BONUS
SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

MIRACLE

REPORT ON BALTIC SEA REGION LEARNING

DELIVERABLE 5.5

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1. Introduction

The Baltic Sea Region (BSR) presents itself as a 'wicked' context for water governance in which the current normative policy environment is incapable of fostering adaptive and systemic responses to key water issues in times of uncertainties and complexities exacerbated by climate change. In light of this, the BONUS MIRACLE project was conceived with a cognisance that meaningful changes towards effective water governance in the BSR cannot be achieved by reproducing the present situation by optimising the pre-existing policy instruments and processes and neither by focusing solely on nutrient emission. (Powell et al., 2017) Findings suggested that governance needs to be defined as a much broader concept than policy, where changes are not just driven by the public policy sector, but by a whole host of sectors and societal domains. Water governance is understood as "a systemic concept with inter-connected multi-level and multi-scale processes of action and interaction that need to take account of how governance-related and biophysical systems affect, or could affect, each other" (Blackmore et al., 2016:2). Moreover, significant changes in terms of water governance require bringing on board a broader set of stakeholders across different levels and scales, which can enable a transformation in practice that can reduce nutrient emission to the Baltic Sea and simultaneously foster multiple benefits in local contexts. The overall objective of MIRACLE is to enact a social learning process that can lead to the reconfiguration of governance approaches through an emphasis on synergies between diverse sectors and stakeholders.

As part of the social learning process within the MIRACLE project, a BSR Governance Learning workshop was held on 28 November 2017 in Uppsala, Sweden. The event was hosted by Swedish International Centre of Education for Sustainable Development (SWEDESD), Uppsala University. The aim of the workshop was to enable co-learning among researchers, policy-makers, and practitioners to identify desirable changes in the BSR water governance domain and generate suggestions for how to bring about those changes. The workshop built upon local insights from social learning processes in four case areas in the project - Berze (Latvia), Reda (Poland), Selke (Germany) and Helge å (Sweden), which have served as forums to support dialogue between researchers and stakeholders having strong stakes and expertise within water governance. The intention of this workshop was to provide an opportunity for participants to share, explore and challenge their knowledge and experiences in water governance, thereby creating shared understandings and revealing new insights into how existing and new regional governance configurations can be adapted and enacted to support the orchestration of local development initiatives that foster multiple benefits in local contexts. In particular, the workshop set out to address the following question: *What can be done at the Baltic Sea Regional level to enable more effective water governance at the local level?*

This report presents an overview of the workshop's process design and methodology, and includes a summary of the outcomes. The specific insights arising from the workshop will inform the development of a roadmap for governance and policy innovations in the BSR that not only will support the reduction of nutrient emission at the BSR level, but also deliver multiple ecosystem services at the local level. Furthermore, it is envisaged that the learning from the workshop will contribute to the design and implementation of social learning as an approach to improve understanding and praxis related to water governance in the BSR and beyond.

2. Process Design and Methodology

2.1. Key principles underpinning the process design

Designing an enabling environment for governance learning

Our point of departure for the process design was in part inspired by the insights and lessons learned from the CADWAGO project (Climate Adaptation and Water Governance Project (CADWAGO, 2013-2016), in which "governance learning" was deployed as an organising principle to design an enabling environment for interactive co-production of knowledge of relevance to water governance (Blackmore et al., 2016; Ruiu et al., 2017; van Bommel et al., 2016). Understanding how to govern water resources in the BSR has baffled both policy and scientific communities for decades. Existing water governance regimes are considered to fall short in dealing with uncertainties, controversies and reconciling multiple stakeholder demand. As a response, a growing body of studies are now advocating for more systemic and adaptive transformations in water governance (e.g. Blackmore et al., 2016; Ison, Collins and Wallis, 2015; Pahl-Wostl et al., 2013). Furthermore, it is claimed that such transformations require the integration of knowledge and orchestration of practices of multiple actors from different sectors and societal domains (Foster et al., 2016; Powell et al., 2017). Blackmore et al. (2016) further highlighted the need for developing adaptive capacity at different levels and scales for water governance transformation. Following this approach, we acknowledged the limitation of the conventional paradigm of producing scientific knowledge for improving water governance in the BSR, and argued for a more dynamic approach that involves a wider dialogue with a diverse set of stakeholders, allowing for a multiplicity of perspectives. Therefore, in our process design for the BSR Governance Learning workshop, participants were seen as active co-constructors of knowledge for improving water governance rather than "passive receivers" of solutions or recommendations from scientific experts (Ruiu et al., 2017). In light of this, the workshop was intended to shift away from merely a transfer of content and knowledge to the creation of a participatory platform for the emergence of new learning opportunities to address complex

issues within the BSR water governance domain. This approach to the process design was also consistent with the second-order design perspective, which has been elaborated on in Deliverable 5.2 (Powell et al., 2017), and Deliverable 5.4 (Do et al., 2017).

A systemic co-inquiry into water governance

Drawing on the experiences from the governance learning workshops within the CADWAGO project (Foster et al., 2016), we designed the BSR workshop as a *systemic co-inquiry* into water governance in the BSR. Co-inquiry methodology shifts the focus from researching on people to researching with people, and in the co-inquiry process, stakeholders are considered as co-researchers who contribute to the design, implementation and evaluation of the research (Heron and Reason, 2001). Systemic co-inquiry has been gaining increasing attention as a means to improve understanding and practice in situations characterised by uncertainties and "wickedness" (e.g. Foster et al., 2016; Ison 2010, 2016). It builds on systems thinking, theories of learning, action research and adaptive management, including second-order cybernetics and soft systems methodology. A systemic co-inquiry is designed in a purposeful manner, however not as a blueprint for implementation. Within so-called conventional project management, the problem motivating the project has already been predefined or bounded, and the outcomes and the enabling structures are predetermined. In contrast, a systemic co-inquiry process is open ended. The purpose is to foster a learning situation in which multiple forms of knowing and framing are deployed to surface new insights about an unbounded issue as well as connections and interdependencies (Ison, 2010; 2016; Rubenstein et al., 2016). A co-inquiry process is supported by the enactment of a social learning process with those who are considered having a "stake" in the issue under deliberation (Foster et al., 2016), and the enabling conditions for the emergence of new knowledge and understanding grow out of co-deliberation and co-reflection (Rubenstein et al., 2016).

Figure 1 depicts a systemic co-inquiry into the BSR water governance at the BSR Governance Learning Workshop (the dotted square shape). It was envisaged that this systemic co-inquiry could inspire actions to improve the situation in real life contexts.

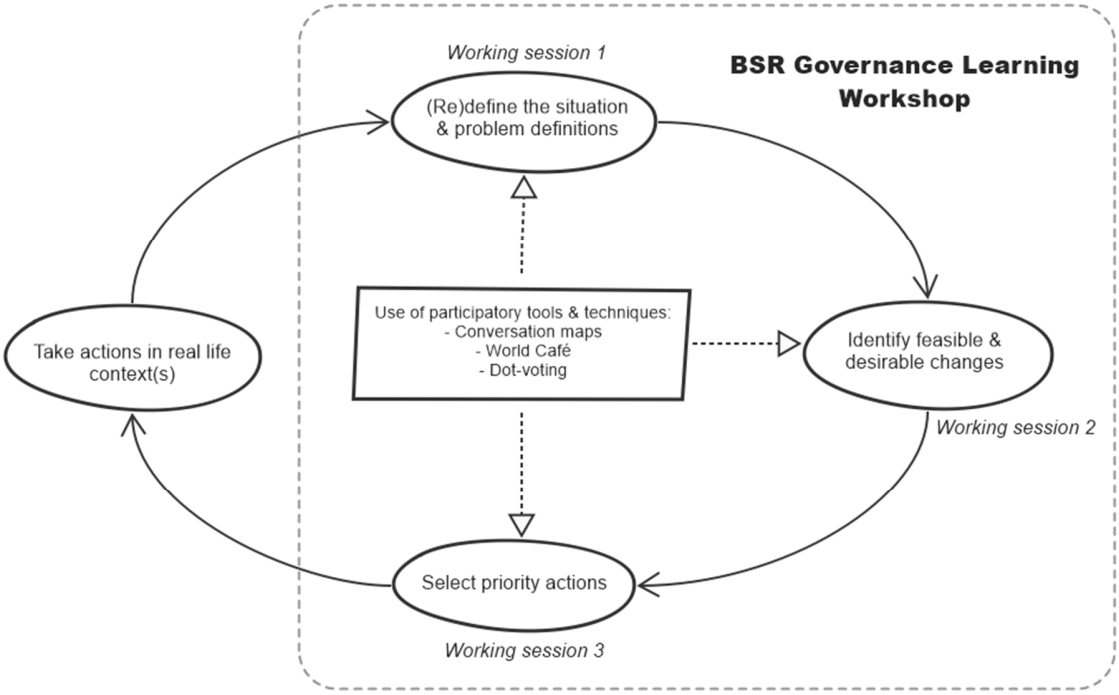


Figure 1. A systemic co-inquiry into the BSR water governance at the MIRACLE BSR Governance Workshop (dotted line frame).

2.2. Workshop format

The one-day workshop comprised a brief introduction to the MIRACLE project, three short keynote speeches; presentations of the MIRACLE project results from different work packages; a panel discussion with keynote speakers and; three interactive participatory working sessions (Table 1). The working sessions were specifically designed to actively engage participants in a systemic co-inquiry in order to explore key issues connected to water governance in the BSR, identify feasible and desirable changes for more effective water governance, and pinpoint priority actions to achieve those changes. The tools and techniques employed in the participatory sessions are described in part 3 of this report. A number of MIRACLE researchers acted as facilitators to guide the participants' discussions and activities in the workshop. Note-takers were also assigned to support the facilitators in capturing key insights from the discussions. In addition, the workshop was moderated by a former member of the MIRACLE project team, who has substantial experience with process design and facilitation and has previously led the learning and multi-stakeholder process component of MIRACLE. Part of the workshop was organised at

the Uppsala Learning Lab[1] where interactive boards and large screens allowed for the display of, and direct interaction with, the MIRACLE visualisation tool.

Table 1. Format of BSR Water Governance Learning Workshop

9:30	Arrival and registration
10:00	Welcome and opening of the workshop
10:10	**Keynote speech 1:** Study on macro-regional strategies and their link to Cohesion Policy
10:20	**Keynote speech 2:** Stakeholder participation and decision-making processes in water governance in the context of uncertainties and controversies of the Baltic Sea Region
10:30	**Keynote speech 3:** Long term socio-economic scenarios for the Baltic Sea Region
10:40	**Presentation:** Changing world and the Baltic Sea Region: what can we say about the 2050s? (Results from the MIRACLE project)
10:50	**Panel discussion**
11:15	**Working session 1:** Developing a shared understanding of key issues of water governance in the Baltic Sea Region
11:45	**Plenary session 1:** Key points and reportage
12:15	Lunch
13:00	**Presentation:** BONUS-MIRACLE Cost-Benefit Analysis - a tool to consider multiple benefits of measures and actions in the context of water governance
13:15	**Presentation:** Challenges to effective water governance in the Baltic Sea Region – key insights from the MIRACLE case studies
13:25	**Working session 2:** Identifying feasible and desirable changes and actions for more effective water governance in the Baltic Sea Region
14:45	**Plenary session 2:** Key points and reportage
15:15	**Working session 3:** Identifying priority actions for effective water governance in the Baltic Sea Region
15:45	Closing remarks

[1] http://www.uu.se/en/about-uu/quality/learning/e-learning/experimental-classroom/

2.3. Participants

The workshop targeted participants who have prior knowledge and experiences associated with water governance and play a key role in transforming water governance in the BSR. Moreover, the workshop sought to invite participants representing a range of countries across the BSR, scales and sectors, including academia, the public sector, the private sector and civil society, in order to bring together a diversity of perspectives. Ensuring the diversity of stakeholders, creating opportunities for engagement, and providing a safe environment for dialogue is considered essential in enhancing the effectiveness of deliberative processes in water resource governance (Webler and Tuler, 1999; Akamani, 2016). 55 potential participants for the workshop were identified through stakeholder analysis and the MIRACLE researchers' existing networks. An invitation letter outlining the purpose of the workshop and preliminary agenda was sent out via email by the MIRACLE team (Appendix 1). The invitation was further followed up by phone calls to ensure participation from the key stakeholders.

In total, the BSR Governance Learning workshop brought together 34 participants, representing 27 different organisations divided in 4 major stakeholder groups (Table 2). Representatives from civil society (e.g. Coalition Clean Baltic, Race for the Baltic, WWF Sweden) were also invited to participate, but they either declined or were unable to attend the workshop. Moreover, the private sector was rather underrepresented in the workshop.

Table 2. Workshop participants

Stakeholder group	Organisation
Academia	Latvia University of Agriculture, Jelgava
	University of Latvia, Riga
	Linköping University, Sweden
	Uppsala University, Sweden
	Stockholm University, Sweden
	University of Copenhagen, Denmark
	Aarhus University, Denmark

	Baltic University Program, Turku, Finland
	Institute of Rural and Agricultural Development, Polish Academy of Science, Poland
Government Agencies	Swedish Meteorological and Hydrological Institute, Sweden
	Swedish International Development Agency
	Swedish Agency for Marine and Water Management
	County Administration Västerås, Sweden
	State Agency for Agriculture, Environment and Rural Areas of Schleswig-Holstein, Germany
	Institute of Meteorology and Water Management, Poland
	Regional Institute for Water Management, Poland
	Latvian Environment, Geology and Meteorology Centre
	BONUS Secretariat, Finland
	DG REGIO, Belgium
Private sector	POMINNO, Gdynia, Poland
	Pier 85, Finland
	Farmers Parliament, Latvia
Research Institutes	Stockholm Environment Institute, Stockholm, Sweden
	Stockholm Environment Institute, Tallinn, Estonia
	Ecologic Institute, Germany
	Norwegian Institute for Water Research
	Thuenen Institute of Farm Economics, Germany

3. Results and Discussions

3.1. Presentations

The workshop was introduced by *Karin Tonderski,* the MIRACLE project coordinator, who briefly presented the project process, the context and the aim of the workshop. Then, three short keynote presentations (Appendix 2) served as inspiration for the co-learning process. First, *Odd Godal* from DG Regio presented a *"Study on macro-regional strategies and their link to Cohesion Policy"* in which he gave an overview of the study results for the BSR. The study focused on examining the overall context and the achievements of the macro-regional strategies in terms of process-oriented and content-oriented results. *Sindre Langaas* from Norwegian Institute for Water Research shared his experiences from working with the Baltic Sea Action Plan from the agricultural stakeholder perspective in *"Stakeholder participation and decision-making processes in water governance in the context of uncertainties and controversies of the Baltic Sea Region"*. He emphasized the previous problems in the chosen approach for setting the Country Allocated Reduction Targets (CARTs) and how strong stakeholder engagement (lobbying) could have effects on actual policy implementation. Afterwards, *Marianne Zandersen* from Aarhus University presented the results from an effort to downscale the Global Shared Socio-economic Pathways (SSPs) to the Baltic Sea Region, executed under the framework of three BONUS projects, and showed large uncertainty regarding the future pressure on the Baltic Sea depending on how society will develop. Following this, *Alena Bartosova* from Swedish Meteorological and Hydrological Institute presented results from the MIRACLE project in the presentation *"Changing world and the Baltic Sea Region: what can we say about the 2050s?"*. Upscaling SSPs and climate change scenarios to the entire region shows that there is a risk for increased loads of N and P due to climate change, but that choices that we make as a society can mitigate or exacerbate that increase. She also showed the improved local water quality that could result from stakeholder favored measures for multiple benefits in different parts of the BSR basin.

3.2. Working session 1 – Developing a shared understanding of key issues of water governance in the Baltic Sea Region

Conversation maps

The first participatory session focused on developing a shared understanding of key issues related to water governance in the BSR by drawing on the participants' knowledge and experiences, using conversation maps. A conversation map starts with a "conversation trigger", which is written down and circled in the centre of a large piece of paper. Participants are invited to respond to the trigger, their responses are recorded and linked together with a line as the conversation progresses (Foster et al., 2014).

Working session 1 was initiated by a short introduction to a conceptual vocabulary related to water governance, including multi-level governance, multi-sectoral governance and multi-actor governance. *Multi-level governance* refers to vertical integration across the multi-level governance system of the EU/BSR, national level and local level. *Multi-sectoral governance* means horizontal integration across different policy silos. Finally, *multi-actor governance* refers to government, civil society, private sector and intersectional domains such as gender, ethnicity, and class. The aim of the vocabulary introduction was to create a shared language and shared identity for a grounded understanding of the BSR context in which the participants were asked to examine their diverse knowledge and experiences.

Summary of discussions

Following the introduction on the water governance vocabulary, the participants worked together in small groups to discuss the following questions:

1. *What are key challenges for future water governance aiming at delivering multiple ecosystem benefits taking into account uncertainties and future drivers?*
2. *What are the key challenges with respect to multi-level governance, multi-sectoral and multi-actor governance, respectively?*

The questions helped to initiate the dialogue between the participants, which in turn led to the production of three conversation maps (one per group). (See Appendix 3 for photos of the conversation maps).

Regarding *Multi-level governance*, some highlighted challenges were:

- Distrust between sectors and poor synchronisation between different policies
- Lack of appreciation of differences in problem perceptions, motivations and acceptance at different levels (national, regional and local) → there is a need to speak to people about their issues.
- Fragmentation and a need for more and better tools
- Need for scientists to better communicate their knowledge to stakeholders at different levels, are they neutral and objective?
- Policies (e.g. Marine Strategy Framework Directive, Baltic Sea Action Plan, Water Framework Directive…) need to consider trade-offs between different goals and to be more adaptive to climate change uncertainties
- Different boundaries with different constituents
- Long distance to the level of implementation and control
- Better spatial targeting of EU funds in the Baltic Sea Region
- Better synchronisation between policies needed

- Agricultural sector's distrust towards the BS governance system

In relation to *Multi-sectoral governance*, issues discussed were:

- There is a need for new modes of cooperation and cross-level interactions
- It should be mandatory to consider cross-sectoral policy objectives and identify common goals (policy integration)
- Top-down/vertical decision making → there is a need for cross-sectoral decision making fora at the local level
- Sectors should engage more with local stakeholders and build on their knowledge
- It is necessary to build better trust between sectors, and this takes time
- There is a need to reformulate the problems and identify common goals
- There is a lack of eutrophication consideration in CFP

The group focusing on *Multi-actor governance* identified the following issues and challenges:

- Need for upstream-downstream cooperation to find common solutions
- Need for awareness raising locally
- Problems when actors are required to pay for other actors causing the problems
- There is a mismatch between policy targets and what is possible to achieve locally, and a political resistance to change targets
- Need to identify (nutrient) reduction targets that are optimal for society and also acceptable for stakeholders required to take actions
- Need to build and MAINTAIN relationships between actors over longer time but a lack of resources and capacity to maintain such cooperation
- Managing expectations can be a challenge
- Difficulties with expectation management and with a system for result-based payment

3.3. Working session 2 – Identifying feasible and desirable changes and actions for more effective water governance in the Baltic Sea Region

World Café method

The second participatory session followed the World Café approach. It is a flexible, easy-to-use technique for fostering collaborative dialogue, sharing mutual knowledge, and exploring opportunities for action. By organizing several discussion rounds, participants are invited to discuss topics that matter to them in small groups. In so doing, this approach creates dynamic networks of conversation that can catalyze a community's collective intelligence around its most important questions. (Brown and Isaacs, 2005)

Summary of discussions

Drawing on the insights from the local case settings and Working session 1, three themes of relevance to water governance in the BSR were selected for further investigation. In this session, the participants were invited to identify opportunities for transformation and desirable changes related to each of the three themes. The groups rotated during the session, allowing each group to address two of the themes.

Theme 1: Mismatch between local and regional expectations of water governance

Key questions addressed:

- *How can diverging interests between regional nutrient-centered policy frameworks and local demands be addressed?*
- *What actions at the BSR level could better integrate local sustainability priorities into regional governance configurations?*
- *What actions at the BSR level could better coordinate and spatially target funding and implementation of sustainability priorities at the local level?*

Theme 2: Working across sectoral silos

Key questions addressed:

- *How can sectoral policies and their management programs (e.g. River Basin Management Plans, Rural Development Plans…) be better aligned under a coherent multi-actor policy framework?*
- *What actions are needed at the BSR level to increase the effectiveness of measures targeting nutrient loading regionally and multiple ecosystem services benefits locally?*

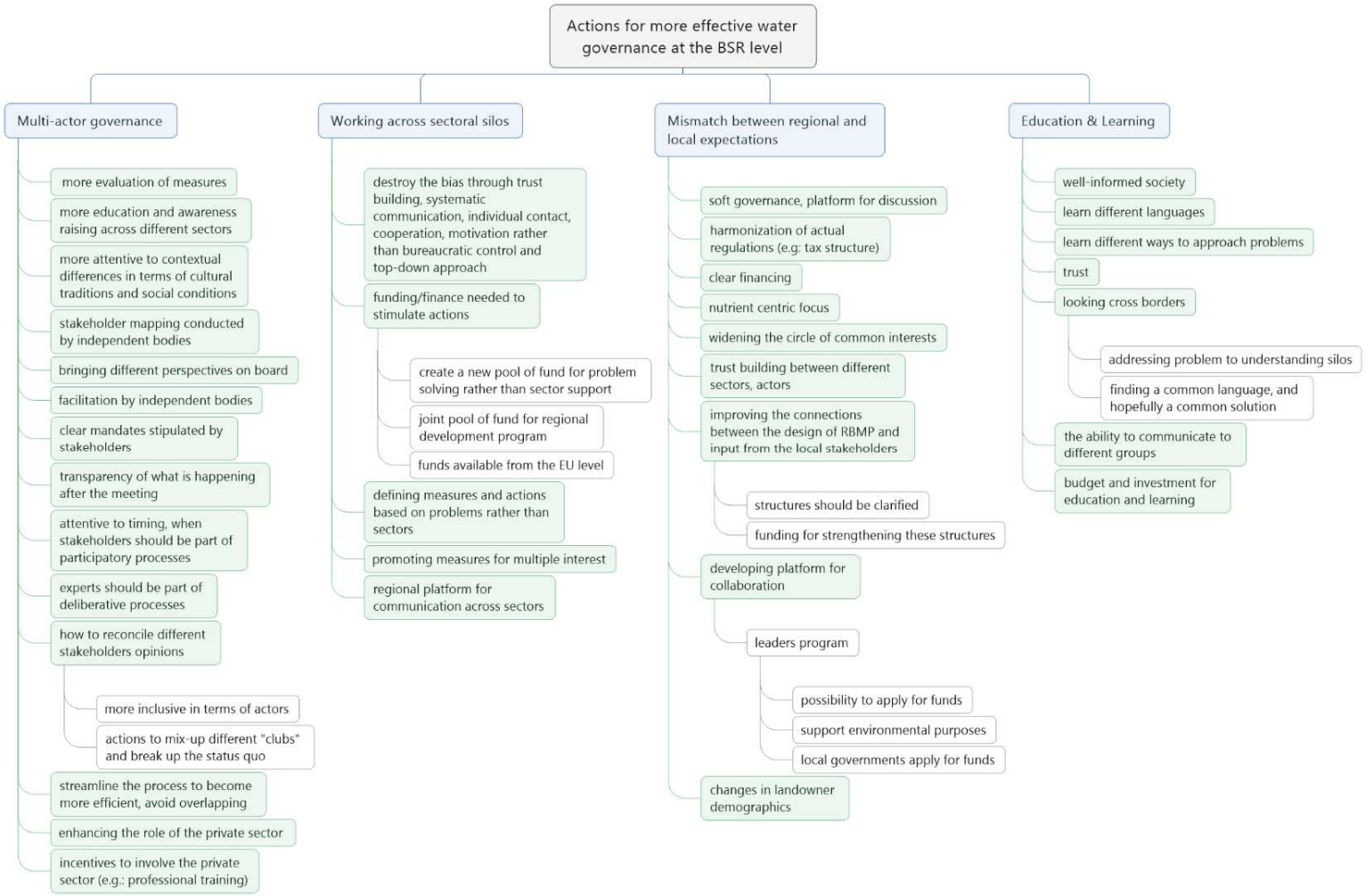
Theme 3: Working across societal domains (civil society, private actors, and public actors)

Key questions addressed:

- *How do existing power differentials affect multi-actor engagement in the development, prioritization and implementation of local policy measures?*
- *What actions are needed at the BSR level to better reconcile the interests of the public sector, the private sector, and civil society?*
- *What actions are needed to enhance the role of the private sector and civil society in the development and implementation of measures?*

A list of different actions suggested by the participants was compiled using MindManager program (Figure 2).

Figure 2. List of actions for more effective water governance at the BSR level, suggested by the stakeholders at the BONUS MIRACLE



Governance Learning workshop (Uppsala, November 2017)

3.4. Working session 3 – Identifying priority actions for effective water governance in the Baltic Sea Region

Dot-voting

Dot-voting (also known as dotmocracy or voting with dots) is an established and useful facilitation tool to help a group narrow down a list of ideas and prioritize those they consider the most important for the group to deal with. In dot-voting, participants vote on their chosen options using a limited number of dot stickers or sticky notes. Participants are given a set number of dot stickers or sticky notes as decided by the moderator. Their task is to place them next to the options presented that they like or perceive to be the most significant. They may place any number of their dots on any number of the options. (Dotmocracy, 2018)

Summary of discussions

Departing from the results of Working session 2, the participants were invited to prioritize between the suggested actions and steps needed for effective water governance in the Baltic Sea Region in relation to their professional positions and national contexts. Each participant was given three dot stickers to select the most important actions from the gross list of actions suggested in Working session 2. Six of the actions were highly prioritized by the participants (Figure 3). One set of actions focuses on the need for improved means of communication between actors and sectors as well as on education. The second highest prioritized type of actions suggests reallocating the funding system to cross-sectoral programs for regional development and focusing more on problem solving, rather than sector-specific issues.

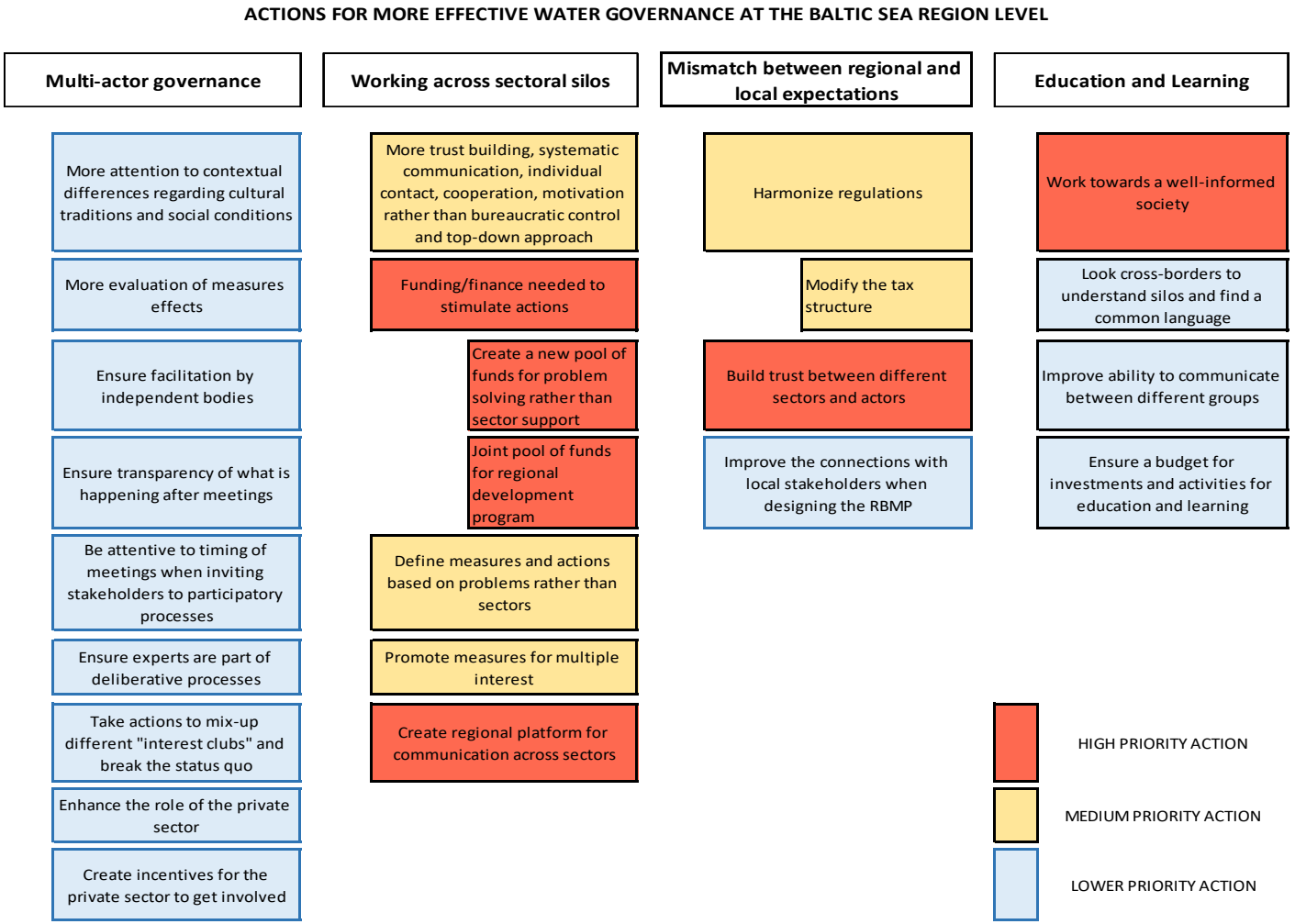


Figure 3. Prioritized actions for a more effective water governance at the BSR level, emanating from the BONUS MIRACLE Governance Learning workshop

4. Concluding Reflections

The workshop presented in this report was undertaken within Task 5.4 entitled *"Lessons for the whole Baltic Sea Region"*. The aim of this task was to implement the governance learning process at the BSR level with narratives growing out of the four case studies. This supported a social learning process for elicitation of governance innovations that are adapted to the inherent diversity of regional and national settings and the differences in the biophysical and socio-economic contexts.

The BSR Governance Learning Workshop provided the opportunity for participants from different professional backgrounds (hydrology, economics, policy, education and learning, etc.) and societal domains (public sector, private sector, academia, research institutes, etc.) to not only share and exchange but also have their knowledge and experience related to water governance in the BSR context. It is within this process that diverse types and sources of knowledge and practice (scientific, local, bureaucratic, etc.) can be integrated in order to deal with 'wicked' problem contexts that are highly characterized by uncertainties and complexities. In light of this, the workshop enabled an interactive platform for co-creation of knowledge towards transforming water governance regime in the BSR. Active engagement by the participants throughout the workshop demonstrated that the systemic co-inquiry underpinning the process design was generally successful in fostering co-learning to improve understanding and practice of relevance to water governance. The workshop revealed new insights in terms of priority actions for a more effective water governance at the BSR level. These insights will in turn be fed into the development of a roadmap for governance and policy innovations in the BSR under Work Package 6 (Innovative Governance) of the MIRACLE project.

Despite our carefully designed process and attempt to bring on board a diversity of perspectives, especially actors outside the scientific and policy communities, the workshop still showed an over-representation of the public sector, academia and research institutes, as well as under-representation of the private sector and civil society. This can be partly explained by the fact that the identification and invitation of the workshop participants was mainly done through the MIRACLE researchers' existing networks, which are often made up of other researchers and state actors. As knowledge is shaped by those in power (Stirling, 2014), it begs the question whether we are reproducing the status quo through distributing more agency to incumbent interests and failing to give adequate attention to marginalised interests in multi-stakeholder processes. In so doing, we would run the risk of reinforcing power asymmetries, inhibiting meaningful empowerment and inclusion for a more equitable water governance regime (Armitage et al., 2015). Some recent studies (e.g. Akamani, 2016; Koontz et al., 2015) have also expressed similar

concern that the influence of incumbent interests, pre-existing inequalities in access to information, resources, opportunities and power could shape the outcomes of water governance in an undesirable manner.

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6. Appendices

Appendix 1. Invitation Letter

INVITATION

BONUS MIRACLE BALTIC SEA REGION WORKSHOP
28 November 2017

Venue: Campus Blåsenhus, Uppsala University
von Kraemers Allé 1A, 752 37 Uppsala, Sweden

The BONUS-MIRACLE team of researchers from Sweden, Latvia, Poland, Germany, and Denmark cordially invites you to a **Governance Learning Workshop** with the aim to enable co-learning to bring about desirable changes in the Baltic Sea Region (BSR) water governance domain. The workshop will address the following key question:

What can be done at the Baltic Sea Regional level to enable more effective water governance at the local level?

The workshop will build on lessons from joint learning processes in four case areas in the BSR which have served as forums to support dialogue between researchers and stakeholders who have strong stakes and expertise within water governance. Lessons from the cases have been discussed within and between the four areas in terms of the degree to which the local development options (pathways), identified in consultation with stakeholders, can support a transformation that more systemically and adaptively addresses the multiple demands manifest in case contexts. The intention of this workshop is to support deliberations over the relevance of the proposed local development options in terms of 1) reducing nutrient emissions to the Baltic Sea and; 2) how existing and new regional governance configurations can be adapted and enacted to support the orchestration of local development initiatives that foster multiple benefits in local contexts.

In the workshop, findings from the MIRACLE project will be used as a starting point for interactive sessions that enable co-learning and are focused on the following issues:

- *Almost two decades have passed since the adoption of the WFD; are its ambitions towards inclusive multiple-benefit river management frameworks making headway?*

- *Is the nutrient-centric focus of current policy frameworks in the BSR an obstacle or an asset to effective water governance in a changing climate?*
- *What types of governance reforms are needed at the EU and national level to support local aspirations, which prioritise on landscape measures with multiple benefits?*

Preliminary Programme

09:30	Arrival and registration
10:00	Welcome and opening of the workshop
10:20	Keynote speech: Challenges and opportunities in the Baltic Sea Region water governance
11:00	Changing world and Baltic Sea Region: what can we say about the 2050s?
11:30	Key insights on water governance from the case areas
12:00	Lunch
13:00	Moving from the local to the regional context – What are the implications for regional policy?
14:00	Coffee break
14:30	Mapping towards actions for effective water governance in the Baltic Sea Region
15:30	Closing remarks
16:00	End of the workshop

To help us in preparing logistics of the meeting – please fill in the registration form: https://goo.gl/forms/Y2NxBpqsC8IdVR023

In case of any questions and comments – please contact Dr. Andrzej Tonderski, communication manager of BONUS-MIRACLE (ati@pominno.eu, +48661360170) or any other partner that you know in our project.

Looking forward to seeing you in Uppsala!

Assoc. Prof. Karin Tonderski
Coordinator of BONUS-MIRACLE
Linköping University

Appendix 2. Presentations at the workshop

Order of appearance:

1. BONUS-MIRACLE: Mediating integrated actions for sustainable ecosystem services in a changing climate (Karin Tonderski)
2. Study on macro-regional strategies and their link to Cohesion Policy (Odd Godal)
3. Stakeholder participation and decision-making processes in water governance in the context of uncertainties and controversies of the Baltic Sea Region (Sindre Langaas)
4. Long term socio-economic scenarios for the Baltic Sea Region (Marianne Zandersen)
5. Changing world and the Baltic Sea Region: what can we say about the 2050s? (Alena Bartosova)
6. Developing a shared understanding of water governance in the Baltic Sea Region (Gerald Schwarz)
7. Cost-Benefit Analysis - a tool to consider multiple benefits of measures and actions in the context of water governance (Søren Marcus Pedersen)
8. Challenges to effective water governance in the BSR - key insights from case areas (Andis Zilans)


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SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION
MIRACLE
BONUS MIRACLE
Mediating integrated actions for sustainable ecosystems services in a changing climate
BONUS-MIRACLE has received funding from BONUS (Art. 185) funded jointly from the European Union's Seventh Programme for research, technological development and demonstration, and from Baltic Sea national funding institutions


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SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION
MIRACLE
Mediating integrated actions for sustainable ecosystems services in a changing climate
April 1st 2015 – July 31th 2018
POLAND: POMinnO Sp. Zo.o., Institute of Meteorology and Water Management, Nat. Res. Inst., Poland
GERMANY: Johann Heinrich von Thünen-Institut, Helmholtz Centre for Environmental Research
LATVIA: University of Latvia, Latvia University of Agriculture
DENMARK: University of Copenhagen
SWEDEN: Linköping University, Swedish Meteorological and Hydrological Institute, Stockholm Environment Institute, Swedish International Centre of Education for Sustainable Development, Uppsala University
POMInnO
THÜNEN
LATVIJAS UNIVERSITATE
SMHI
SEI
SWEDESD
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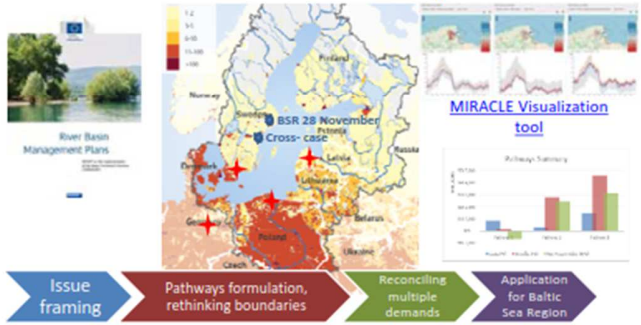
BONUS
SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION
MIRACLE
Baltic Sea Region – Multiple Issues, Conflicting interests and Actions
Changes in run-off and erosion
Energy crop production
Flooding risks, nutrient enrichment, brownification
Recreation
Groundwater depletion
Renewable Energy Directive
Pollution from industrial and household waste
Cultural Heritage
Nitrates Directive
Enhance ecosystems services
Food security
River Basin Management Plan/WFD
Inundation and sea level rise
Rural Development Plan
Wetlands and aquatic biodiversity
Habitats Directive
Shoreline exploitation
BONUS-MIRACLE has received funding from BONUS (Art. 185) funded jointly from the European Union's Seventh Programme for research, technological development and demonstration, and from Baltic Sea national funding institutions


MIRACLE Objective
• Enact a social learning process that
➢ will lead to identification of new water governance configurations based on the ecosystem services concept.
➢ aims at addressing stakeholder defined issues while also reducing nutrient enrichment and flood risks in the Baltic Sea Region - Win-win
BONUS
MIRACLE
Slide 4

Science supported social learning in four case areas and the BSR – 5 sets of stakeholder workshops



BONUS MIRACLE Slide 5

What can be done at the Baltic Sea Regional level to enable more effective water governance at the local level?

Build on lessons from joint learning processes in the four case areas.

How can existing and new regional governance configurations be adapted to address the multiple demands manifest in local contexts?

BONUS MIRACLE Slide 6

Summary reflections

- Current regional policies need to be more adaptive to allow flexibility in both space, time and cultural contexts – both for acceptable target definitions and for programs of measures
- Knowledge about future predictions of changes etc needs to be communicated for awareness raising – need for a Platform for this
- New models for communication between sectors and actors, and resources allocated
- Allocate funds to problem solving rather than sectors

BONUS MIRACLE Slide 13

BONUS MIRACLE outputs

- Visualization of model and costs and benefits results – Access from http://www.bonus-miracle.eu/ "Visualization"
- Roadmap for governance and policy innovations in the Baltic Sea region
- Joint conference with BONUS SOILS2SEA, BONUS BALTICAPP, BONUS GO4BALTIC in Gdańsk, March 14-16th 2018
  www.bonus2018.eu

BONUS MIRACLE Slide 14

BONUS MIRACLE BALTIC SEA REGION WORKSHOP – Uppsala 28.11.17

Study on Macro-regional Strategies and their links with Cohesion Policy

The basic idea

- A set of issues of strategic importance can be identified for a wider geographical space
- There is agreement on which countries/regions to be included
- Shared challenges and opportunities can be translated into a limited set of goals or objectives
- These goals or objectives should be associated with indicators allowing to monitor progress towards concrete goals
- The participating countries should display on-going commitment to the strategies by harnessing adequate institutional capacity for their implementation

EU Strategy for the Baltic Sea Region

First macro-regional strategy in the EU (set up 2009);

8 EU member states; 80 million people (17% of EU population)

Better and more effective use of existing policies, funding, institutions and legislation

Three objectives: "Save the Sea", "Connect the Region", "Increase Prosperity"

Water governance in the EUSBSR

- **PA Hazards – Reducing the use and impact of hazardous substances**
- **PA Nutri – Reducing nutrients inputs to the sea to acceptable**
- **HA Spatial Planning – Encouraging the use of maritime and land-based spatial planning in all Member States around the Baltic Sea and develop a common approach for cross-border cooperation**
- **Pa Ship – Becoming a model region for clean shipping**

Review of the EUSBSR

The review of the EUSBSR objectives concludes that the majority of the chosen objectives and sub-objectives correspond to a need or opportunity and are also regionally relevant

Summary of content achievements of EUSBSR

[1] From question: What are the drivers for collaboration within your area/topic?

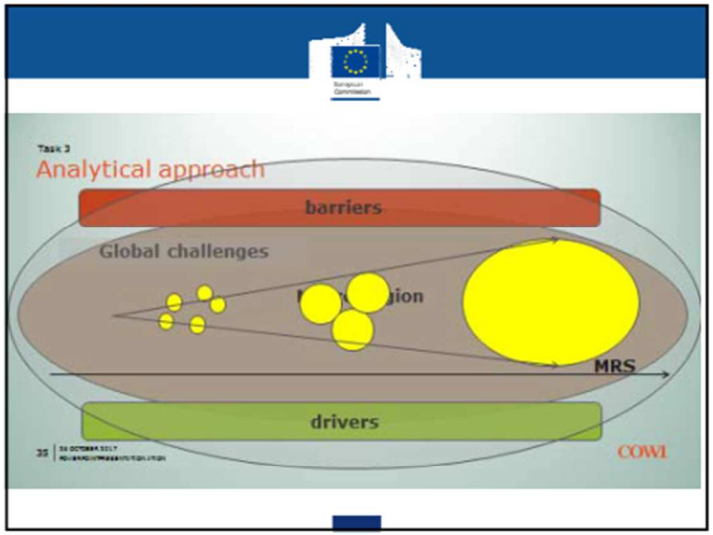
Types of achievements	Survey %	PA Education	PA Innovation	PA Nutri	PA Safe	PA Transport
More policy dialogue across countries Increase development of common/joint policy in macro-region	76	H	M	M	H	H
Increase in mobilization of finance for projects	38	H	M	H	H	M
Increase in (joint) generation of ideas for specific projects/activities/actions	74	H	H	H	M	M
Increased cooperation on major issues in the macro-region	88	H	M	H	H	M
Increase in implementation of (regional/EU) polices in the macro-region	64	H	M/H	H	H	M

Summary of process achievements for EUSBSR

Types of achievements	Survey %	PA Education	PA Innovation	PA Nutri	PA Safe	PA Transport
The MRS-process brings together (new) actors across sectors (cross sectoral cooperation) The MRS –process brings together actors across countries (all countries in the MRS)	85 93	H	M	M	H	H
The MRS-process brings together actors across levels (national/regional) and type (public/private)	81	H	M	H	H	M
Cooperation with relevant EU Commission Services	-	H	H	H	M	M
Increase in cooperation with third-countries (in and outside the MRS)	52	H	M	H	H	M

Key funding sources in the EUSBSR

- Baltic Sea Region Programme (Interreg) at various CBC programmes in the Baltic sea Region
- EU Programmes (Horizon, BONUS, LIFE, Erasmus +) are also active in supporting projects
- The European Regional Development Fund (ERDF) and European Social Fund (ESF) are relatively new to funding the cooperation under EUSBSR. A wish for a closer alignment.



Flagship projects

Flagships are

- A single project
- Set of projects
- A process

Given to project/process

- Has high macro-regional impact
- Contributes to meeting the objectives, indicators and targets of the EUSBSR
- Is related to the implementation of one or more actions of a policy area/horizontal action

Relevant links

http://www.balticsea-region-strategy.eu/
http://groupspaces.com/eusbsr-nutrient-inputs/
http://www.swedishepa.se/Environmental-objectives-and-cooperation/Cooperation-internationally-and-in-the-EU/International-cooperation/Multilateral-cooperation/Baltic-Sea-Region-EUSBSR/Policy-Area-Hazards/

Important concepts, acronyms and key ingredients in my story

HELCOM = The Baltic Marine Environment Protection Commission

BSAP = Baltic Sea Action Plan

CART = Country Allocated Reduction Targets (N, P)

NEST = a nested, dynamic simulation model designed to determine CARTs for the HELCOM signatories based upon chosen eutrophication state for the Baltic Sea

BFFE = Baltic Farmers' Forum on Environment [Observer to HELCOM]

LRF = Federation of Swedish Farmers & lead actor in BFFE

NIVA Forfatternavn 07.12.2017 2

BSAP & CARTs & NEST

- Baltic Sea Action Plan = not really a plan, but more a joint formulation/verification of utopian eutrophication targets set in the MSFD = Good Environmental Status 2021. Utopian with respect to WHEN it can be achieved; 2020/21.
- The most important ingredient in BSAP are the so-called Country Allocated Reduction Targets (CART) for nitrogen and phosphorus that should be reached by 2018.
- These are calculated using the NEST model, a simulation model developed by the Baltic Nest Institute, Sthlm University, and approved for its use in the BSAP context by the HELCOM signatories

NIVA Forfatternavn 07.12.2017 3

The NEST model

- The MARE NEST model works by first setting environmental targets for the various Baltic Sea sea basins (N, P)
- Then it calculates the necessary reduction in N, P loads from the basin catchments.
- These reductions are then «allocated» to the countries draining to the basins, able to provide gross country allocated reduction targets (CARTs)

NIVA Forfatternavn 07.12.2017 4

Model features & handling of uncertainty

- The model was designed based upon the legal HELCOM BSAP framework, effectively disregarding internal loads of phosphorous.
- CARTs did not diffentiate between background loads of nutrients, from those of anthropogenic origin. Problematic as only anthropogenic readily can be reduced.
- CART did not consider the level of treatment of already in place in various sectors in the various HELCOM signatories. A political choice.
- NEST did not enable any uncertainty «bands» for the calculated CARTs
  - Given the highly variable load / size of the various countries, one might expect rather robust figures for eg Poland, while small countries such as Estonia might expect less accurate CARTs
- The calculated CARTs, offered at a 1 ton precision per country, still were to be accepted as is.
  - Else, there would be a risk for lengthy arguments among the countries for reduced CARTs because of one or another reason (scientific, economic, political)

NIVA

Stakeholder behaviour & responses (1)

- Due to the known model features and decision risks implied in the BSAP governance and decision-making setting and the use of the NEST model, LRF mobilised within BFFE
- LRF followed closely the partially secret model runs undertaken late autumn 2012- winter 2013.
- The final and chosen model run proposed for the BSAP would effectively mean a P-CART for Sweden > total anthropogenic loads of P (=impossible)
- Also major uncertainties about the CARTs for the Baltic States

NIVA

Stakeholder behaviour & responses (2)

- LRF prepared a technical Report on these modelling provisions and matters and consequences thereof, issued for public consultation(!)
- BFFE wrote letters to HELCOM pointing to these aspects and consequences thereof.
- LRF met with representatives of Ministry of Environment Sweden and the Governmental Parties in the Parliament to explain their views.

NIVA

What did it lead to?

- Massive awareness among «those concerned» of the situation created by the deterministic use of the NEST model given its structural framework conditions
- Due to the role of Sweden as the HELCOM forerunner and the highly potent role of the Baltic Sea issue in national politics, Sweden could not [publicly] request special treatment
- The completely unreasonably CART (for Sweden) was instead handled nationally through softened politics nationally with less stringent and forceful handling of the CART by concerned ministries and authorities.

NIVA

BONUS SOILS2SEA SHEBA BALTIC APP

Long-term socio-economic scenarios for the Baltic Sea Region

Marianne Zandersen
Senior researcher
Aarhus University
mz@envs.au.dk

Acknowledgements: Hyytiainen, K., Meier, H.E.M., Tomzcak, M., Bauer, B., Haapasaari, P., Olesen, J.E., Gustafsson, B., Kosenius, A.K., Refsgaard, J.C., Fridell, E., Pihlainen, S., Le Tissier, M.D.A., Van Vuuren, D.P.

What are scenarios?

Stories that describe *plausible* future societies

Internally *consistent*

Show the range of *possible* futures

Basis for the Baltic Sea Region Scenarios: the Global Shared Socio-economic Pathways (SSPs)

5 stories of broad societal trends

Common elements but with different developments

Two elements:
i) narrative storylines;
ii) A set of quantified measures of development

Economy & lifestyle	Growth per capita; inequality; international trade; globalization; consumption & diet
Policies & institutions	International cooperation; environmental policy; policy orientation; effectiveness of institutions;
Technology	Development pace; transfer; energy tech change; energy intensity
Environment & natural resources	Fossil constraints; environment status; regulation of land use; agricultural productivity and technological development
Population growth and urbanisation	Fertility rate; mortality rate; urbanization rate;

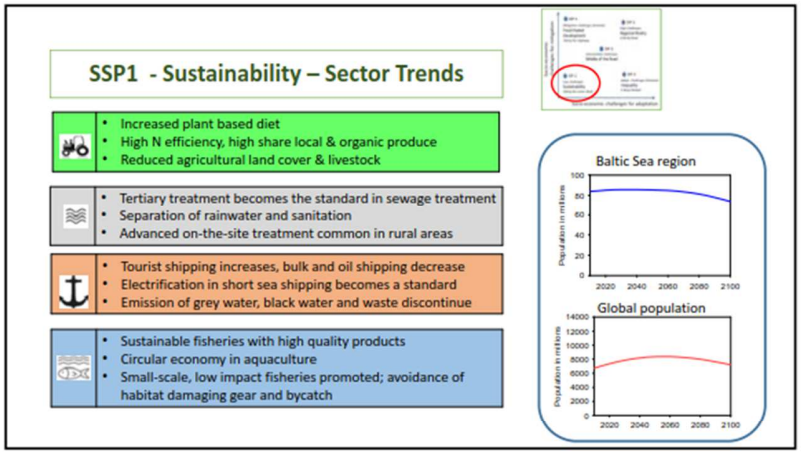
SSP1 - Sustainability – General trends

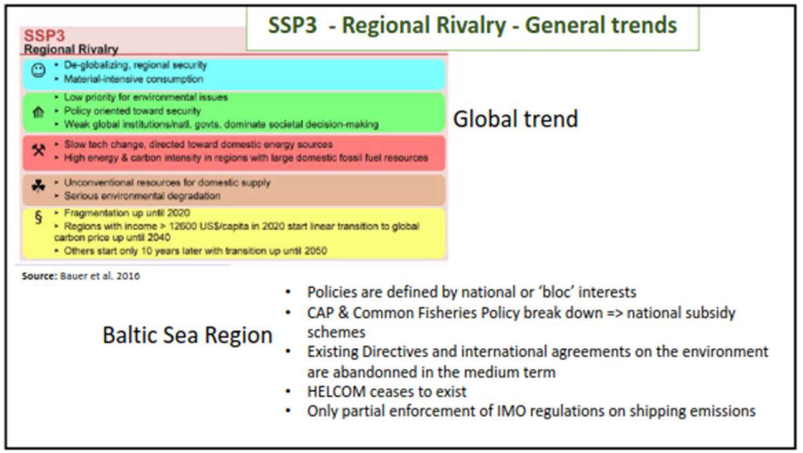
Source: Bauer et al. 2016

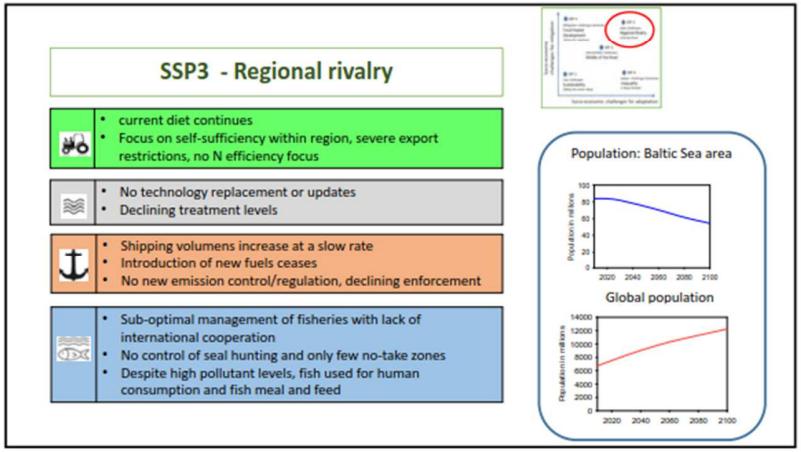
Global trend

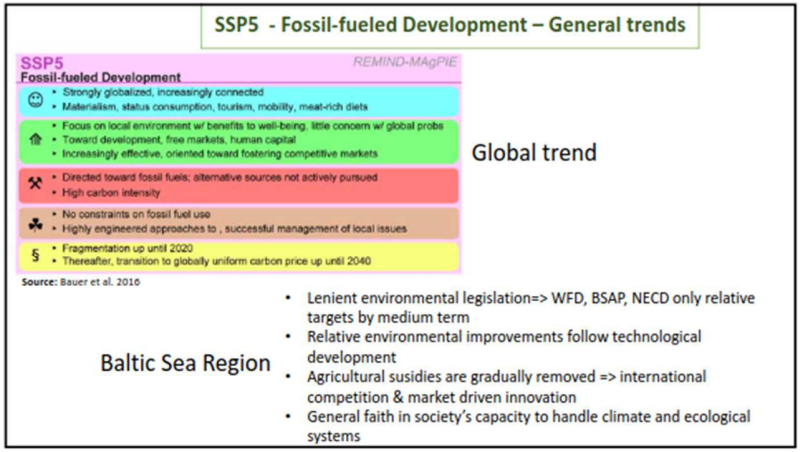
Baltic Sea Region

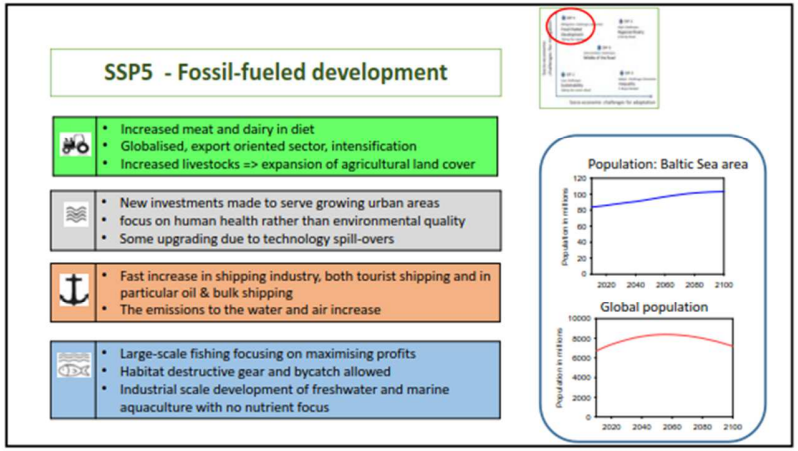
- Medium term: Full implementation of existing EU Directives and international agreements on the environment
- Long term: strengthened cooperation and strong environmental regulation
- Increased environmental awareness => diet and consumption changes, increased material efficiencies


SSP1 - Sustainability – Sector Trends
• Increased plant based diet
• High N efficiency, high share local & organic produce
• Reduced agricultural land cover & livestock
• Tertiary treatment becomes the standard in sewage treatment
• Separation of rainwater and sanitation
• Advanced on-the-site treatment common in rural areas
• Tourist shipping increases, bulk and oil shipping decrease
• Electrification in short sea shipping becomes a standard
• Emission of grey water, black water and waste discontinue
• Sustainable fisheries with high quality products
• Circular economy in aquaculture
• Small-scale, low impact fisheries promoted; avoidance of habitat damaging gear and bycatch
Baltic Sea region
Global population


SSP3 - Regional Rivalry - General trends
SSP3
Regional Rivalry
• De-globalizing, regional security
• Material-intensive consumption
• Low priority for environmental issues
• Policy oriented toward security
• Weak global institutions/natl. govts. dominate societal decision-making
• Slow tech change, directed toward domestic energy sources
• High energy & carbon intensity in regions with large domestic fossil fuel resources
• Unconventional resources for domestic supply
• Serious environmental degradation
• Fragmentation up until 2020
• Regions with income > 12600 US$/capita in 2020 start linear transition to global carbon price up until 2040
• Others start only 10 years later with transition up until 2050
Global trend
Source: Bauer et al. 2016
Baltic Sea Region
• Policies are defined by national or 'bloc' interests
• CAP & Common Fisheries Policy break down => national subsidy schemes
• Existing Directives and international agreements on the environment are abandonned in the medium term
• HELCOM ceases to exist
• Only partial enforcement of IMO regulations on shipping emissions


SSP3 - Regional rivalry
• current diet continues
• Focus on self-sufficiency within region, severe export restrictions, no N efficiency focus
• No technology replacement or updates
• Declining treatment levels
• Shipping volumens increase at a slow rate
• Introduction of new fuels ceases
• No new emission control/regulation, declining enforcement
• Sub-optimal management of fisheries with lack of international cooperation
• No control of seal hunting and only few no-take zones
• Despite high pollutant levels, fish used for human consumption and fish meal and feed
Population: Baltic Sea area
Global population


SSP5 - Fossil-fueled Development – General trends
SSP5
Fossil-fueled Development
REMIND-MAgPIE
• Strongly globalized, increasingly connected
• Materialism, status consumption, tourism, mobility, meat-rich diets
• Focus on local environment w/ benefits to well-being, little concern w/ global probs
• Toward development, free markets, human capital
• Increasingly effective, oriented toward fostering competitive markets
• Directed toward fossil fuels; alternative sources not actively pursued
• High carbon intensity
• No constraints on fossil fuel use
• Highly engineered approaches to , successful management of local issues
• Fragmentation up until 2020
• Thereafter, transition to globally uniform carbon price up until 2040
Global trend
Source: Bauer et al. 2016
Baltic Sea Region
• Lenient environmental legislation=> WFD, BSAP, NECD only relative targets by medium term
• Relative environmental improvements follow technological development
• Agricultural susidies are gradually removed => international competition & market driven innovation
• General faith in society's capacity to handle climate and ecological systems



Why long-term socio-economic scenarios?

Useful to investigate how easy or difficult societal futures may be regarding mitigating and adapting to environmental problems

Provides consistent and long-term contexts for communicating, debating and analysing plausible futures

Slow human response; time lags in ecosystem system; environmental targets are long term


BONUS
MIRACLE
Changing World and the Baltic Sea Region: What can we say about the 2050s?
Alena Bartosova
November 28, Uppsala, SE
SMHI
BONUS-MIRACLE has received funding from BONUS (Art. 185) funded jointly from the European Union's Seventh Programme for research, technological development and demonstration, and from Baltic Sea national funding institutions


LOOKING FORWARD TO THE '80s
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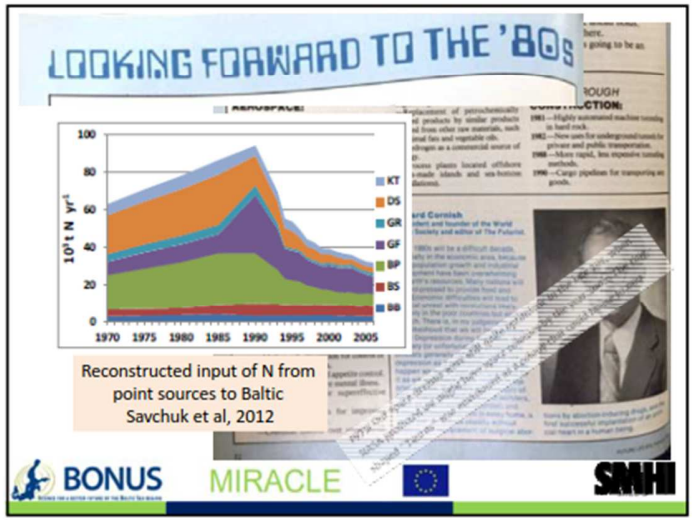
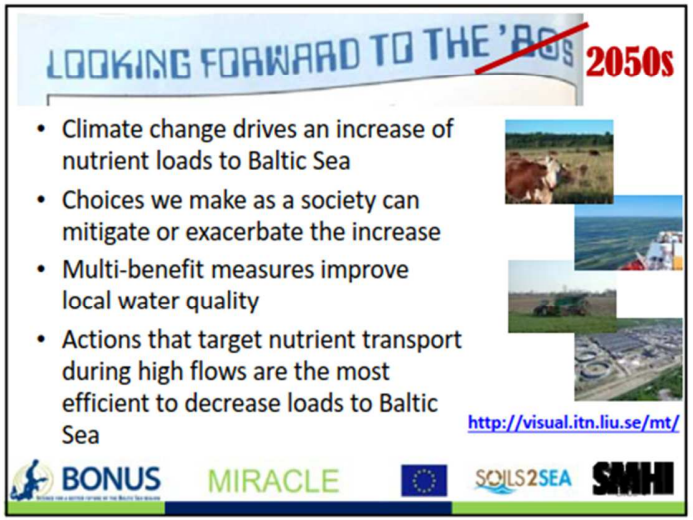

LOOKING FORWARD TO THE '80s
100
80
60
40
20
0
1970 1975 1980 1985 1990 1995 2000 2005
KT
DS
GR
GF
BP
BS
BB
Reconstructed input of N from point sources to Baltic Savchuk et al, 2012
BONUS
MIRACLE
SMHI


LOOKING FORWARD TO THE '80s
2050s
• Climate change drives an increase of nutrient loads to Baltic Sea
• Choices we make as a society can mitigate or exacerbate the increase
• Multi-benefit measures improve local water quality
• Actions that target nutrient transport during high flows are the most efficient to decrease loads to Baltic Sea
http://visual.itn.liu.se/mt/
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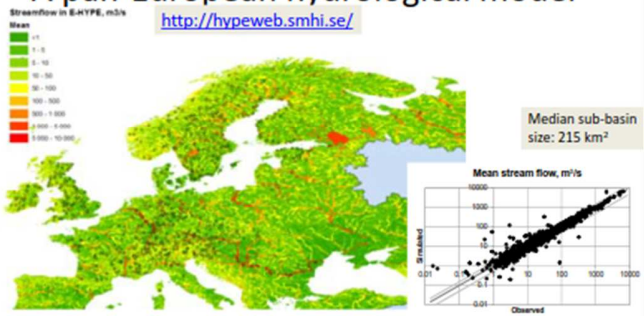
E-HYPE v.3.1.4 – A pan-European hydrological model

http://hypeweb.smhi.se/

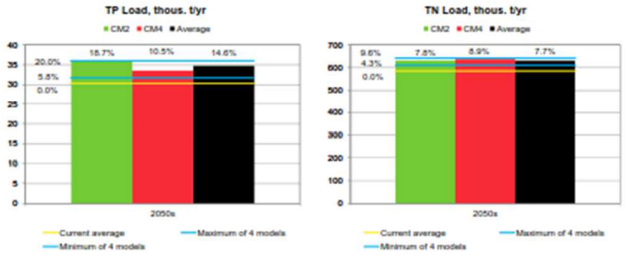


- Continental-scale modeling: Flow, nutrients, and water temperature
- Calibrated with a sub-set of available sites

BONUS MIRACLE SOILS2SEA SMHI

Climate-Driven Load Increase

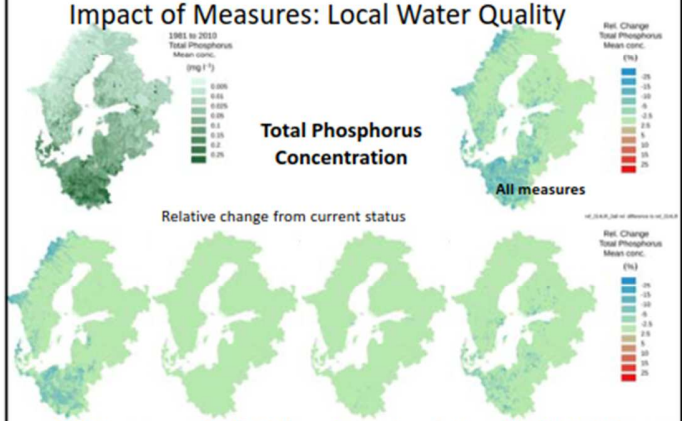
2050s



- Remaining slides show only average of the 2 models
- More climate models at: http://swicca.climate.copernicus.eu/

BONUS MIRACLE SOILS2SEA SMHI

Impact of Measures: Local Water Quality



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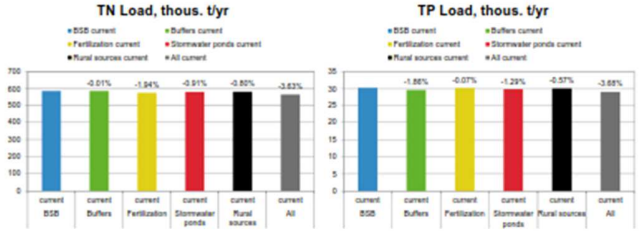
Impact of Measures: Load to Baltic Sea

- Relatively small impact each but can add up when combined
- Target nutrient-generating processes during high flows for most effectiveness



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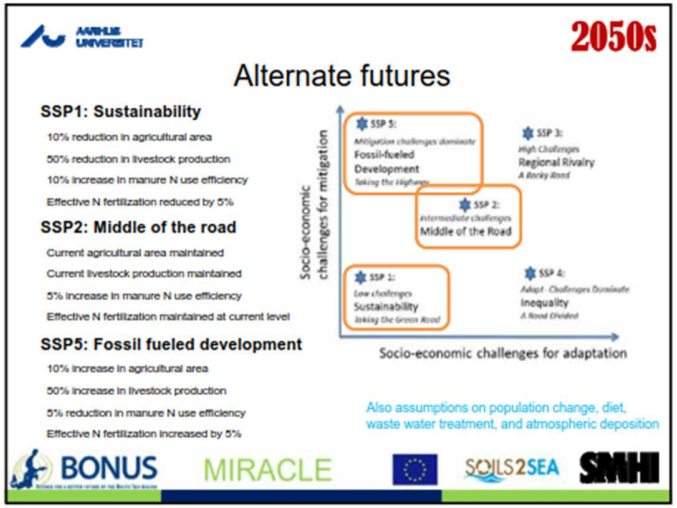
2050s
Alternate futures
SSP1: Sustainability
10% reduction in agricultural area
50% reduction in livestock production
10% increase in manure N use efficiency
Effective N fertilization reduced by 5%
SSP2: Middle of the road
Current agricultural area maintained
Current livestock production maintained
5% increase in manure N use efficiency
Effective N fertilization maintained at current level
SSP5: Fossil fueled development
10% increase in agricultural area
50% increase in livestock production
5% reduction in manure N use efficiency
Effective N fertilization increased by 5%
SSP 5: Fossil-fueled Development
SSP 3: Regional Rivalry
SSP 2: Middle of the Road
SSP 1: Sustainability
SSP 4: Inequality
Socio-economic challenges for mitigation
Socio-economic challenges for adaptation
Also assumptions on population change, diet, waste water treatment, and atmospheric deposition
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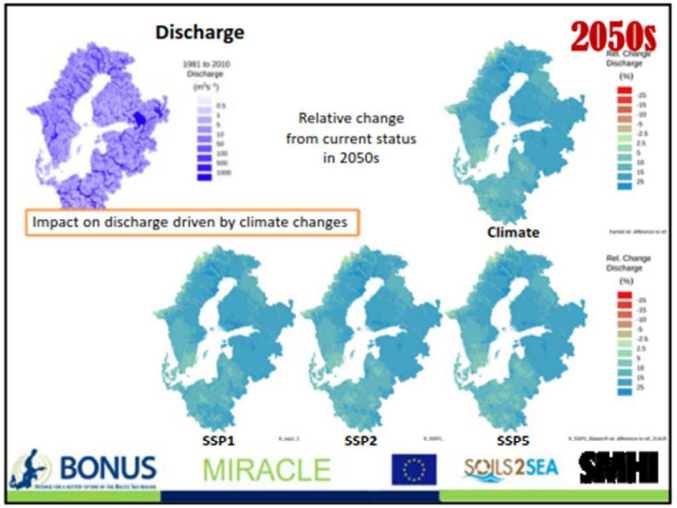
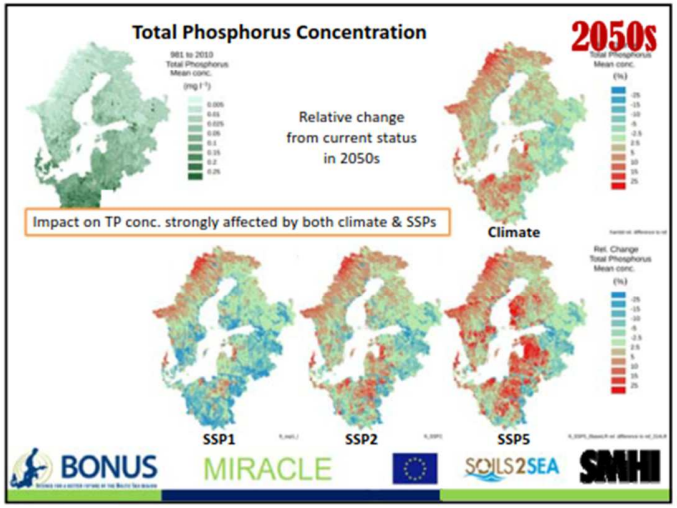
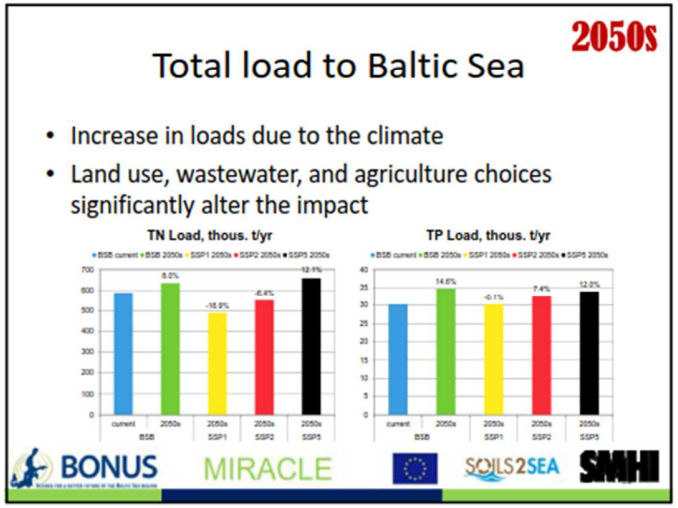
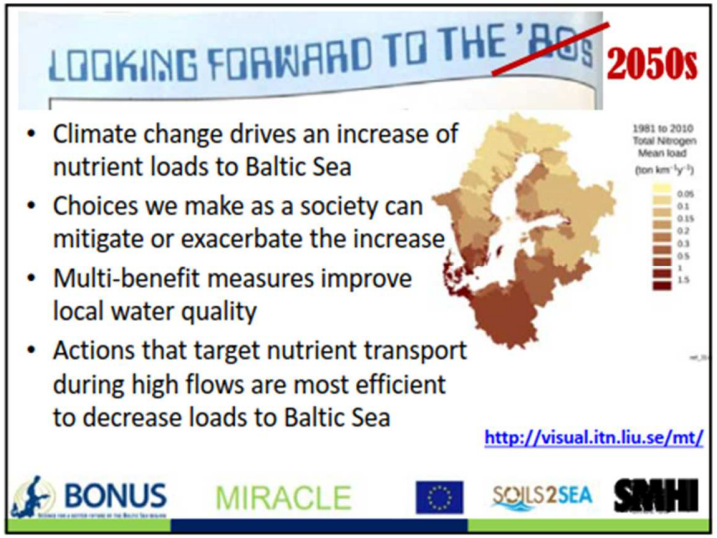

Discharge
2050s
Relative change from current status in 2050s
Impact on discharge driven by climate changes
Climate
SSP1
SSP2
SSP5
BONUS
MIRACLE
SOILS2SEA
SMHI


Total Phosphorus Concentration
2050s
Relative change from current status in 2050s
Impact on TP conc. strongly affected by both climate & SSPs
Climate
SSP1
SSP2
SSP5
BONUS
MIRACLE
SOILS2SEA
SMHI


2050s
Total load to Baltic Sea
Increase in loads due to the climate
Land use, wastewater, and agriculture choices significantly alter the impact
TN Load, thous. t/yr
TP Load, thous. t/yr
BONUS
MIRACLE
SOILS2SEA
SMHI


LOOKING FORWARD TO THE '80s 2050s
• Climate change drives an increase of nutrient loads to Baltic Sea
• Choices we make as a society can mitigate or exacerbate the increase
• Multi-benefit measures improve local water quality
• Actions that target nutrient transport during high flows are most efficient to decrease loads to Baltic Sea
1981 to 2010
Total Nitrogen
Mean load
0.05
0.1
0.15
0.2
0.3
0.5
1
1.5
http://visual.itn.liu.se/mt/
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Introduction Session 1

Developing a shared understanding of water governance in the Baltic Sea Region

Andis Zilans, University of Latvia
Gerald Schwarz, Thuenen Institute of Farm Economics

BONUS MIRACLE BALTIC SEA REGION WORKSHOP
Uppsala University, Sweden,
November 28, 2017

Source: Waterschap vechtstromen (https://www.vechtstromen.nl/)

BONUS-MIRACLE has received funding from BONUS (Art. 185) funded jointly from the European Union's Seventh Programme for research, technological development and demonstration, and from Baltic Sea national funding institutions

Multiple objectives and ecosystem benefits

- Socio-economic and environmental objectives
- Trade-offs & synergies
- Uncertainties
- Across different scales and levels
- Range of different sectors
- Variety of interests and actors
- Complex governance arrangements

Source: Baveye et al. (2016)

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Slide 2

Complexity of water governance in the BSR

- Three main dimensions of the complexity of water governance in the BSR:

- vertical policy integration – multi-level governance
  - EU level, BSR level, national level, local level
- horizontal policy integration – multi-sectoral governance
  - e.g. agriculture, forestry, wastewater, fishery, and "environment"
- stakeholder involvement in policy-making – multi-actor approach
  - governmental stakeholders, private sectors and actors, civil society

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Slide 3

Questions to be discussed

- What are key challenges for future water governance aiming at delivering multiple ecosystem benefits taking into account uncertainties and future drivers?

- What are the key challenges with respect to...
  - ...multi-level governance?
  - ...multi-sectoral governance?
  - ...multi-actor governance?

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Slide 4

Cost-Benefit Analysis - a tool to consider multiple benefits of measures and actions in the context of water governance

BONUS MIRACLE Baltic Sea Region Workshop
Uppsala, 28 november 2017

Søren Marcus Pedersen
Johannes Carulos
Søren B Olsen
UNIVERSITY OF COPENHAGEN

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Content

- Objectives
- CBA and cost-effectiveness approach
- Pathways and measures, scope and costs
- Multiple ecosystem service benefits
- Findings/Conclusions

Objectives

- To assess the cost and benefits of different nutrient mitigating measures and pathways on four catchment areas in Sweden, Germany, Poland and Latvia.
- To provide a CBA tool that allow for stakeholder interaction and sensitivity analysis
- Time period from 2017-2020 until 2030

Focusing on 4 catchments Helge Å (River), Berze River, Selke River and Reda River.

CBA approach

- Measures and pathways are based on suggested outcome from MIRACLE workshops with relevant stakeholders in an interactive process
- CBA approach is mainly based on benefit transfer and data from various sources
- Benefits include eutrophication and other ecosystem services
- Flexible tool that allow for sensitivity analysis

Socio-Economic Assessments- Example: Helge Å

Cost-Benefit Analysis

Helge River catchment

Helge å river basin (river mouth 55°51'27.835"N 14°14'16.113"E), drains to the Hanö Bay in Sweden

Character	Description
Largest urban area	Kristianstad
Area	4 725 km²
Inhabitants and administrative organization	131 000 inh. (97% in urban areas). Three counties and 14 local districts
Land use	65% forest, 15% cropland, 7 % grazing land, 2 % urban area

Source: http://bonus-miracle.eu/pilots/helge-a

Pathway 1 – Business as usual

Measure	Scope	Yearly Costs per Unit (2017 – 30)	Cost Structures (in SEK/unit)	Potential Impacts
Liming by doser	4262,4 t/y	SEK 2.232,45	Doser Cost: 2.000.000 Administrative Costs: 60 Ongoing: 1060	Changes in pH-value/reduced Acidification; Lake specific sedimentation; Biodiversity; Tourism; Recreation; Fishing/Angling
Liming by boat	673,6 t/y	SEK 1.000,93	Administrative Costs: 80 Ongoing: 960	
Liming by air	365,5 t/y	SEK 1.642,63	Administrative Costs: 80 Ongoing: 1580	
Custom Buffer Strips on Farm Land	181 ha	SEK 6.915,28	Investment: 7.500 Ongoing/Production Loss: 5000	Slowing/reducing P and N runoff; Flood Risk reduction; Erosion/Sediment control; Filtration of Pollutants
Wetlands	210 ha	SEK 24.011,02	Investment: 230.000 Ongoing/Production Loss: 2850	Slowing, storing & reducing runoff; Biodiversity/Habitat; Flood Risk Reduction; Aesthetic/cultural value; Groundwater/aquifer recharge; Erosion/Sediment control; Aesthetic Value; Recreation; absorb/retain CO2

Pathway 1 – business as usual (cont'd)

Measure	Scope	Yearly Costs per Unit (2017 – 30)	Cost Structures (in SEK/unit)	Potential Impacts
Individual Sewage Emission Reduction - Reduction to normal level	5431 units	SEK 7.142,52	Investment: 75.600 Administrative Costs: 2400	Reduced Eutrophication
Individual Sewage Emission Reduction - Reduction from normal to high level	1657 units	SEK 1.446,82	Investment: 13.400 Administrative Costs: 2400	
Non-productive field margins in agricultural landscape ("obrukade fältkanter")	300 ha	SEK 2.070,00	Ongoing/Production Loss: 2000	Reduced run-off; Soil conservation
Removal of traditional water regulating dams	78 units	SEK 230.611,15	Investment: 1.750.000 Administrative Costs: 175.000 Production Loss: 52.500	Natural Water Flow; Biodiversity; Fishing/Angling; Recreation; Tourism; Flood Risk Reduction

Pathway 2 – Ecosystem Service Approach

Measure	Scope	Yearly Costs per Unit (2020 – 2030)	Cost Structures (in SEK/unit)	Potential Impacts
Storm Water Ponds in Urban Areas	15,35 ha	SEK 279.997,37	Investment Cost: 2.500.000 Ongoing/Production Loss: 20.000	Slowing, storing & reducing runoff; Reducing Pollution; Soil Conservation; Biodiversity/Habitat; Flood Risk Reduction; Recreation; Aesthetic/cultural value
Flood plain targeting agricultural production areas	150 ha	SEK 25.466,39	Investment: 200.000 Ongoing/Production Loss: 5000	Slowing, storing & reducing runoff; Reducing Pollution; Soil Conservation; Biodiversity/Habitat; Flood Risk Reduction; Aesthetic/cultural value; Groundwater/aquifer recharge; Erosion/Sediment control; Aesthetic Value; Recreation
Wetlands for Nutrient Retention	597,4 ha	SEK 26.670,72	Investment: 230.000 Ongoing/Production Loss: 2850	Slowing, storing & reducing runoff; Biodiversity/Habitat; Flood Risk Reduction; Aesthetic/cultural value; Groundwater/aquifer recharge; Erosion/Sediment control; Aesthetic Value; Recreation; absorb/retain CO2
Phosphorus Wetlands/Dams	58,65 ha	SEK 74.775,69	Investment: 600.000 Ongoing/Production Loss: 13.200	Slowing, storing & reducing runoff
Riparian Zones in Agricultural area	400 ha	SEK 5.947,50	Investment: 7.500 Ongoing/Production Loss: 5000	Slowing/reducing P and N runoff; Flood Risk reduction; Erosion/Sediment control; Filtration of Pollutants
Re-Meandering	82,5 km			

Pathway 3 – Water Management in the Forestry Sector

Measure	Scope	Yearly Costs per Unit (2020 – 2030)	Cost Calculation (in SEK/unit)	Potential Impacts
Alder Swamp Forest	35.000 ha	SEK 10.478,34	Investment: 94.000 (Forest Market Price, Skåne 2013) Administration Costs: 6.000	Tourism; N and P reduction; Reduced brownification; Biodiversity
Riparian Zones in Forest Landscape	600 ha	SEK 5.658,30	Investment: 45.000 Administration Costs: 9.000	Reduced Acidification & Eutrophication; Biodiversity
Fish Migration - Fishway or Removal of Migration Obstacle [size 1]	3,1 m	SEK 11.526,17	Investment Cost: 100.000 Administrative Costs: 10.000	
Fish Migration - Fishway or Removal of Migration Obstacle [size 2]	184,48 m	SEK 54.341,48	Investment: 500.000 Administrative Costs: 10.000 Ongoing/Production Loss: 1000	
Fish Migration - Fishway or Removal of Migration Obstacle [size 3]	31,3 units	SEK 119.042,00	Investment: 1.000.000 Administrative Costs: 50.000 Ongoing/Production Loss: 10.000	Biodiversity; Fishing/Angling; Recreation; Tourism; Good Ecological Water Status
Fish Migration - Culvert Replacement	4 units	SEK 21.480,60	Investment: 200.000 Administrative Costs: 5.000 Ongoing/Production Loss: 0	
Transition from coniferous to broadleaved forest	300 ha			

Methodology

Cost-Effectiveness Analysis

$$CER = \frac{C}{E}$$

CER = cost-effectiveness ratio
C = cost in money unit
E = environmental unit

Cost-Benefit Analysis

Cost-Effectiveness, Helge River Pathway 2

	Cost-Effectiveness	
Measures (y)	**N reduction***	**P reduction**
Storm water ponds	4,297 SEK	47,755 SEK
Flood plain	115 SEK	4,244 SEK
Wetlands	1,385 SEK	28,200 SEK
Phosphorus Wetlands	110 SEK	1,099 SEK
Riparian Zones	-	118,950 SEK
Re-Meandering	2,876 SEK	-

*the removal of 1 kg N costs in average x SEK when using measure y

- Compared with benefits of nutrient mitigation from other studies:
- 244 SEK (2016)/kg N reduction
- 5546 SEK (2016/kg P reduction

(source: Helcom und NEFCO, 2007):

Methodology

Cost-Benefit Analysis

Administration Costs
Implementation Costs
Maintenance Costs
Lost/Reduced Income

N & P mitigation
(Reduced Eutrophication)

Ecosystem Services

- Fisheries and Aquaculture
- Biodiversity Preservation
- Flood Risk Reduction
- Carbon sequestration
- Erosion/Sediment Control
- Recreation & Tourism
- ...

Cost-Benefit Analysis

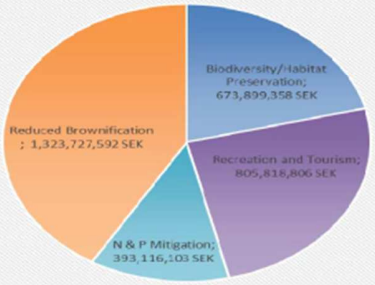
End Year	2030		Social Discount Rate	3.50%
	Current Status (=0)	Pathway 1	Pathway 2	Pathway 3
Biodiversity/Habitat Preservation		Low	Medium	High
Flood Risk Reduction		Low	Low	High
Erosion/Sediment Control		Low	Low	Medium
Recreation and Tourism		Low	High	Medium
Water Purification		100 percent	100 percent	100 percent
Reduced Brownification		Low	Medium	Medium

Note: Impact indications describe the change to the "current status" [Ranking: High, Medium, Low, None/Negligible, Negative]

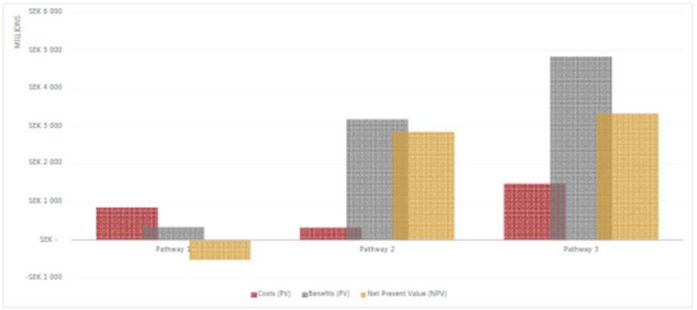
	Costs (PV)		Benefits (PV)		Net Present Value (NPV)	
Pathway 1	SEK	854,772,974	SEK	340,707,242	-SEK	514,065,732
Pathway 2	SEK	328,055,355	SEK	3,196,561,859	SEK	2,868,506,504
Pathway 3	SEK	1,493,905,907	SEK	4,850,787,890	SEK	3,356,881,983

Note: *The NPV of PW1 is relative to the current status with zero nutrient mitigation, while PW2 and PW3 are relative to the business*

Benefits for Pathway 2 (Ecosystem Services)



Pathway 1-3 Helge Å



Conclusions

- The project has provided a flexible tool to assess cost and benefits of measures to reduce eutrophication and provide other ecosystem services
- Findings show that it is relatively costly to reduce N and P for several of the selected measures in Helge Å
- Findings also indicate that each pathway (group of measures) could provide other ecosystem services in addition to reduced eutrophication
- Which may provide an overall positive NPV from other ecosystem services like reduced brownification, recreation and biodiversity.

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Increasing the effectiveness of policies and governance delivering nutrient management and multiple ecosystem services benefits in the Baltic Sea Region

Challenges to effective water governance in the BSR – key insights from case areas

Andis Zilans, University of Latvia
Gerald Schwarz, Thuenen Institute of Farm Economics

BONUS MIRACLE BALTIC SEA REGION WORKSHOP
Uppsala University, Sweden,
November 28, 2017

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How to adapt institutional settings to increase the effectiveness of policies & governance delivering multiple ES benefits?

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Methodological Approach

- **Review of more than 30 examples of payment for ecosystem services-type schemes from the EU, Australia and North America.**
- **Interviews of scheme managers or initiators.**

➢ Examples used to identify **factors of success** that have contributed to the success of these innovative approaches.

➢ **Factors of success** used to **analyse policy environments** in case areas for key policy frameworks (RBMP, CAP, RDP, FRMP) to **identify strengths and weaknesses** of policy settings and governance arrangements.

➢ **Identify actions for adapting institutional settings to deliver multiple ES benefits.**

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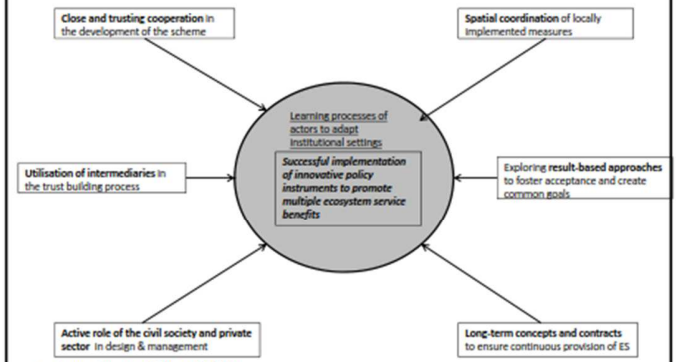
Key factors of success



Source: Zilans and Schwarz (2016)

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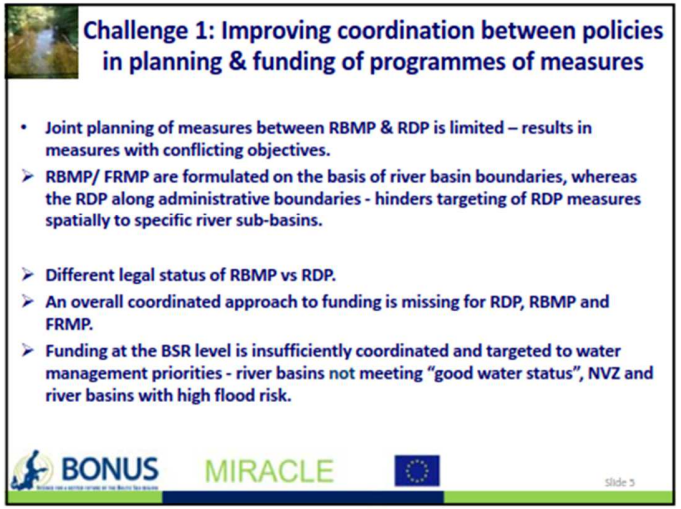
Challenge 1: Improving coordination between policies in planning & funding of programmes of measures
• Joint planning of measures between RBMP & RDP is limited – results in measures with conflicting objectives.
➢ RBMP/ FRMP are formulated on the basis of river basin boundaries, whereas the RDP along administrative boundaries - hinders targeting of RDP measures spatially to specific river sub-basins.
➢ Different legal status of RBMP vs RDP.
➢ An overall coordinated approach to funding is missing for RDP, RBMP and FRMP.
➢ Funding at the BSR level is insufficiently coordinated and targeted to water management priorities - river basins not meeting "good water status", NVZ and river basins with high flood risk.
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Challenge 2: Better targeting of local stakeholder needs and involvement of land managers in formulation of measures
• Case area stakeholders indicate RBMP, RDP and FRMP consultations are merely a formal process – limited input to decisions on measures.
• Local/regional water councils established for RBMP stakeholder consultations, but mandate unclear and decision-making limited.
• RDP does not have a formal requirement for stakeholder discussion forums – limits impact of land managers & non-agricultural stakeholders in planning & targeting of measures.
➢ Top-down planning approach in RBMP and RDP limits the incorporation of the needs, knowledge and ideas of land managers in measures and schemes.
➢ RBMP and CAP/RDP are insufficiently flexible to support local bottom-up initiatives/ measures and to encourage entrepreneurship in policy planning.
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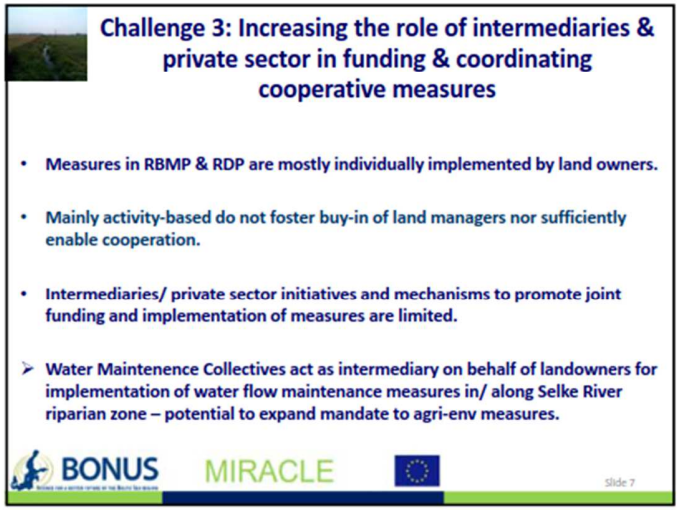
Challenge 3: Increasing the role of intermediaries & private sector in funding & coordinating cooperative measures
• Measures in RBMP & RDP are mostly individually implemented by land owners.
• Mainly activity-based do not foster buy-in of land managers nor sufficiently enable cooperation.
• Intermediaries/ private sector initiatives and mechanisms to promote joint funding and implementation of measures are limited.
➢ Water Maintenence Collectives act as intermediary on behalf of landowners for implementation of water flow maintenance measures in/ along Selke River riparian zone – potential to expand mandate to agri-env measures.
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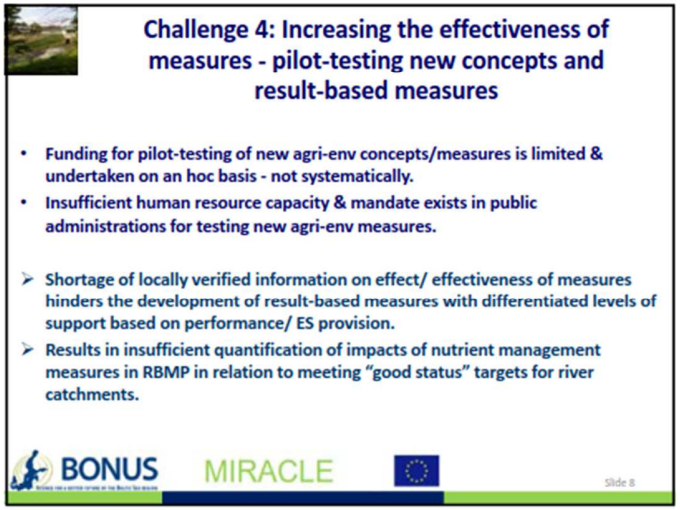
Challenge 4: Increasing the effectiveness of measures - pilot-testing new concepts and result-based measures
• Funding for pilot-testing of new agri-env concepts/measures is limited & undertaken on an hoc basis - not systematically.
• Insufficient human resource capacity & mandate exists in public administrations for testing new agri-env measures.
➢ Shortage of locally verified information on effect/ effectiveness of measures hinders the development of result-based measures with differentiated levels of support based on performance/ ES provision.
➢ Results in insufficient quantification of impacts of nutrient management measures in RBMP in relation to meeting "good status" targets for river catchments.
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Appendix 3. Photos of the conversation maps