and reflexive governance) to reach a comprehensive understanding of the governance of the Baltic Sea environment. Reflexive governance was also identified as a fruitful bridging perspective that relates to most of the key components covered by the other approaches. It has been argued that development of such integrated interdisciplinary perspectives is one of the most pressing and hard tasks in current environmental science. In this respect, we argue that RISKGOV, apart from contributing with empirically based analyses of governance structures and processes connected with key environmental risks, also provides an example of a possible approach to the development of a truly interdisciplinary research practices.

The performed case studies revealed several case-specific challenges connected with governance structures, assessment-management interactions, as well as stakeholder participation and communication. These case-specific issues are described and discussed in detail in RISKGOV case study reports and related publications (see Annex 1). In this final report we instead focus on discussing the results of the cross-case comparisons and what these imply in terms of recommendations for improvements.

A general finding of the cross-case analyses performed within RISKGOV is that regional governance of the Baltic Sea ecosystem is quite well-developed in an international comparison. Still, although comprehensive regulatory frameworks in most cases are in place, enforcement and implementation often lags behind, and better integration among frameworks could be achieved. Moreover, regional institutional forms and mechanisms for systematic reflection among stakeholders on long-term improvement of environmental safety within individual risk-areas as well as between different sectors are largely lacking. Consequently, RISKGOV concludes that it is necessary to improve the robustness and responsiveness of governance practices to achieve sustainable ecosystem management. This alteration of practices is complex and requires careful reflection not only before initiating change, but even more importantly, as a component in a continuous process of an evolving and adaptive ecosystem approach to management.

Since a move towards more sustainable practices is very complex and potentially quite hard and time consuming, RISKGOV has focussed on generating suggestions for governance improvements in the medium to long-term (i.e. years-decades) using what might be called a ‘hierarchical’ approach. This means that suggestions, first, have been centred to general issues that RISKGOV identify as key challenges for achieving sustainable governance of the Baltic Sea ecosystem (e.g. lack of coordination and collaboration in governance, insufficiently developed integration and management of knowledge and uncertainty, lack of a well-developed system for stakeholder input). In a second step we then identify some examples of what this could mean in terms of the practices of important organisations in Baltic Sea environmental governance such as HELCOM and ICES.
To summarise, RISKGOV has resulted in the following general recommendations:

1. **Governance structures**
   There is a need to take three moves towards more reflexive governance by improving regulatory coordination, cross sector collaboration and integrative policies, and interaction space for reflexivity. We exemplify these moves by pointing at potential positive effects of: (i) increased interactions between HELCOM and EU aiming at the combination of mandatory regulation and voluntary agreements, as well as a potential uploading of HELCOM initiatives and Recommendations into binding EU directives, (ii) further developing HELCOM dialogue forums such as those linked to fishing and agriculture, and (iii) expanding the role of regional stakeholder forums such as the Baltic RAC.

2. **Assessment-management interactions**
   There is a need to further develop the regional and ecosystem basis of knowledge generation and management, as well as the development of science-based advice. Specifically this involves required improvements in terms of: (i) integration of various forms of scientific knowledge, (ii) stakeholder participation in the generation of science-based advice, (iii) coping with scientific uncertainty and disagreement, (iv) appraisal of interdependencies among environmental risk issues, and (v) transparency on the politicised nature of science-policy interactions. Although there have been calls for an independent Baltic Sea science panel, we believe that much is to be won by instead reforming the practices of already present organisations at the science-policy interface such as HELCOM, ICES and EU institutions.

3. **Stakeholder participation and communication**
   There is a need for the development of a more integrated system of stakeholder input (of values, knowledge, and critique). Setting up such a system, e.g. in the form of a ‘regional marine advisory council’, would require mastering of several challenges: (i) facing issues of inclusion, (ii) improving motivation and capacity, (iii) creating a common concern, and (iv) improving vertical coordination. We exemplify these challenges by pointing at the possibility for HELCOM to expand its stakeholder involvement policy, to define EAM more as a participatory approach, as well as to point at the need to enhance efforts to communicate environmental issues and EAM to the general public.
2 SCOPE AND AIMS

The Baltic Sea ecosystem is subject to a wide array of human pressures connected with physical and biological contamination (e.g. hazardous chemicals, nutrient inputs and invasive species) as well as exploitation of physical and biological resources such as fish (Ducrotoy and Elliott 2008). However, although substantial (and sometimes successful) efforts have been made by state and non-state actors on local, national, European and international levels to counteract negative environmental trends in the Baltic Sea, it is evident that human activities still cause severe environmental and human health risks and problems (HELCOM 2010). Consequently it is vital to identify, describe and adequately address key challenges that obstruct sustainable governance of the Baltic Sea environment.

The aims of the interdisciplinary RISKGOV project are thus to develop a more comprehensive understanding of the structures and processes that shape the governance of environmental risks and, ultimately, to suggest possible ways on how to improve environmental risk governance in the Baltic Sea. It is important to note, however, that this latter – normative objective – primarily aims at providing ideas on how to improve governance structures and processes in the medium to long-term, and not as many previous studies to mainly focus on more specific (and often short-term) management suggestions. The project was thus based on the assumption that sustainable governance of complex environmental risks and problems require reflexive, precautionary and participatory approaches rooted on acknowledgement of ecosystem and risk specific challenges connected with complexity, uncertainty and ambiguity (as e.g. further discussed and motivated in the RISKGOV publications by Gilek et al. 2011a and Renn et al. 2011).

In practice, the RISKGOV aims have been addressed by comparing the governance of five severe environmental risks (eutrophication, overfishing, invasive species, chemical pollution and oil discharges linked to marine transports) in terms of three key components of environmental risk governance: ‘Governance structures’ focuses on the policy context, regulatory institutions, forms of decision-making, collaboration and participation. ‘Risk assessment – risk management interactions’ scrutinises processes of interaction between science and policy, risk assessment and risk management, as well as descriptions and management approaches to uncertainties and multiple lines of scientific evidence.

‘Stakeholder participation and communication’ analyses practices and conditions for stakeholder communication and participation (Figure 1).

![Figure 1. Outline of the scope of the interdisciplinary RISKGOV project.](image-url)
In this final report we aim at providing a focused account of the main RISKGOV results and their potential implications (thus avoiding unnecessary duplication of more in-depth descriptions and analyses provided elsewhere as summarised in Annex 1 and on www.sh.se/riskgov). The structure of the report is to first describe and motivate the analytical and methodological framework that was developed within RISKGOV to achieve an interdisciplinary and comparative analysis of the studied environmental risk issues. This ‘theoretical’ section is followed by a discussion of key analytical results connected with the cross-case comparisons, as well as indications of potential implications of these findings. Section five then continues to summarise RISKGOV’s key conclusions and recommendations on possible ways of improving governance structures and processes. Finally, in the last section of the main report we identify and elaborate on some potential ways of further exploiting RISKGOV results, as well as point at important research questions that need more exploration.

The three Annexes also provide more detailed information to the interested reader as well as to potential peer-reviewers: Annex 1, gives a full record of RISKGOV’s dissemination ‘products’; Annex 2, provides an account of the practical implementation of RISKGOV outputs in terms of BONUS+ performance statistics; Annex 3, offers a comparison of RISKGOV outputs and efficiency in relation to the original research and financial plans.
3 DEVELOPING AN INTERDISCIPLINARY ANALYTICAL FRAMEWORK

Initially we put substantial effort into developing a common analytical and methodological framework that subsequently was used within RISKGOV to achieve an interdisciplinary and comparative analysis of the studied environmental risk issues\(^1\). Clearly there were several reasons why this was important (not least the inherent problem to achieve comparable case studies among different research groups of an international project such as RISKGOV). It was already at the onset of the project apparent that the studied environmental risk issues differed substantially in terms of their complexity in for example sources, possible effects and societal responses\(^2\). This means that there was a need to develop the analytical and methodological framework so that both general cross-case perspectives, and case-specific possibilities and challenges in risk governance were identified and scrutinised in all cases.

We do not here intend to present a full account of the analytical approaches used in RISKGOV but rather to introduce briefly the most important ones (\textit{i.e.} ecosystem management, environmental governance, environmental risk governance, and reflexive governance) and to motivate that all of these are needed to reach a comprehensive understanding of the governance of the Baltic Sea environment. During the analysis of the cases, RISKGOV has identified reflexive governance as a fruitful ‘bridging’ perspective that relates to most of the key components covered by the other approaches. It has been argued that development of such integrated interdisciplinary perspectives is one of the most pressing and hard tasks in current environmental science (\textit{e.g.} Söderström \textit{et al.} 2009). In this respect, we argue that RISKGOV, apart from contributing with empirically based analyses of governance structures and processes (see 4.1 to 4.3), also provides an example of a possible approach to the development of a truly interdisciplinary research practices.

3.1 Ecosystem management

Ecosystem management has been described as a profoundly new approach to natural resource management that contrary to traditional single-resource management recognises and addresses the complex interdependencies among biological and environmental components of ecosystems (Grumbine 1994). The ecosystem approach can thus be seen as being primarily based in natural sciences and its origin can be traced back to a criticism of single-resource management models as being too simplistic in the sense that ecosystem complexities and interdependencies are neglected. This means that the approach strives to consider not only the sustainability of the exploited resource but also the sustainability of other indirectly affected ecosystem components as well as ecosystem function and services.

Prominent research topics in relation to ecosystem management in recent years include implications of vulnerability, thresholds, and resilience of socio-ecological systems for management criteria and strategies (\textit{e.g.} Folke \textit{et al.} 2004). However, in a wider perspective the ecosystem approach has also been influenced by a variety of concepts based in both natural and social sciences, such as policy-cycle analyses including implementation and enforcement, as well as stakeholder involvement and learning (often in relation to discussions on adaptive (co-)management) (Endter-Wada 1998; Armitage \textit{et al.} 2007). Connected with this wider perspective the Ecosystem Approach to Management (EAM) is today widely supported in policy and science as a means of integrating social, economic and ecological

\(^1\) The analytical framework is available for download at www.sh.se/riskgov

\(^2\) This was for example argued and exemplified in the original RISKGOV research proposal which later was revised to constitute the projects research plan (available for download at www.sh.se/riskgov)
objectives and thereby facilitating sustainable development of marine and coastal areas (e.g. CBD 1998; Curtin and Pellezio 2010). According to this holistic approach, sustainable management of human activities and pressures should be based on the sensitivity and complexity of the ecosystem in focus, as well as integration of cumulative pressures (e.g. over various sources of pollution and resource extraction) (McLeod and Leslie 2009). Central to the concept are also ideas that management needs to be based on a variety of relevant knowledge and experience (e.g. scientific, local, actor-based knowledge), on stakeholder participation and deliberation, as well as on precaution and adaptability (e.g. Hammer et al. 2011).

In summary, these debates in ecosystem management have led to significant new insights into the management of complex socio-ecological systems and a focus on such issues of relevance also to the environmental governance approach. However, as exemplified in the next section, a comparison of the two approaches reveals environmental governance to be a broader and less place-based approach, which offers a complementary and critical analysis of structures, processes and trends of societal responses to environmental issues.

3.2 Environmental governance

During the last decade the term ‘governance’ has experienced tremendous popularity in the literature on international relations, comparative politics, policy studies, sociology of technology and environment and risk research. The concept of governance denotes structures and processes for collective decision-making involving both state and non-state (profit and non-profit) actors on different levels – local, regional, national, European and global (Rosenau 2003). Likewise, the concept of ‘environmental governance’ (or similar terms such as ‘governance for sustainable development’) pays special attention to environmental decision-making as a multi-actor and multi-level process, and new modes of regulation and collaboration in an increasingly complex, globalised and less state-centric world (e.g. Pattberg 2007). However, while some talk about the minimization or hollowing out of the state, others claim that what we are witnessing is more a transformation of the state rather than its decline. This transformation leads to new governance arrangements which involve the transfer of national authority in three directions: upwards to the level of international and supranational institutions, sideways to civil society actors, and downwards to subnational actors (Pierre and Peters 2000).

Further research topics of relevance to RISKGOV include (i) benefits and difficulties of participatory governance, (ii) environmental communication and (iii) framing. First, both policy-makers and scholars call for a turn towards more inclusive and cooperative forms of policy-making (Lafferty and Meadowcroft 1996). Several scholars argue that the inclusion of a broad array of knowledge claims and viewpoints is a necessary element in environmental policies. Yet, hopes for inclusiveness have their vivid opposite in fears and disappointments, founded on cumbersome decision-making, stalemates, over- and under-representation of certain actor categories, power shifts, and painful compromises (e.g. Boström 2006, Bäckstrand 2006).

Second, the way issues are communicated will influence actors’ perceptions, engagement and participation. Communication is important for our understanding of what constitutes an environmental problem or risk and how we should and could act (e.g. Cox 2006).

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3 It has been argued that especially regional level (e.g. the Baltic Sea) environmental governance as in RISKGOV is in need of more scrutinising in comparison with the global and local levels (e.g. Balsiger and Debarbieux 2011).
Communication is essential for all actors wishing to take part in or influence power structures and governance.

Finally, a useful perspective for analysing environmental communication is provided by framing theory. Frame analysis is useful to investigate how actors involved in environmental policies may or may not develop common understandings of problem situations. “[F]raming is a way of selecting, organizing, interpreting, and making sense of a complex reality to provide guideposts for knowing, analyzing, persuading, and acting” (Rein and Schön 1993). It is an important task for the analysts of policy-making to derive the exclusion or disguise of certain aspects in activities and debates from the limitations constructed in the framing processes.

Thus, RISKGOV acknowledges the great variation in the definition and use of the concept of governance (see e.g. Pierre and Peters 2000; Pattberg 2007). Our definition includes both structures – such as policy contexts, existing power relations among key actors, regulatory frameworks and organizational forms for decision-making and participation – and processes. Processes comprise such aspects as the evolution of organisations, interactional dynamics and communication among policy-makers and stakeholders, the development of strategies, framings and common understanding and the rise of new conflicts and stalemate in discussions.

3.3 Environmental risk governance

Several studies have shown that the governance of environmental risk poses specific challenges and problems: they require a substantial debate of what is at stake and what value is being assigned to different components of ecosystems (e.g. Parson 2001). In response to this, environmental risk governance involves the translation of the substance and core principles of environmental governance to the context of risk-related decision-making. This approach, thus, extends beyond the three conventionally recognised components of risk analysis (risk assessment, risk management and risk communication). In this perspective, risk governance includes the totality of actors, rules, conventions, processes and mechanisms concerned with how relevant risk information is collected, analysed and communicated and how management decisions are taken (Renn 2008).

A key process studied in environmental risk governance is the interface between the primarily science-based assessment sphere (i.e. generation of knowledge on risks) and the management sphere (i.e. decisions on and implementation of actions) (Renn et al. 2011). Clearly, interactions over this interface (e.g. in terms of evaluating if risks are tolerable/acceptable or not) are usually complicated by severe challenges connected with complexity, uncertainty and ambiguity (Stirling 2007, Renn 2008), which frequently result in controversy in both society and science on appropriate risk evaluation and management. These three fundamental challenges are not primarily related to the intrinsic characteristics of hazards or risks themselves, but to the state and quality of knowledge available about both hazards and risks.

Social science based risk scholars such as Renn (2008) and Stirling (2007) have, however, proposed that science-policy interfaces should evolve differently for different categories of environmental risks depending on the involved uncertainty and ambiguity. This discussion relates to ecosystem and place-based arguments within the ecosystem management approach, where it is often maintained that there is a need for context dependence and adaptability in the development of science-policy interfaces (McLeod and Leslie, 2009). Stirling (2007) argues that the role and methods of scientific advice need to expand from traditional risk assessment and scientific consensus to also include stakeholder deliberations, as well as precautionary
and adaptive approaches if risks are characterised by high levels of ambiguity and uncertainty. Consequently, we have in RISKGOV studied to what extent complexity, uncertainty and ambiguity constitute significant challenges in relation to the governance of Baltic Sea environmental risk, as well as if there are indications of various coping strategies towards these challenges.

3.4 Reflexive governance as a bridging perspective

The concept on reflexive governance points to the need for strategic thinking on how to build institutions and governance modes that are, on the one hand, forward-looking and able to cope with uncertainties and complex problems and, on the other hand, backward-looking in that it entails self-critical scrutinizing of the previous and current mode of governance (Voss et al. 2006). Thus, reflexivity entails reflection on the very governance process itself including its condition: *i.e.* the extent to which existing boundaries, constitutions, discourses, policies, regulations, science-policy interactions, organisational arrangement reproduce the generation of environmental problems. From this perspective, problem-handling requires the possibility to transgress existing discursive and institutional boundaries (Voss and Kemp 2006). A precondition for such transgressing is that a variety of actors can take part in the debate and search for solutions. The concept (or frame) of ecosystem approach to management (EAM) is likely to facilitate such type of reflection. However, concepts/frames alone are not sufficient to accomplish such tasks. Also institutional/organisational structures that provide interaction space, and remove obstacles, for such reflexivity need to be in place.

A key obstacle for both effective (in terms of problem-solving) and reflexive governance is that the scale of the problems matches institutionalised political and administrative scales: "the interaction space [within governance] needs to be congruent with the problem space" (Voss et al. 2006: 427; Lidskog et al. 2009). Like EAM, the perspective on reflexive governance acknowledges interdependencies across scales, sectors and arenas of governance, which in turn necessitates co-operation and dialogue among a variety of actors. The key question to address is whether there are arenas, forums and networks that allow for multi-actor, multi-scale as well as inter-sectoral collaboration and reflexivity. On the regional level (*e.g.* the Baltic Sea region) this question and challenge is accentuated even more because institutional structures are traditionally developed within the national state system.

The perspective of reflexive governance has clear similarities with scholarly writhing about adaptive (co-)management. Both approaches endorse a learning and dynamic view on governance, as well as the important role of multiple actors in goal-formulation, knowledge production and decision-making. While adaptive co-management sets its primary focus on ecosystems, particularly at the local level, reflexive governance, however, highlight more the role played by social critique at various levels. Social critique (or social reflexivity; *cf.* Beck 1992; 2006) plays a potentially constructive role for social and institutional learning. To be able to put oneself under scrutiny, individuals, organisations and institutions need to be confronted with witnesses about how their own practices contribute to the reproduction of problematic circumstances. The reflexive governance perspective accordingly pays key attention to the importance of public debate and the monitoring role of civil society organisations and other actors. Reflexive governance also pays considerable attention to path dependency; and encourages taking it seriously. Incremental rather than radical change is, normally, more realistic. A number of exogenous and endogenous factors serve to reproduce existing institutional structures in any sector or organisation (economic, institutional, cultural) (Grin 2006). While path dependency metaphorically denotes a barrier to change, one could also see it in more positive light, as "path-ways". Are there any windows of opportunities to
overcome lock-in effects and induce new pathways? The search for such pathways requires reflexivity.

Path dependency can be applied both to specific organisations (such as ICES, HELCOM) and to sectors (e.g. agriculture) in general. Both these social entities tend to change only slowly. Organisations tend to change slowly as procedures, practices and expectations become increasingly established and part of the organisation’s identity. While such patterns create organisational inertia and a limited ability to adapt to changing societal expectations (Ahrne and Papakostas, 2002), existing rules, routines, know-how and expertise that have been built up in the organisations over time can also become their biggest assets and create action capacity and authority (Barnett and Finnemore 2004).
4 MAIN ANALYTICAL RESULTS AND THEIR IMPLICATION

4.1 Governance structures

4.1.1 Focus on reflexive governance perspectives

In this part of the project, the aim has been to arrive at an in-depth discussion on possibilities for higher degrees of Baltic Sea risk governance robustness and responsiveness. At the outset, we analysed risk governance structures and institutions from a broad perspective, but as we subsequently realised that almost no studies had been made on reflexive governance perspectives, we chose to place much of our focus there when comparing governance structures between the studied issue-areas. Another important reason why we chose to focus on potentials for reflexive governance rather than on more concrete management changes in specific risk areas was because we think this is necessary in order to revise practices towards sustainable ecosystem management. This alteration of practices is complex and requires careful reflection not only before initiating change, but even more importantly, as a component in a continues process of an evolving and adaptive ecosystem approach to management.

4.1.2 Point of departure

The dimensions of identified type of risk, scope and contemporary governance patterns were taken as a point of departure in this discussion as these comprise restrictions for what is possible to achieve (Hassler et al. 2011: 15-16). The type of risk is crucial as this determines parameters such as potential impact and socioeconomic distribution of effects. For example, a low probability/large impact risk (e.g. large scale oil spill) typically affects framing and thus management options very different from a high probability/long term risk (e.g. eutrophication). The scope dimension refers to geographical distribution of impact, or more precisely put, the fit – or misfit – between administrative and ecosystem scales. Governance structures and strategies need to be adapted to how effects upon ecosystems propagate over smaller or larger geographical areas. This means that whereas certain aspects of specific problems could be dealt with locally or in sub-regional constellations of actors, others have global implications and therefore require very different forms of institutional responses. Typically, decisive action is harder to achieve the larger the number of affected countries is. Moreover, our results show that factors such as prior experience from collaboration, similar interests and administrative capacity tend to improve abilities to handle environmental problems that cross country borders. Contemporary governance patterns, finally, is an important parameter since these patterns tend to influence future management outcomes. Because of so-called path dependency (Hassler et al. 2011: 11-12), it is typically difficult and costly (in monetary terms as well as in cognitive and administrative respects) to change established management practices.

In the following, we describe three moves towards an improved EAM. It should be noted that these moves should not be perceived as consecutive steps, but rather as measures that need to be taken in close coordination and interaction with each other.

4.1.3 Proposed moves towards reflexive governance

Coordination of vertical and horizontal institutional interaction

A first move towards a more robust, adaptive and reflexive EAM of the Baltic Sea environment concerns the need to make marine governance better adapted to vertical and horizontal interaction between different layers of regulation (Hassler et al. 2011: 36-39). Not the least national, regional (e.g. HELCOM) and EU levels of governance need to be closer coordinated in order to avoid inefficient overlaps and regulatory gaps. Moreover, voluntary or
soft regulation (e.g. through the recommendations of HELCOM) can be helpful to fill some of the gaps and to serve as a testing ground for subsequent hard regulations. Such initiatives are sometimes taken as a response to inert intergovernmental regulatory processes. Soft and hard approaches can support each other (Hassler et al. 2011). For example, the former help paying attention to and serve to legitimise new perspectives such as precaution, the ecosystem approach and sector integration. A combination of voluntary and mandatory regulation is also necessary in the cases when global flows of raw material and products relate to the regional risks, and where effective global conventions are absent. The mix of hard and soft approaches should accordingly be seen as context-dependent and could thus be adjusted depending on the scale and scope of the problem structure. In order to address negative path dependencies and lock-in effects, interactions between governance levels need to be scrutinised to be able to find opportunities for new pathways and innovative options of collaboration and synergism (Hassler et al. 2011: 43-45). A promising but so far relatively underdeveloped strategy has been to stimulate initiatives among smaller groups of countries, encourage a continued process by bringing the elaborated initiative to a regional body in order to foster wider support and finally to approach the EU Commission with the goal of turning soft regional agreements into binding directives. The handling of the Baltic Sea Action Plan has been shown to have followed this three tier process quite closely (Hassler et al. 2011: 17).

Cross-sector collaboration
A second move would be to address cross-sector collaboration and integrated environmental policy-making more systematically than what previously has been done (Haahti et al. 2010: 59). Clearly, the need to let the problem at hand rather than existing sector divisions determine management choices is easier said than done. One conclusion is that such interaction is still more the exception than the rule (Hassler et al. 2011). Therefore, innovative examples and synergisms need to be found and elaborated. For example, attempts to match the rather well integrated internal institutional structure of HELCOM with something comparable at the EU level in workshops or similar kinds of forums could serve to spur innovative forms of cross-sector cooperation. Although too early to tell, a promising example of such an initiative may be the recent establishing of the HELCOM Fisheries and Environment Forum (HELCOM FISH/ENV forum) and the HELCOM Agriculture and Environment Forum (HELCOM AGRI/ENV forum). The former started its activities in August 2008 and has invited representatives from the EC, national authorities (from both environmental and fisheries), expert groups and NGOs for cross-sector deliberations. The latter started off somewhat later (i.e. in 2010), and seems to have been less active and more expert-oriented so far based on minutes from meetings. These two forums where set up to facilitate discussions on especially the implementation of the BSAP among a broad array of stakeholders. A reasonable expectation is that these forums will be valuable as meeting occasions for e.g. administrators and experts from different member countries/sectors/disciplines.

Interaction spaces for reflexivity
Move three, finally, comprises the building up of interaction spaces for reflexivity, in order to foster a productive climate for innovative thinking on how EAM robustness and adaptive management could be enhanced. This could, but does not necessarily mean, new organisations. More important is to create spaces for new arenas or forums where interaction between experts, sector representatives, NGOs, practitioners and politicians could meet on an iterated basis to allow for feedback loops and institutional, social as well as individual learning. We have found that soft measures of different kinds (non-binding agreements,

labelling schemes, “name and shame” etc.) can be useful in the elaboration of new schemes of governance (Hassler et al. 2011: 47-49). When actors do not have to commit to specific targets, proactive countries can take the lead and try out new forms of governance components without having to create consensus among large and diverse sets of actors. The Swedish initiatives, later presented to HELCOM, on environmentally diversified fairway dues and emission fees are good example (HELCOM BSAP Task Force 2007).

A limited, but nevertheless interesting, example of inclusion of stakeholders and regionalisation of governance structure is the establishing of so called RACs (Regional Advisory Councils) in the EU Common Fisheries Policy, although so far only sector representatives and NGOs are part of these councils (for more discussion, see section 4.3). In Table 1 below the three moves suggested above are summarised.

Table 1. Three proposed moves towards reflexive EAM governance.

<table>
<thead>
<tr>
<th>Move</th>
<th>What</th>
<th>Why</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move I</td>
<td>Improve vertical and horizontal coordination</td>
<td>Gives synergetic effects and reduces overlaps. Encourages pioneering initiatives among smaller groups of countries</td>
<td>Combination of soft and hard regulation. ‘Uploading’ of HELCOM Recommendations into binding EU directives</td>
</tr>
<tr>
<td>Move II</td>
<td>Stimulate cross-sector collaboration and integrative policies</td>
<td>Places problem rather than administrative unit in focus</td>
<td>HELCOM Fishing/Agriculture Forums</td>
</tr>
<tr>
<td>Move III</td>
<td>Create interaction space for reflexivity</td>
<td>Facilitates institutional, social, and individual learning as well as refined EAM and adaptive governance</td>
<td>Regional Advisory Councils (RACs) in the EU CFP</td>
</tr>
</tbody>
</table>

4.2 Assessment – management interactions

The governance of the Baltic Sea marine environment can be regarded as a relationship between two systems: a ‘governing system’ and a ‘system-to-be-governed’. Both are diverse, complex, dynamic, socially ambiguous and vulnerable. Science-policy interfaces constitute the key sphere of interaction between the two systems through, for example, science-based advice and politically negotiated management decisions. Unravelling how science-policy interfaces have evolved and function in relation to various environmental risks, management objectives, societal sectors and multi-level governance requirements, is essential for reaching a more comprehensive understanding of the environmental governance of the Baltic Sea.

In this part of the project three main issues connected with the science-policy interactions were in focus: i) the organisational structure of science-based risk assessment activities and the generation, selection and implementation of management options, ii) the management of scientific uncertainties and disagreements, and iii) implementation of the EAM.

4.2.1 Main results linked to assessment-management interactions

In order to understand these aspects we started by describing and analysing the characteristics of the five risk cases. This revealed substantial differences in terms of sources, effects and complexities (in terms of scientific uncertainty and socio-political ambiguity)(Table 2). For example, chemical risks are associated with great uncertainty and oil spills with much lower; fisheries relate to very high socio-political ambiguity, whereas invasive species show the
opposite nature and oil spill fit with more traditional risk parameters. Our analysis also revealed a great variation in the societal risk responses, which far from always seems rational in relation to the risk characteristics.

Table 2. Summary of identified challenges and observed assessment-management interactions linked to environmental risks in the Baltic Sea (from Gilek et al. 2011b)

<table>
<thead>
<tr>
<th>Environmental risk case</th>
<th>Type of knowledge, uncertainty</th>
<th>Assessment-management interactions</th>
<th>Observed assessment-management interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eutrophication</td>
<td>Uncertainty - Ambiguity</td>
<td>Strong role of science</td>
<td>Science-based assessment of risks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(co-production linked to BSAP)</td>
<td>Diffuse and instrumental</td>
</tr>
<tr>
<td>Overfishing</td>
<td>Ambiguity - Uncertainty</td>
<td>Highly formalised</td>
<td>Science-based assessment of risks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>linked to EU fisheries management</td>
<td>Formalised, towards participatory</td>
</tr>
<tr>
<td>Invasive alien species</td>
<td>Ignorance</td>
<td>Rather undeveloped</td>
<td>Science-based assessment of risks</td>
</tr>
<tr>
<td>Chemical pollution</td>
<td>Uncertainty - Ambiguity</td>
<td>High complexity of interactions</td>
<td>Science-based assessment of risks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Diffuse, multi-level and fragmented</td>
</tr>
<tr>
<td>Oil discharges</td>
<td>‘Technical’ risk</td>
<td>Focus on surveillance and monitoring</td>
<td>Science-based assessment of risks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Focus on technical safety analysis</td>
</tr>
</tbody>
</table>

1 According to the risk typology developed by Stirling (2010) as described and discussed in Gilek et al. (2011b).

When it comes to the organisational structures, we can conclude that different forms of institutions and institutional arrangements and relations have evolved over time in the various cases, for instance relatively well-formalised in the overfishing case, and rather informal for combating eutrophication (Table 2). Similarly, we see different forms of expert dependencies. In the overfishing case there are institutionalised formal links between e.g. ICES and the EU Commission and the historic path-dependency is quite strong, thereby causing institutional inertia, even though the development of Regional Advisory Councils (RACs) such as the Baltic RAC are gradually changing the picture. In relation to many other environmental risk cases (e.g. eutrophication and chemicals) HELCOM provides a regional basis for assessment and management (although implementation of management recommendations have often proved complex). Still, assessment-management interactions seem more developed and better organised in the overfishing case, even though it is obvious that the last link, the political decision-making on quotas, has deviated substantially from the science-based advice, thereby opening for continued overfishing. Similarly, well-developed institutions seem to allow for improved deliberative processes for fisheries, including improved analysis of socio-economic dimensions, which we cannot find to the same extent for e.g. chemicals, eutrophication and invasive species.

The assessment and management responses we see to the studied risks do not seem to be based on any thorough analysis of the specific risk characteristics, or on the suitability of different overall strategies (e.g. traditional science-based assessment, precautionary, deliberative). Instead, all studied assessment-management interactions can be classified as being built primarily on traditional science-based assessment of risks. Of course, we see elements of for example precaution in e.g. the chemicals case, and deliberation in the fish case, and the inclusion of the EAM as a starting point for assessment exercises and management decisions is becoming more common, but overall this happens only partially and infrequently.
4.2.2 Conclusions and implications

Thus, to summarise, we conclude that there are substantial differences among environmental risks in relation to, for example, complexity, uncertainty and ambiguity, and we argue that it is important to maintain a balance between ideals of holistic approaches such as EAM and context dependent requirements of various management objectives, environmental risks and sectors. For example, high levels of uncertainty (e.g. chemical pollution) and ambiguity (e.g. overfishing) can be assumed to require assessment-management approaches focussed on precaution and participatory deliberation, respectively.

Furthermore, our analysis identifies six key issues and challenges that, if adequately addressed, may improve assessment-management interactions and facilitate the implementation of the ecosystem approach to management (summarised in Table 3 and discussed in detail in Gilek et al. 2011b). All off these challenges relate directly to the three general moves towards reflexive governance (i.e. coordination, collaboration and reflexivity) identified in connection with RISKGOV’s analysis of governance structures (section 4.1 above). Thus, we argue that the identified key challenges should be reflected upon by all stakeholders and organisations in relation to their practices to improve science-policy interactions and ultimately to promote sustainable governance of the Baltic Sea ecosystem. Although this reflection might expose requirements for future institutional innovation at the science-policy interface, we believe that improved coordination, collaboration and reflexivity among and within already present organisations such as HELCOM, ICES and EU institutions may well be sufficient.

Table 3. Summary of key issues and challenges for improving assessment-management interactions connected with the governance of Baltic Sea environmental risks (from Gilek et al. 2011b).

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. We see a need to further develop the regional and ecosystem basis of assessment-management interactions in terms of addressing prioritised knowledge gaps, as well as developing regional knowledge management and monitoring to strengthen regionally-based scientific advice.</td>
<td></td>
</tr>
<tr>
<td>2. Integration of various forms of scientific knowledge is currently rather undeveloped in assessment and scientific advice, which reduces possibilities of addressing also the social dimension of sustainable development as well as possibilities of identifying and reducing ‘blind spots’.</td>
<td></td>
</tr>
<tr>
<td>3. Stakeholder participation requires more consideration since incorporation of practitioner and local knowledge in risk assessments as well as stakeholder deliberation in risk management often are vital for the successful implementation of the ecosystem approach to management.</td>
<td></td>
</tr>
<tr>
<td>4. We identify substantial room for improvements linked to coping with scientific uncertainty and disagreement in both risk assessment and risk management. We conclude that there in fact are examples of science-based precautionary approaches and methods, but that a comprehensive and coherent strategy for addressing uncertainty is often lacking.</td>
<td></td>
</tr>
<tr>
<td>5. Interdependencies among environmental risk issues need to be more specifically addressed than today. Climate change will, for example, influence both the outcome of risk assessments as well as the possibilities for successful management in all the studied environmental risk cases.</td>
<td></td>
</tr>
<tr>
<td>6. Despite a commonly expressed idea of a clear separation between assessment and management, the studied science-policy interactions are in general rather diffuse and politicised. This lack of transparency about how these interactions evolve and are constructed may mislead political decision makers and the public and thus potentially hamper management progress.</td>
<td></td>
</tr>
</tbody>
</table>

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5 This topic is explored more in detail in Gilek et al. (2011c) and Hassler et al. (submitted)
4.3 Stakeholder participation and communication

The emphasis on ecological and integrative objectives of recent initiatives on EU marine policy calls for innovative forms of stakeholder involvement in the Baltic Sea Region (BSR). It creates a need to develop structures and processes for exchange between the riparian countries and also the various stakeholders on the nature of the interconnectedness between risks and sectors and possible ways to deal with this interconnectedness in risk assessment and risk management. In this part of RISKGOV we have produced an analysis of current conditions for stakeholder involvement in support of more integrated environmental risk governance in the BSR as required by EAM (Dreyer et al. 2011). The analysis had a twofold focus. Firstly, we investigated risk frames in terms of existing perspectives of five environmental risks in the debates over marine environmental risk governance in the BSR. Secondly, we explored in regard to the five cases institutional provisions for risk communication in the BSR targeted at stakeholders and/or the general public.

4.3.1 Key results linked to stakeholder participation and communication

A general finding is that amongst some of the stakeholders there is currently a rather low level of interest in and awareness/understanding of ecosystem related challenges and the conditions for realising the solution potential of EAM. Implementation of a more integrated approach of environmental risk governance in the spirit of EAM in the Baltic Sea region would require increased efforts to empower stakeholders and encourage them to develop ownership of environmental and ecological risks as well as commitment to the basic principles supporting EAM.

Another general finding is that EAM-related risk communication targeted at the general public is only emerging and that EAM has not (yet) become part of public imagination, debate, and reflexivity at national and transnational (BSR) levels. A high level of public awareness and media attention towards the subject of EAM could facilitate the development of ownership and commitment by the various groups affected by and interested in the management of Baltic Sea resources and uses. Stimulation of public attention to EAM is made more difficult by the fact that there is a lack of news media and a media-supported agenda at the regional level.

On the other hand, recent changes in stakeholder risk communication policy in regard to the studied environmental risks could have a supportive effect on EAM implementation. In the past decade, novel, dialogue-based forms of stakeholder involvement have been established. They include HELCOM’s stakeholder ‘dialogue policy’ (‘Stakeholder Conferences’) which complements its traditional ‘observer policy’ since the Baltic Sea Action Plan (BSAP) was initiated. With the focus of the BSAP on EAM, HELCOM’s dialogue policy may contribute to stimulating stakeholder interest in the development and pursuit of ecological and integrative objectives in Baltic Sea environmental risk governance. There is furthermore the establishment of the Baltic Sea Regional Advisory Council (BS RAC). The BS RAC forms part of a system of stakeholder-led bodies tasked with providing regionally-sensitive advice on fisheries management under the revised EU’s Common Fisheries Policy. The multi-stakeholder design of the RACs (which provides for the inclusion of environmental NGOs) can help that the resource users develop ownership of environmental and ecological risks in terms of taking responsibility for the risks reflected in the management advice they advocate.

4.3.2 Conclusions and implications

Successful as well as reflexive implementation of EAM would require, however, a more integrated system of stakeholder input (of values, knowledge, and critique), which better takes into account interdependencies among environmental risk issues and also their social and
economic implications. We show that setting up such a system, e.g. in form of a “regional marine advisory council”, would require mastering of several challenges (Dreyer et al. 2011). This includes addressing issues of inclusion, motivation and capacity, divergent interpretations of EAM, and vertical coordination of stakeholder advice in a multi-level governance system; these challenges are shown in Table 4.

Table 4. Challenges of setting up an integrated system of stakeholder input in the BSR

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Related findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facing issues of inclusion</td>
<td>Moving towards an integrated system of stakeholder input requires defining a membership, which ‘truly’ reflects the range/role of stakeholders making up the different sectors in the BSR and designing an organisational structure allowing for efficient working processes. The persistent debate on the two-third dominance of the fisheries sector in the RACs is one indicator of this issue’s importance.</td>
</tr>
<tr>
<td>Unclear/insufficient motivation and capacity</td>
<td>Integrated issue management does not automatically present an attractive option for all stakeholders, power and resources are unequally distributed, and strategic interests may be opposed to it. Such issues need to be addressed in the pursuit of such an approach.</td>
</tr>
<tr>
<td>Creating a common concern</td>
<td>The EAM is understood very differently and not fully acknowledged by all relevant stakeholders in the different cases. Defining it primarily as a participatory management approach could enhance acceptance and thereby increase motivation for joint advice giving on integrated issue management.</td>
</tr>
<tr>
<td>Vertical coordination</td>
<td>The pursuit of an integrated system of stakeholder input requires improved coordination of regional stakeholder input with stakeholder input produced at the other political levels.</td>
</tr>
</tbody>
</table>

As possible next steps forward we suggest:

- To expand and intensify HELCOM’s stakeholder involvement policy, for instance by supplementing the recently established structures for facilitating dialogue between the national Ministries (HELCOM Baltic Agriculture and Environment Forum and HELCOM Baltic Fisheries and Environment Forum) by similar structures for facilitating dialogue between the various stakeholder groups that are attached to the different socio-economic sectors in the BSR.
- To propagate EAM more strongly in regard to its procedural aspects and define it as a participatory management approach. If representations of the concept within policy, management and scientific circles placed special emphasis on the participation component, popularisation of the concept in the BSR could gain momentum. The concept could gain in attractiveness from promises to stimulate and foster the setting up of innovative participatory learning and coordination processes and the development of ‘learning’ institutions in regard to how a healthy Baltic Sea ecosystem can be achieved.
- To enhance efforts to communicate EAM to the general public. For example, strengthened efforts could be made to use illustrative examples of ecological risks and appropriate EAM-based solutions in communicating the concept to journalists and other disseminators; this could help to make the ecological/environmental challenge a ‘hot topic’ and the management concept a charismatic idea in the entire BSR.
5 SUMMARY OF RISKGOV RECOMMENDATIONS

Regional governance of the Baltic Sea ecosystem is clearly quite well-developed in an international comparison. Still, although comprehensive regulatory frameworks in most cases are in place, enforcement and implementation often lags behind, and better integration among frameworks could be achieved. Moreover, regional institutional forms and mechanisms for systematic reflection among stakeholders on long-term improvement of environmental safety within individual risk-areas as well as between different sectors are largely lacking. Consequently, RISKGOV concludes that it is necessary to improve the robustness and responsiveness of governance practices to achieve sustainable ecosystem management. This alteration of practices is complex and requires careful reflection not only before initiating change, but even more importantly, as a component in a continuous process of an evolving and adaptive ecosystem approach to management.

Specifically, RISKGOV, has studied governance challenges and identified possible routes for improvements linked to three vital dimensions of environmental governance: (i) Governance structures, (ii) Assessment-management interactions and (iii) Stakeholder participation and communication. Since a move towards more sustainable practices is very complex and potentially quite hard and time consuming, RISKGOV has focussed on generating suggestions for governance improvements in the medium to long-term (i.e. years-decades) using what might be called a ‘hierarchical’ approach. This means that suggestions, first, have been centred to general issues that RISKGOV identify as key challenges for achieving sustainable governance of the Baltic Sea ecosystem (e.g. lack of coordination and collaboration in governance, insufficiently developed integration and management of knowledge and uncertainty, lack of a well-developed system for stakeholder input). In a second step we then identify some examples of what this could mean in terms of the practices of important organisations in Baltic Sea environmental governance such as HELCOM and ICES.

To summarise, RISKGOV has resulted in the following general recommendations:

1. Governance structures

   There is a need to take three moves towards more reflexive governance by improving regulatory coordination, cross sector collaboration and integrative policies, and interaction space for reflexivity. We exemplify these moves by pointing at potential positive effects of: (i) increased interactions between HELCOM and EU aiming at the combination of mandatory and voluntary regulation, as well as a potential uploading of HELCOM initiatives and Recommendations into binding EU directives, (ii) further developing HELCOM dialogue forums such as those linked to fishing and agriculture, and (iii) expanding the role of regional stakeholder forums such as the Baltic RAC.

2. Assessment-management interactions

   There is a need to further develop the regional and ecosystem basis of knowledge generation and management, as well as the development of science-based advice. Specifically this involves required improvements in terms of: (i) integration of various forms of scientific knowledge, (ii) stakeholder participation in the generation of science-based advice, (iii) coping with scientific uncertainty and disagreement, (iv) appraisal of interdependencies among environmental risk issues, and (v) transparency on the politicised nature of science-policy interactions. Although there have been calls for an independent Baltic Sea science panel, we believe that much is to be won by instead reforming the practices of already present organisations at the science-policy interface such as HELCOM, ICES and EU institutions.
3. Stakeholder participation and communication

There is a need for the development of a more integrated system of stakeholder input (of values, knowledge, and critique). Setting up such a system, e.g. in the form of a ‘regional marine advisory council’, would require mastering of several challenges: (i) facing issues of inclusion, (ii) improving motivation and capacity, (iii) creating a common concern, and (iv) improving vertical coordination. We exemplify these challenges by pointing at the possibility for HELCOM to expand its stakeholder involvement policy, to define EAM more as a participatory approach, as well as to point at the need to enhance efforts to communicate environmental issues and EAM to the general public.
6 FUTURE RESEARCH AND EXPLOITATION OF THE RESULTS

Although the descriptive, analytical and normative aims of RISKGOV were developed and addressed through frequent dialogue with stakeholders (i.e. by arranging a series of roundtable discussions and a final conference with e.g. representatives from IGOs, NGOs, authorities, industry and political parties), it is clear that full exploitation of RISKGOV results requires that even more effort is put on stakeholder dialogue. Therefore, we are now (through other external funding) embarking on a final ‘dialogue phase’ of the project, which aims to develop more specific sector- and stakeholder-specific recommendations for improving governance practices. For example, we are planning to (in collaboration with e.g. the Federation of Swedish Farmers) develop specific recommendations aiming at informing farmers and other stakeholders in the agricultural sector. The idea is also to further refine and specify the suggestions already developed in relation to governance practices of important regional organisations such as HELCOM.

In the end, however, it is obviously also important to initiate new research that builds and expands on RISKGOV’s results and suggestions. Below we pinpoint and explain four key research topics linked to Baltic Sea environmental governance that we believe deserves more attention:

1. Challenges, best practices and ideas for building improved arenas for dialogue and knowledge input.

In RISKGOV we concluded that there is a need for three major moves towards improved (reflexive) governance of the Baltic Sea environmental (i.e. coordination, collaboration and reflexivity)(see Table 1). We argue that especially the topic of collaboration would be fruitful to address and study from a multi-level and multi-actor perspective. One approach to generate in-depth empirical information could be to scrutinize what promotes and obstructs collaboration (i.e. in science, between science and policy, among countries, among stakeholders etc.) in relation to specific sectors or processes that constitute important challenges (such as agriculture) or are associated with high expectations (such as marine spatial planning).

2. Ecosystem management: gap analysis and strategies for improved operative chains

Ecosystem management includes a broad set of activities aimed at governing human societies’ complex interactions with the environment. In the public domain, common elements of environmental policy include scientific input; agreement on objectives (e.g. sustainable fisheries, non-toxic environment) and normative principles and approaches (e.g. polluter accountability, precaution, EAM); operative tools (taxes, laws, etc.); and enforcement and monitoring. This chain of operationalisation seems rational but due to numerous gaps in the chain, objectives are far from always achieved. This is true for not least the Baltic Sea, in spite of international agreements and EU objectives expressing the EAM. While the RISKGOV project focused on governance processes related to the interface between assessment and management of environmental risks, and in particular uncertainty and disagreement, and aimed to describe and analyse how and why this might differ from one risk area to another, we now suggest to look in detail at the whole policy chain and investigate operationalisation gaps, with the aim to provide ideas for helping to close these gaps. Consequently, the overriding questions are: why are objectives not reached and how can improvements be achieved?
3. **Environmental communication and the public.**

Generally, research in the area of environmental risk governance has focused on stakeholder communication mainly in terms of participation (with close connection to the area of public deliberation issues) but our experiences and results from RISKGOV points to the importance of widening the stakeholder-concept and to acknowledge the importance of citizen/public communication. For example, it can be argued that placing a certain (risk/environmental) issue on the agenda may enhance (public) engagement and increase possibility and quality of (public) participation, which will in the end result in improved (risk/environmental) management and policy implementation. Consequently, we believe that it is important to perform in-depth analyses of communication strategies and activities of civil society actors and organisations; the role and importance of European and regional public spheres and common agendas, as well as the role and importance of various media and other communication platforms (e.g. Twitter, blogs etc.).

4. **Comparisons of environmental governance in various regional seas (e.g. Baltic Sea, North Sea, Black Sea and Mediterranean Sea)**

The governance system of Europe’s seas has undergone rapid change since the 1970s. This development is characterised by various degrees of Europeanization and regionalization of marine environmental governance. However, as far as we can see the published literature usually concentrates on specific aspects of EU marine governance such as fisheries and marine spatial planning or on the governance of specific regional seas such as the Baltic Sea (as e.g. within RISKGOV). Consequently, we argue that it is important to initiate interdisciplinary studies comparing policy change, practical implementation in the form of management practices and the generation of scientific advice, and the resulting environmental effects among various regional European seas (e.g. Baltic Sea, North Sea, Black Sea and Mediterranean Sea). This will provide not only a more comprehensive understanding of the governance of Europe's marine environment, but also a more in-depth picture of the drivers and challenges for particular regional seas such as the Baltic Sea (e.g. in terms of Europeanization, regionalization and transfer of policy and practices).
7 ACKNOWLEDGMENTS

The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP/2007-2013) under grant agreement n° 217246 made with the joint Baltic Sea research and development programme BONUS, as well as from the Swedish Environmental Protection Agency, the Swedish Research Council FORMAS, the Foundation for Baltic and East European Studies, the German Federal Ministry of Education and Research (BMBF), the Polish Ministry of Science and Higher Education, and the Academy of Finland.

8 CITED LITERATURE


9 ANNEX 1: RISKGOV DISSEMINATION

9.1 Written texts

9.1.1 RISKGOV reports (available at www.sh.se/riskgov)


9.1.2 Scientific peer-reviewed articles

Dreyer, M., Boström, M. and Jönsson, AM. To be submitted. The Baltic Sea Region: Moving towards participatory implementation of an ecosystem-based marine environmental management? Final submission to Environmental Policy and Governance in February 2012.


Linke, S., Gilek, M., Karlsson, M. and Udovyk, O. To be submitted. Unravelling science-policy interactions in the environmental risk governance of the Baltic Sea: overfishing, eutrophication
and hazardous chemicals. Final submission to special issue in Journal of Risk Research in February 2012.


9.1.3 Books, special issues and book chapters


9.1.4 Papers presented at scientific conferences


9.1.5 Posters presented at scientific conferences


9.1.6 Science briefs and popular science articles


Gilek, M. 2008. Östersjöns miljörisiker under lupp (In Swedish). Tidningen Forskning. ForskningsFörlaget AB.


9.2 Oral presentations

9.2.1 Presentations at scientific conferences


Lundberg, C. 2011. From words to actions - Similarities and differences in framing and communication of the eutrophication in the Baltic Sea between different groups of stakeholders. 8th Baltic Sea Science Congress in St Petersburg, August 22-26, 2011.


Smolarz, K., Lemke, P. and Zgrundo, A. 2011. Qualitative assumptions or quantitative calculations - the role of science in marine biosecurity risk assessment using bioinvasions and the Baltic Sea as a case study. 8th Baltic Sea Science Congress in St Petersburg, August 22-26, 2011.

Söderström, S and Hassler, B. Power relations and marine oil transportations in a multi-actor system. 16th Annual International Sustainable Development Research Conference, Hong Kong on 30 May - 1 June 2010


9.2.2 Popular science and briefing presentations


9.3 Arrangement of scientific conferences, special sessions and workshops

- **Coping with Uncertainty: a multidisciplinary research conference on risk governance in the Baltic Sea region.** 15-17 November 2009, Stockholm. Ca 80 participants from Academia, NGOs, private and public organisations.
- Session on ‘Managing the scientific knowledge on the Baltic Sea environment’ at the 8th Baltic Sea Science Congress in St Petersburg. August 22-26, 2011.
- **Governing Europe’s Marine Environment.** Author’s workshop with ca 15 scholars from Sweden and Europe. Södertörn University. October 13, 2011 with funding from FORMAS

9.4 Arrangement of stakeholder roundtables and conferences

- **RISKGOV final conference.** *Towards better environmental risk governance of the Baltic Sea.* Presentation and discussion of RISKGOV results and conclusions with stakeholders and experts. December 8, 2011 Gdynia, Poland.

9.5 Academic courses and PhD students

- PhD Course on: *Environmental risk governance of the Baltic Sea.* Askö Laboratory, August 2010. 9 PhD Students from Sweden, Poland and Norway.
- Master level course on: *Environmental Risks: assessment and management.* 5 week course that uses Baltic Sea environmental risks as case studies.
- Numerous lectures based on RISKGOV results for Bachelor and Master level students at Södertörn University.
- A number of PhD students have been associated with the RISKGOV project:
  - Sara Söderström (Södertörn University): Tentative title: ‘Environmental risk communication in a complex setting: the case of maritime oil transportation in the Baltic Sea’
  - Oksana Udovyk (Södertörn University): Tentative title: ‘Science-policy interactions and the governance of the Baltic Sea environment’
  - Sam Grönholm (Åbo Akademi University): Tentative title: ‘The dilemma of the modern welfare society - a center – periphery analysis’
10 ANNEX 2: PRACTICAL IMPLEMENTATION OF RISKGOV OUTPUTS AND BONUS PERFORMANCE STATISTICS

Table 5 summarises RISKGOV outputs in terms of the performance statistics of BONUS+. Most of these quantitative indicators (i.e. 5-17) correspond to dissemination activities and products presented in full in Annex 1. Here we briefly also explain RISKGOV activities in relation to the statistic 1-4 (cf. Table 5):

**Statistic 2: ‘Number of times the scientists working in your project have served as members or observers in the stakeholder and scientific committees’**

- Michael Gilek (SUC) has been a member of a scientific reference committee on environmental issues in the Baltic Sea region appointed to help the Swedish International Development Cooperation Agency (SIDA - Baltic Sea Unit) develop their programme on the Environment in the Baltic Sea region. 2008 – 2010.
- Mikael Karlsson (SUC) has served as a member of the following committees and working groups:
  - Member of the Environment and Climate Change Advisory Group, 7th Research Framework Programme, European Commission (2008-)
  - Expert in the Swedish Governmental Committee on the System for Environmental Quality Objectives (2008-2009)
  - Member of the European Commissions’ High Level Group on the Competitiveness of the European Chemicals Industry (2007-2009)
  - Expert in the Swedish Environmental Objectives Council (2005-2010)
- Furthermore, project researchers Mikael Karlsson, and Erik Bonsdorff have participated in several activities with relevance to marine environmental governance in the Swedish and Finnish parliaments, respectively.

**Statistic 4: ‘Number of suggestions for designing, implementing and evaluating the efficacy of pertinent public policies and governance originating from the work of your Project’**

As is described in detail in this final report one of RISKGOV’s main aims is to generate suggestions on possible ways of improving environmental governance of the Baltic Sea. These recommendations were developed by first identifying fundamental challenges and possible ways of addressing these and then in a second step, by exemplifying what these general suggestions could mean for important organisations such as HELCOM and ICES. Consequently it is hard to exactly quantify the number of suggestions produced within RISKGOV. A conservative estimate is to say that RISKGOV has developed three general suggestions connected with the main environmental governance issues studied (i.e. governance structures, assessment-management interactions and stakeholder participation and communication). These are summarised in section 5 of this final report.

Although it can be argued that there is a need to put even more effort into communicating and discussing these suggestions with stakeholders to promote practical implementation of RISKGOV outputs (see section 6 of this report), there are already indications that RISKGOV suggestions will be considered in the development of governance structures and processes. For example, at the third RISKGOV stakeholder roundtable in Stuttgart (14-15 Feb, 2011) future structures for stakeholder involvement in Baltic Sea environmental risk governance were discussed with participation of the General Secretary of the International Council for the Exploration of the Sea (ICES) who signalled that he would consider the results of this discussion in his future work on contributing to designing these structures.
Table 5. RISKGOV implementation (2009-2011) in terms of BONUS+ performance statistics.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Number of times your project has contributed to consultations carried out by European Commission.</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>Number of times the scientists working in your Project have served as members or observers in the stakeholder and scientific committees.</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Number of times the effort of your project has resulted in modifications made to relevant policy documents and action plans (in particular, Baltic Sea Action Plan).</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>Number of suggestions for designing, implementing and evaluating the efficacy of pertinent public policies and governance originating from the work of your Project.</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Number of persons (above) and working days (below) spent by foreign scientists on research vessels participating in the cruises arranged by your Project.</td>
<td>0</td>
</tr>
<tr>
<td>6.</td>
<td>Number of persons (above) and working days (below) spent by foreign scientists using other major facilities involved in your Project.</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>Number of popular papers produced by your Project</td>
<td>7</td>
</tr>
<tr>
<td>8.</td>
<td>Number of interviews to media given by members of your Project’s consortium.</td>
<td>7</td>
</tr>
<tr>
<td>9.</td>
<td>Number of multi-media products and TV episodes produced by your Project with dissemination purpose</td>
<td>0</td>
</tr>
<tr>
<td>10.</td>
<td>Number of other dissemination products produced by your Project.</td>
<td>44</td>
</tr>
<tr>
<td>11.</td>
<td>Number of times your Project team has issued a recommendation how to improve general public’s comprehension and priorities regarding the Baltic Sea.</td>
<td>0</td>
</tr>
<tr>
<td>12.</td>
<td>Number of times your project has contributed to dissemination products/events addressed to general public concerning coupling between marine environmental quality and human health and well-being.</td>
<td>5</td>
</tr>
<tr>
<td>13.</td>
<td>Number of datasets your project has delivered to the common metadata base of the programme.</td>
<td>0</td>
</tr>
<tr>
<td>14.</td>
<td>Number of scientists that attended international workshops, WG meetings, conferences, inter-calibration exercises etc. paid by BONUS+</td>
<td>21</td>
</tr>
<tr>
<td>15.</td>
<td>Number of PhD courses (above) organized by your Project and persons participating (below).</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Number of modifications made to current PhD course programmes that resulted from the work of our Project.</td>
<td>11</td>
</tr>
<tr>
<td>16.</td>
<td>Number of student visits (persons above, visit days below) from your Project to other BONUS projects.</td>
<td>2</td>
</tr>
<tr>
<td>17.</td>
<td>Number of student visits (persons above, visit days below) from your Project to other BONUS projects.</td>
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</tr>
<tr>
<td></td>
<td>Number of student visits (persons above, visit days below) from your Project to other BONUS projects.</td>
<td>3</td>
</tr>
</tbody>
</table>
11 ANNEX 3: COMPARISON WITH THE ORIGINAL RESEARCH AND FINANCIAL PLAN

11.1 Comparison with original research plan

The time plan, project activities and deliverables of RISKGOV as specified in the original research plan are summarised in Table 6 and 7. The project has, with only slight modifications in terms of the timing of milestones and deliverables, progressed fully in line with the original plans. This can clearly be observed by comparing the account of RISKGOV dissemination products in Annex 1 with the original research plan (Table 6 and 7). Although there has been a slight delay in the submission of peer-review articles linked to some of the cross-case comparisons (see Dreyer et al.; Linke et al. and Gilek et al. to be submitted in Annex 1) as well as connected to the ‘Normative framework’ report (Hammer 2012 in Annex 1), we argue that dissemination and publication linked to RISKGOV is clearly more extensive than what was originally planned. For example, we have presented RISKGOV findings at a large number of scientific conferences and stakeholder events. Furthermore, apart from several submitted and published peer-reviewed articles, we have published a special issue in AMBIO (Vol. 40(2): 2011), numerous book chapters and finally, two edited scientific books to be published by Ashgate and Springer, respectively.

Table 6. Gantt chart of the RISKGOV project showing the timing of different Work packages (WP), Tasks, Milestones (M), Roundtables (R), Deliverables (D), and Project meetings (PM).

<table>
<thead>
<tr>
<th>Time in Months</th>
<th>Research stage 1</th>
<th>Research stage 2</th>
<th>Research stage 3</th>
<th>Research stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP1 (ÅAU and SUC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Analytical framework</td>
<td>M1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundtable 2 (R2)</td>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-case analysis</td>
<td>D8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normative framework</td>
<td>M4 D11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WP2 (SUC leading)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytical framework</td>
<td>M1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundtable 1 (R1)</td>
<td>R1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-case analysis</td>
<td>D9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normative framework</td>
<td>M4 D11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WP3 (DIALOGIK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytical framework</td>
<td>M1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Roundtable 3 (RC)</td>
<td>R3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-case analysis</td>
<td>D10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normative framework</td>
<td>M4 D11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case studies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eutrophication (ÅAU)</td>
<td>M2</td>
<td>M3</td>
<td>D2</td>
<td></td>
</tr>
<tr>
<td>Fisheries (DIALOGIK)</td>
<td>M2</td>
<td>M3</td>
<td>D3</td>
<td></td>
</tr>
<tr>
<td>Biodiversity (DMEF)</td>
<td>M2</td>
<td>M3</td>
<td>D4</td>
<td></td>
</tr>
<tr>
<td>Chemicals (SUC)</td>
<td>M2</td>
<td>M3</td>
<td>D5</td>
<td></td>
</tr>
<tr>
<td>Maritime transport (SUC)</td>
<td>M2</td>
<td>M3</td>
<td>D6</td>
<td></td>
</tr>
<tr>
<td>RISKGOV web-page</td>
<td>D7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly reports</td>
<td>D7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final conf. (DMEF)</td>
<td></td>
<td></td>
<td>FC</td>
<td></td>
</tr>
<tr>
<td>Final report</td>
<td></td>
<td></td>
<td></td>
<td>D12</td>
</tr>
<tr>
<td>Project meeting (PM)</td>
<td>PM1</td>
<td>PM2</td>
<td>PM3</td>
<td>PM4</td>
</tr>
</tbody>
</table>

Milestones = M1: Analytical and methodological framework; M2: Working papers on case studies; M3: interim reports of case studies available on RISKGOV web pages; M4: Report informing decision-makers and stakeholders of the developed normative framework for ‘Environmental risk governance of the Baltic Sea’.
## Table 7. Planned dissemination activities of RISKGOV.

SUC: Södertörn University College; ÅAU: Åbo Akademi University; DIALOGIK: Non-profit institute for communication and cooperation research, Germany; DMEF: Dept of Marine Ecosystem Functioning, Gdansk University, Poland.

<table>
<thead>
<tr>
<th>Deliverables (tentative titles)</th>
<th>Type¹</th>
<th>Lead partner</th>
<th>Month²</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1: Set-up of RISKGOV web-page</td>
<td>WS</td>
<td>SUC</td>
<td>1</td>
</tr>
<tr>
<td>D5: Chemical pollution: a case study of environmental risk governance in the Baltic Sea.</td>
<td>R, PA³</td>
<td>SUC</td>
<td>18, 24</td>
</tr>
<tr>
<td>D7: RISKGOV Year 1 and Year 2 reports</td>
<td>R</td>
<td>SUC</td>
<td>13, 25</td>
</tr>
<tr>
<td>D8: Governance structures of environmental risks in the Baltic Sea</td>
<td>PA</td>
<td>ÅAU</td>
<td>31</td>
</tr>
<tr>
<td>D9: Interactions between risk assessment and risk management for environmental risks in the Baltic Sea</td>
<td>PA</td>
<td>SUC</td>
<td>31</td>
</tr>
<tr>
<td>D10: Processes of stakeholder communication connected to environmental risks in the Baltic Sea</td>
<td>PA</td>
<td>DIALOGIK</td>
<td>31</td>
</tr>
<tr>
<td>D11: Towards better environmental risk governance of the Baltic Sea</td>
<td>R, PA⁴</td>
<td>SUC</td>
<td>33, 36</td>
</tr>
<tr>
<td>D12: Final project report</td>
<td>R</td>
<td>SUC</td>
<td>37</td>
</tr>
</tbody>
</table>

### Other dissemination activities (tentative titles)

<table>
<thead>
<tr>
<th>Type⁶</th>
<th>Lead partner</th>
<th>Month²</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1: Roundtable on ‘Scientific uncertainty, precaution and the implementation of the ecosystem approach to management’</td>
<td>RT</td>
<td>SUC</td>
</tr>
<tr>
<td>R2: Roundtable on ‘Implications of EU integration for environmental risk governance in the Baltic Sea region’</td>
<td>RT</td>
<td>ÅAU</td>
</tr>
<tr>
<td>R3: Roundtable on ‘Stakeholder participation and communication in Baltic Sea environmental risk governance’</td>
<td>RT</td>
<td>DIALOGIK</td>
</tr>
<tr>
<td>FC: Final conference on ‘Towards better environmental risk governance of the Baltic Sea’</td>
<td>C, BA</td>
<td>DMEF</td>
</tr>
<tr>
<td>Presentations at relevant scientific conferences, workshops etc.</td>
<td>CP</td>
<td>All partners</td>
</tr>
</tbody>
</table>

¹Deliverable types: WS: web-based source; R: report available on RISKGOV web pages; PA: peer-reviewed scientific article; EB: edited book; ²Months: indicated months indicate the planned dates for publishing reports on the RISKGOV webpage and dates for submitting article and book manuscripts for peer-review; ³D2-D6: These deliverables will first be published as an interim reports on the RISKGOV web pages and will subsequently be updated with additional empirical information and submitted to peer-reviewed scientific journals; ⁴D11: This deliverable will first be written as report (R) aimed at informing decision-makers and stakeholders and will subsequently after discussion at the final conference be re-written to a PA; ⁵Other dissemination types: RT: Closed roundtable discussion with invited stakeholders and experts; C: open conference for scientists, experts, decision-makers, stakeholders, journalists etc; BA: book of abstracts; CP: presentations and abstracts at scientific meetings.
11.2 Comparison with original financial plan

In general, all RISKGOV partners have followed the approved financial plan (Tables 8 and 9) with only minor redistributions among budget items.

Specifically SUC and Dialogik report only minor deviations from their respective financial plans in terms of minor redistribution from travel costs to personnel costs. ÅAU reports that it has made some rearrangements in the budget plan during the funding period (following approval from the BONUS secretariat). This was mainly due to changes in researchers (e.g. parental leave) and students connected with their part of the project. Finally, DMEF state that because of formal reasons concerning signing of the project agreement (beyond the control of project participants), and late coming of both Polish and EU funds, some funding was spent later than originally planned. Furthermore, some funding was also redistributed from personnel costs (approximately 8%) to travel costs.

Table 8. Approved RISKGOV financial plan in Euro. Breakdown of yearly costs for entire consortium.

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel costs</td>
<td>128938</td>
<td>197285</td>
<td>233396</td>
<td>559619</td>
</tr>
<tr>
<td>Person months</td>
<td>34</td>
<td>51</td>
<td>58</td>
<td>143</td>
</tr>
<tr>
<td>Consumables</td>
<td>2304</td>
<td>2305</td>
<td>805</td>
<td>5414</td>
</tr>
<tr>
<td>Travel costs</td>
<td>15533</td>
<td>25533</td>
<td>19134</td>
<td>60200</td>
</tr>
<tr>
<td>Equipment</td>
<td>4500</td>
<td>2800</td>
<td>1000</td>
<td>8300</td>
</tr>
<tr>
<td>Other costs</td>
<td>10000</td>
<td>7500</td>
<td>16089</td>
<td>33589</td>
</tr>
<tr>
<td>Subtotals</td>
<td>161275</td>
<td>235423</td>
<td>270424</td>
<td>667122</td>
</tr>
<tr>
<td>Overhead</td>
<td>33412</td>
<td>40997</td>
<td>46687</td>
<td>121096</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td><strong>194687</strong></td>
<td><strong>276420</strong></td>
<td><strong>317111</strong></td>
<td><strong>788218</strong></td>
</tr>
</tbody>
</table>

1 All overheads have been calculated according to the standards of the different partners.

Table 9. Approved RISKGOV financial plan in Euro. Breakdown of total costs among the participating organisations.

<table>
<thead>
<tr>
<th></th>
<th>SUC</th>
<th>ÅAU</th>
<th>DIALOGIK</th>
<th>DMEF</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel costs</td>
<td>194759</td>
<td>133000</td>
<td>156360</td>
<td>75500</td>
<td>559619</td>
</tr>
<tr>
<td>Person months</td>
<td>38</td>
<td>34</td>
<td>31</td>
<td>40</td>
<td>143</td>
</tr>
<tr>
<td>Consumables</td>
<td>414</td>
<td>2000</td>
<td>0</td>
<td>3000</td>
<td>5414</td>
</tr>
<tr>
<td>Travel costs</td>
<td>11700</td>
<td>10000</td>
<td>18000</td>
<td>20500</td>
<td>60200</td>
</tr>
<tr>
<td>Equipment</td>
<td>0</td>
<td>2300</td>
<td>0</td>
<td>6000</td>
<td>8300</td>
</tr>
<tr>
<td>Other costs</td>
<td>6500</td>
<td>10500</td>
<td>7589</td>
<td>9000</td>
<td>33589</td>
</tr>
<tr>
<td>Subtotals</td>
<td>213373</td>
<td>157800</td>
<td>181949</td>
<td>114000</td>
<td>667122</td>
</tr>
<tr>
<td>Overhead</td>
<td>74680$^1$</td>
<td>23616$^2$</td>
<td>0$^3$</td>
<td>22800$^4$</td>
<td>121096</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td><strong>288053</strong></td>
<td><strong>181416</strong></td>
<td><strong>181949</strong></td>
<td><strong>136800</strong></td>
<td><strong>788218</strong></td>
</tr>
</tbody>
</table>

$^1$ 35% overhead on all costs; $^2$ 15% overhead on all costs; $^3$ No overheads have been calculated since the German funding organisation does not pay any overheads under the Bonus+ programme; $^4$ 20% overhead on all costs