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Enabling policy innovations promoting multiple ecosystem benefits: lessons learnt from case studies in the Baltic Sea Region

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Abstract

This paper analyses how specific institutional barriers and drivers affect the success of agri-environmental governance and policy innovations in four case study catchments in Germany, Latvia, Poland and Sweden. Possible adaptations of institutional settings are explored, aiming at increased effectiveness of policies and governance in delivering multiple ecosystem benefits along with reduced nutrient emissions and flood management. Factors of success synthesized from existing examples of innovative policy instruments in the EU and further afield are used to identify barriers and opportunities for the implementation of policy innovations in different institutional settings across the Baltic Sea Region (BSR). Key factors of success include close and trusting cooperation in scheme development, utilization of intermediaries in trust building, an active role of civil society and private sector, spatial targeting and coordination of measures, and result-based and long-term approaches. It is concluded that the effectiveness of measures can be increased by (i) adopting a less prescriptive approach to implementation, (ii) strengthening bottom-up participatory stakeholder learning processes, (iii) fostering cross-sectoral planning and funding initiatives, (iv) creating incentives for local collaborative actions, (v) developing cooperative nutrient management initiatives in the BSR and (vi) developing a systematic and coordinated approach to pilot-testing of new concepts and measures.

Keywords: Agricultural and environmental policies; Multiple ecosystem benefits; Nutrient management; Policy innovation

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Introduction

The Baltic Sea is one of the world's most polluted seas and eutrophication is seen as its greatest challenge (HELCOM, 2014). The main sources of nutrients (nitrogen and phosphorus) released to the sea are waterborne loads coming from inland via rivers and direct discharges from the coast. The two most significant sources of waterborne nutrient loads are diffuse sources, mainly agriculture and point sources, mainly urban wastewater (HELCOM, 2015). Moreover, flooding episodes in the Baltic Sea Region (BSR) are considered to be a key driver of nutrient leaching (Øygarden *et al.*, 2014). Climate change adds two further challenges. Firstly, it is predicted that shorter and wetter winters will lead to less snow and ice cover and thus to greater run off from river catchment areas. Secondly, marine water temperature is projected to increase significantly and sea-ice covers to decrease significantly which will provide better conditions for the growth of algal blooms, as well as lead to a prolonged growing period (Meier, 2015).

EU marine water quality is governed by the 2008 Marine Strategy Framework Directive, the objective of which is to ensure that the EU's marine waters reach a good environmental status by 2020 (European Parliament and the Council of the European Union, 2008). Member states (MS) are required to prepare a programme of measures to achieve a good environmental status building on the objectives and activities of the existing regional sea conventions (ECA, 2016). For the Baltic Sea, the relevant convention is the 1974 Helsinki Convention (governed by the Helsinki Commission (HELCOM)) and its 2007 Baltic Sea Action Plan (BSAP), which requires the reduction of nutrient loads from the signatory countries. The plans of MS for achieving HELCOM nutrient reductions are based on their River Basin Management Plans (RBMP) prepared on the basis of the Water Framework Directive (WFD) (European Parliament and the Council of the European Union, 2000; HELCOM, 2007).

Nevertheless, actions implemented by the BSR MS have led to limited progress towards reducing nutrient inputs into the Baltic Sea. Investments in wastewater infrastructure (Council of the European Communities, 1991) have been only partly effective, agricultural measures (European Parliament and the Council of the European Union, 2013a, 2013b) are not commensurate with the scale of the pressure and are insufficiently targeted, and the added value of the EU Strategy for the Baltic Sea is difficult to assess (ECA, 2016).

To foster better policy outcomes, the 2013 HELCOM Copenhagen Ministerial Declaration recommended strengthening cross-sectoral integration of policies and implementation of the ecosystem approach in all sectors and policies to preserve biodiversity and to reduce nutrient loading to the Baltic Sea from municipal wastewater treatment facilities and from agriculture (HELCOM, 2013). Similarly, the European Union Strategy for the Baltic Sea Region and Action Plan (EUSBSR) recognizes the need for better integration of agricultural and environmental policies. Yet, insufficient coordination and integration between sectoral policies due to imbalanced power relations and opposing agendas remain a constraint for the effectiveness of existing policy strategies, regulations and directives in addressing multiple ecosystem benefits (De Santo, 2015).

Improved targeting of multiple ecosystem benefits requires a more holistic approach, which integrates environmental, socio-economic and sectoral concerns and objectives into one conceptual framework for designing policies. The ecosystem services (ES) approach provides a structured, comprehensive and holistic approach for decision-making that puts a strong emphasis on the flow of benefits people receive from ecosystems and can provide arguments for their conservation, rehabilitation and/or enhancement (MEA, 2005; Greenhalgh & Hart, 2015). It is thought that greater mainstreaming of the ES approach

in (e.g. agricultural and environmental) policies could support better policy integration, by explicitly recognizing, valuing and compensating the full range of ES or public goods provisioned, refocussing policy objectives on win–win and trade-off considerations (including the reduction of disservices) and fostering cross-sector cooperation (Power, 2010; Plieninger *et al.*, 2012).

It is recognized that regulations are important and can play a role in mainstreaming ES in environmental and agricultural policies (Bouwma *et al.*, 2018). However, agricultural and environmental regulations are aimed at ensuring an acceptable maximum level of environmental pollution or a minimum level of environmental benefits, approaches that have proved to be insufficiently effective in the BSR. Further and potentially more effective provision of (multiple) ES from agriculture, forestry and other land use sectors is thought to be possible in combination with voluntary instruments based on the provider-gets principle. However, in order to successfully implement a coherent ES framework in agricultural and environmental policies in the BSR, a new kind of governance is needed (Matzdorf & Meyer, 2014) – a governance system that enables involving new key stakeholders and creating new incentives for farmers to produce those services.

This paper analyses how specific institutional barriers and drivers affect the potential for successfully implementing governance and policy innovations in four case-areas in Germany, Latvia, Poland and Sweden and explores possible adaptations of the institutional settings to increase the effectiveness of policies and governance delivering multiple ecosystem benefits from reduced nutrient enrichment and flood management.

Context of research

The objective of the research was to improve the understanding of barriers and drivers of effective and adaptive policy approaches and governance delivering reduced nutrient enrichment and multiple ES benefits (BONUS MIRACLE, 2017).

The research focussed on four case-area river catchments, three of which are located in the Baltic Sea drainage basin:

- Berze River, Latvia, located in the Lielupe River basin discharging in the Gulf of Riga in the eastern Baltic Sea;
- Helge River, Sweden, discharging in the western Baltic Sea;
- Reda River, Poland, discharging in the Bay of Gdansk in the southern Baltic Sea;
- Selke River, Germany, located within the Elbe River basin, discharging in the North Sea.

The Selke case-area was included in the study due to the availability of extensive water flow and quality monitoring data and the experience of researchers with nutrient modelling approaches enabling knowledge transfer and support to the assessments in the Baltic Sea catchments. The characteristics of the four case-area catchments are summarized in Table 1.

In each case-area, the research was embedded in a social learning process (Pahl-Wostl *et al.*, 2007) guided by a multi-disciplinary team of researchers. A diverse set of public- and private-sector actors with differing mandates and perspectives regarding nutrient and flood management delivering multiple ES were involved. Key public-sector stakeholders included representatives from national and regional agricultural and environmental ministries and water authorities responsible for the planning,

Table 1. Characteristics of the four case-area catchments.

Characteristics	Berze River, Latvia	Helge River, Sweden	Reda River, Poland	Selke River, Germany
Population and proportion in urban areas	26,500; 50%	131,428; 97%	200,000; 83%	33,000; 80%
Size (km^2)	872	4,725	485	463
Elevation	2–120 m amsl	0–235 m amsl	0–234 m amsl	605–653 m amsl
Mean annual precipitation	630 mm/year	810 mm/year	794 mm/year	660 mm/year
Mean annual temperature	5.6 °C	7.4 °C	8.4 °C	9 °C
Agricultural land	50%	22%	51%	52%

management and supervision of the implementation of key agricultural and environmental policies. Additionally, stakeholders from rural policy support services, rural advisory services and farmers' associations and representatives from the non-agricultural sector including regional and local planning authorities, environmental inspectorates, water and nature management agencies, forestry agencies, water and wastewater utilities, and environmental and nature protection non-governmental organizations (NGOs) were involved in project activities.

Methodology

Five stakeholder workshops were organized in each case-area to foster social learning between stakeholders and researchers on the management, governance of nutrients and floods. A soft systems methodology (Checkland, 2000) was used to guide the social learning process. Following an initial issue framing phase, a systemic issue (Reda – flooding; Helge – brownification; Selke – biodiversity; Berze – functional diversity) was defined in each case-area and used to mediate critical reflection and co-deliberation between different stakeholder perspectives (Powell & Toderi, 2003) and to co-construct 'alternative pathways' to the 'business-as-usual pathway' of measures in current policy documents, namely RBMP, Rural Development Programmes (RDP) 2014–2020, and Flood Risk Management Plans (FRMP) (European Parliament and the Council of the European Union, 2007). The effects of 'pathways' of measures on nutrient loading were modelled using the E-HYPE model (HYPE wiki, 2016) and cost-effectiveness and cost–benefit assessments were undertaken to identify the most feasible 'pathways' of measures in relation to nutrient and flood risk management and the provision of multiple ES benefits. An interactive web-based visualization platform (MIRACLE Visualization Tool, 2017) was used to increase understanding of complex interactions both in stakeholder dialogues and among researchers from different disciplines.

To better understand how existing institutional settings and governance structures in the case-areas need to be adapted to facilitate better policy integration between the agricultural and environmental sectors to increase the efficiency and effectiveness of nutrient management and provision of multiple ES benefits, examples of innovative policy approaches from elsewhere were studied. A literature review was undertaken of innovative ES approaches and schemes from the EU, Australia and North America, followed up by written or phone interviews (e.g. Florida Ranchlands Environmental Services Project, USA; Performance-based Environmental Policies for Agriculture Initiative,

USA; Gemeinschaftlicher Wiesenvogelschutz in Germany; MEKA III programme in Germany) with some scheme initiators or managers to clarify specific details regarding the operation of the schemes. The literature review paid particular attention to schemes targeting water quality and watershed management, but also included examples of schemes dealing with biodiversity, carbon sequestration and bundles of ES.

More than 30 reviewed schemes demonstrated effective achievement of environmental objectives and were cited in the literature as 'good practice' examples (Appendix 1, available with the online version of this paper). Many schemes were developed as part of social learning processes and were considered 'successful' both by ES providers and beneficiaries. The OECD Principles on Water Governance (OECD, 2015) were used as guiding principles to review and identify factors of success in the literature review. The identified key factors of success for policy innovations provisioning ES in the reviewed schemes were examined in the context of previous studies identifying factors of success of effective environmental management and social learning through policy innovations (e.g. Mills *et al.*, 2011) and synthesized (Figure 1).

The methodological approach for the mapping and assessment of case-area institutional settings and governance structures in the case-areas involved the following steps:

- Development of common methodological guidelines with standardized mapping questions based on the 'classic' policy cycle stages – planning (agenda setting), formulation (development) and implementation, evaluation (monitoring and assessment) and adaptation of policy programmes and measures (Baker & Eckerberg, 2013).
- Mapping of institutional settings and governance structures (i.e. mandates, roles, responsibilities and procedures of institutions and actors) involved in implementing and supporting policies and measures in key policy frameworks in case-areas.
- Assessment of the strengths and weaknesses of existing institutional settings and governance structures in case-areas against the factors of success synthesized from the literature review.

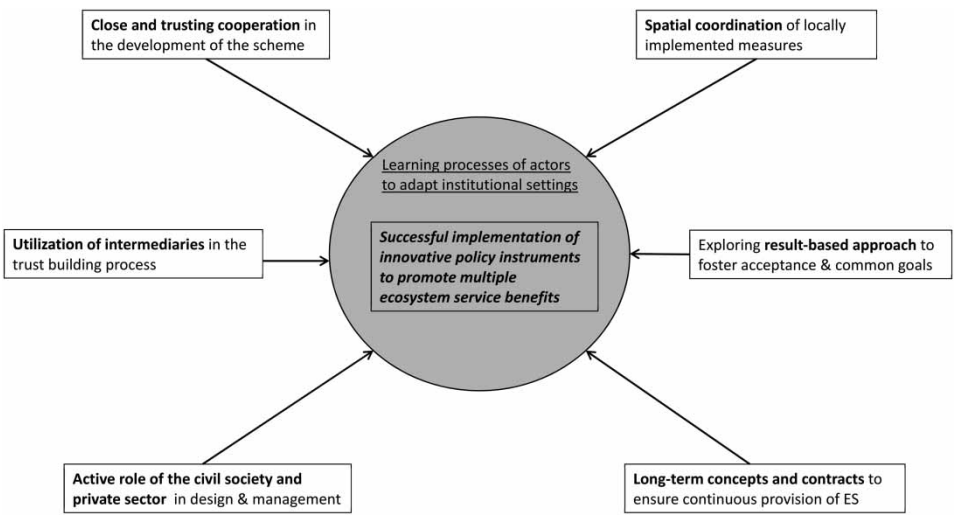

Fig. 1. Summary of success factors.

Key policy frameworks for which policy settings and governance structures were analysed in the four case-areas included the CAP and RDP (2014–2020). Respective RBMP (2016–2021) were considered in the Berze, Helge and Selke case-areas, whereas in the Reda case-area, the Water and Environmental Programme (2016–2021) containing the Programmes of Measures for the 10 RBMP in Poland was used as the focus for the water governance analysis. All subsequent discussions dealing with river basin planning are referenced as RBMP. The FRMP (2016–2020) for the City of Kristianstad was additionally considered in the analysis in the Helge case-area.

Results

Factors of success

Figure 1 provides a summary of the identified factors of success related to innovative policy approaches and schemes. The literature review indicates that a long-term collaboration between relevant stakeholders and an active role of civil society and the private sector in decision-making processes are important for successful innovations in agricultural and environmental policies promoting multiple ES benefits. Highlighted across many of the reviewed examples is the importance of close and trusting cooperation between stakeholders from the start of the development phase of the scheme (e.g. 'Upstream Thinking with Westcountry Rivers Trust' (Westcountry Angling Passport, 2018) in the UK; pilot projects on cooperative management for water and habitat protection (Molenaar, 2013) in the Netherlands; 'Florida Ranchlands Environmental Services Project' (FRESP, 2016) in the USA; 'Pumlumon Living Landscapes Project' (Alison Millward Associates, 2014) in the UK. This includes a joint assessment of the extent of the problem(s) policy instruments shall address, the development of strategic objectives and design, implementation and coordination of support schemes. Experiences from 'Kooperationsmodell Trinkwasserschutz' (Niedersachsischer Landesbetrieb fur Wasserwirtschaft, Kusten- und Naturschutz, 2011) in Germany, the 'Conservation Reserve Enhancement Program' (USDA, 2015) and the 'Medford Water Quality Trading Programme' (Jockers & Johnson, 2014) in the USA highlight the advantages of joint efforts of governmental agencies and private stakeholder organizations, as well as cooperation between farmers and conservationists and at the administrative level.

Intermediaries play a critical role in the trust-building process during scheme development. They act as a broker with the ability to integrate actors from different sectors across scales to build coalitions with common objectives. Intermediaries can help mobilize funding, including private funding to help initiate support schemes; they can act as advisors and trainers for farmers and provide expertise in the design, planning, management and verification of schemes. In many cases, the role of an intermediary is carried out by civil society organizations – 'Bonneville Environmental Foundation Water Restoration Certificates' (Bonneville Environmental Foundation, 2010) in the USA, 'Upstream Thinking' (Upstream Thinking, 2017) in the UK, 'Edwards Aquifer Protection Program' (Edwards Aquifer Protection Program, 2018) in the USA and 'Trinkwasserwald® e.V.' (Trinkwasserwald, 2017) in Germany. Most importantly, changes in institutional arrangements to foster close cooperation between different stakeholder groups and the recognition and appreciation of a wider set of objectives and interests require (social) learning processes that are best facilitated by experienced intermediaries.

Spatial targeting, result-based design and long-term contracts can improve the effectiveness of support instruments. Achieving the desired provision of ES from eutrophication and flood management

requires spatial coordination of locally implemented measures and a collaborative approach to land and water management. Spatial coordination can be incentivized by bonus payments for a particular network or catchment pattern such as in 'Ordinance for Ecological Quality' in Switzerland (Swiss Confederation, 2014) or neighboring parcels in hotspots as in the 'Conservation Reserve Enhancement Program' in Oregon, USA (Oregon Watershed Enhancement Board, 2017). However, spatial coordination on its own is not sufficient for complex ES. Interests of a multiplicity of actors need to be aligned, which requires more effort and funds to achieve a fair process of involvement and the desired outcomes. Partnership or community-based approaches such as 'Landcare projects' (German Association for Landcare, 2017) in Germany and Australia (Landcare Australia, 2017) have been successful by addressing multiple stakeholder interests.

Schemes particularly oriented towards local conditions usually pursue a result-based approach. Schemes with a result-based approach permit the land manager to innovate, thus, drawing on their experience and local knowledge to achieve better targeted and more cost-effective results (Burton & Schwarz, 2013). Examples such as 'Flowering Steinburg' (Groth, 2011) and the 'Flowering Meadows Scheme' (Fleury *et al*., 2015) in France show that by making knowledge of how to improve conservation on farms important, result-based schemes create common goals between farmers and conservationists, leading to cooperation between groups with conflicting objectives. Similarly, as demonstrated by the 'Performance-based Environmental Policies for Agriculture Initiative' (Winrock International, 2010) in the USA, flexible, output-based payments motivate farmers to carefully consider environmental concerns in their business decision-making and to implement the most effective actions specific to their farms. In the long term, this can also help to improve the viability of farms.

Long-term concepts and contracts such as in the 'MoorFutures' in Germany (Joosten *et al.*, 2013), the 'Clean Water Services Thermal Loading Offset Programme' (Freshwater Trust, 2017) in the USA, 'Woodland Carbon Code' (Forestry Commission England, 2017) in the UK, jointly developed between the different stakeholders, further improves the trust and support of actors for ES benefits and helps to ensure permanence and continuous provision of ES.

Case study results

The factors of success derived from the literature review were used to assess the strengths and challenges of institutional settings and governance structures related to key policies. In the process of mapping and assessing policy settings and in consultations with stakeholders, several other factors were identified as being relevant in the case-areas in supporting policy innovation and successful policy outcomes:

- coherence between policy frameworks and sectors;
- coherence within a policy framework;
- clear definition of institutional mandates, programme rules and enforcement procedures.

These factors are aligned with the OECD Principles on Water Governance (OECD, 2015).

Appendix 2 (available with the online version of this paper) summarizes the key strengths and challenges of the current policy and governance settings in the four case-areas in relation to the factors of success. Some of the identified strengths and challenges are applicable to more than one success factor, but to avoid redundancy they are reported only once.

Close and trusting cooperation in scheme development. In the context of the assessed policies, stakeholder involvement is formally prescribed including information provision and consultations at different stages of planning and development of programmes of measures. Recognizing that a closer involvement of a wide range of actors and citizens is required to set up a successful and durable policy framework the RBMP foresees the constitution of local discussion forums composed of state, regional, municipal and sectoral non-governmental organizations and local stakeholders. The Selke case-area has an additional regional discussion forum or advisory board to address issues relevant at the Federal state level. The institutional set-up for the local discussion forums varies between case-areas. In Latvia and Poland, local discussion forums are established on a river basin level, whereas in Sweden and Germany on a sub-basin level. Discussion forums in Latvia are centrally administered by the national water authority, whereas in Sweden, this is the responsibility of the regional water authorities each with its own rules regarding membership. Overall, administrative support for the organization of the work of discussion forums is weak. In the Helge case-area, one partly funded staff position is allocated to the organization of the discussion forum, whereas in Latvia, administrative support is provided for the organization of discussion forum meetings. The lack of a clear mandate and limited political support has meant that the intended purpose of discussion forums in ensuring that needs and local knowledge of diverse stakeholders are considered when formulating RBMP programmes of measures is not being adequately realized. Stakeholders in the Helge and Selke case-areas indicate that the mandate of the local stakeholder discussion forums (water councils) in the RBMP system remains unclear and that water councils did not play a meaningful role in the planning of the latest RBMP (2016–2021). Local stakeholders in the Helge case-area argue that the selection of RBMP measures did not adequately consider local land use practices.

The RDP planning process does not have a formal requirement for stakeholder discussion forums. Although a range of state, municipal and private-sector stakeholders associated with agriculture and rural areas are involved in RDP consultations, nevertheless, the impact of farmers and non-agricultural stakeholders on the planning of measures is limited.

Although the programmes of measures within the different policy frames are in terms of timing developed in parallel, cross-sectoral coordination is weak. Some water management measures are integrated in the RDP, but joint planning exercises for programmes of measures do not exist between RBMP, RDP and FRMP which has resulted in the adoption of conflicting measures (e.g. Helge case-area). RBMP water authorities are sometimes consulted by agriculture authorities on proposed RDP measures, but this usually occurs late in the planning process when decisions on RDP funding allocations for programmes of measures have already been made (e.g. Berze case-area). In the Berze case-area, the cross-sectoral Agricultural and Environmental Advisory Council under the Ministry of Agriculture is occasionally used as a mechanism to exchange information and coordinate RDP and RBMP planning issues between the Agriculture and Environment ministries and associated sectors.

Active role of civil society and private sector in the design and management of schemes. Notwithstanding formally instituted consultation arrangements, multi-level governance systems largely operate from strategic EU objectives to the local implementation of measures. Stakeholders in all case-areas indicated that the existing largely top-down planning approach limits the incorporation of the needs, knowledge and ideas of farmers in measures and schemes and consequently does not encourage local initiatives or entrepreneurship in policy planning. Instead, farmers' associations are consulted and provide input into the process of identifying and approving measures on behalf of farmers. This approach limits the awareness

raising and buy-in of farmers and thus impacts negatively on the durability and effectiveness of the policy processes and the uptake of measures. Similarly, non-state actors such as foundations and environmental NGOs in the Helge and Reda case-areas have had a limited role in the process of planning RBMP and RDP programmes of measures. However, in Latvia, RDP grassland management measures have been developed in close cooperation with the non-state actor Latvian Fund for Nature.

Utilization of intermediaries in the trust-building process. In the case-areas, measures are most often individually implemented by farmers with limited collective or coordinated implementation that can negatively impact the efficiency and effectiveness of measures. Mechanisms and incentives to promote coordination and joint implementation by groups of landowners are limited. However, intermediaries do play a role in some of the case-areas.

In the Helge case-area, local municipal authorities have facilitated the creation of wetlands involving different landowners and municipalities. The Rural Training and Consultation Centre in the Berze case-area provides services to landowners with respect to the agri-environmental measure (AEM) 'High Nature Value (HNV) Grassland', including training on HNV grassland management and the assessment of indicator species. Water Management Companies in the Reda case-area, legislated by the National Water Law, represent landowners along water bodies and are responsible for the implementation of joint water management measures. These cooperatives are partly supported by the government, but the main funding source is a fee paid by all farmers in the jurisdiction of a Water Management Company.

Spatial targeting and coordination of locally implemented measures. While there are linkages between the examined policy frames, closer alignment is challenging due to different boundary systems. The RBMP and FRMP are formulated on the basis of river basin boundaries, whereas the RDP is developed along administrative boundaries. This mismatch in boundary conditions hinders targeting of RDP measures spatially to specific river catchments. For example, in the Helge case-area, RDP measures are formulated on the basis of soil-type assessments within regional administrative boundaries, whereas a basin-wide approach is used for RBMP measures. Similarly, the RDP budget for measures is allocated to county administrations, and not according to river basin boundaries, consequently, targeting of water improvement measures to priority sub-catchments is hindered.

Spatial targeting of locally implemented measures in both the RDP and RBMP is limited. In the Berze case-area, however, water bodies at risk of not achieving 'good status' under the WFD and located within areas designated nitrate vulnerable zones (NVZ) under the Nitrate Directive are prioritized when planning and funding measures from national grants (e.g. improvements to municipal wastewater treatment plants and RDP ecological land drainage system measures).

In both the RBMP and RDP, measures are targeted much more on agricultural land and less to forestry land, which has an impact on the overall effectiveness of nutrient reduction programmes in sub-catchments with an extensive forest cover. This is particularly relevant to the Helge case-area where the forested area exceeds 55%, thus contributing proportionately more to total nutrient loading.

Exploring result-based approaches to foster acceptance and create common goals. Result-based payments are directly linked with the environmental outcome achieved by the land manager according to different levels of outcome. This suggests that the payment is based on the monitoring of the outcome. For example, the payment-by-results approach for nutrients can be based on a nutrient accounting system and in the context of nitrate contamination of groundwater, a land manager is typically rewarded

according to the amount of left-over mineralized nitrogen remaining in the soil (Brouwer *et al*., 2003). But in the case-areas, all RDP, RBMP and FRMP measures are activity-based. In the Selke case-area, a result-based measure that targeted fertilizer reductions was withdrawn due to different expectations and interpretations of the European Commission (EC) and regional RDP administrations on the level of fertilizer reduction that is eligible for support. Stakeholders indicated that the withdrawal impacted negatively on the acceptance and perceptions of land managers of result-based payments.

Pilot-testing innovations. In the case-areas, a systematic approach for the identification and testing of the effectiveness of new agri-environmental and water measures in the case-areas is not established. This is, in part, due to limited human resource capacity and mandate in governmental agricultural and water institutions to pursue policy innovation. Typically, adherence to the minimum requirements of EU Directives and associated guidance documents is the norm. Furthermore, national funding for the testing of new AEMs is limited. Testing of pilot-scale water management measures is undertaken mainly on an ad hoc basis in regional capacity-building projects by government agencies, research institutions and agricultural and environmental non-state actors. In the Selke case-area, however, pilot-testing in the context of the RBMP is used to explore complex thematic issues (e.g. nutrient loading) and problematic spatial settings (e.g. sub-catchments).

Long-term concepts and contracts to ensure continuous provision of ES, including multiple benefits. In all case-areas, 5-year agreements are typically signed with farmers for the implementation of measures receiving RDP and RBMP support payments. However, some Helge case-area stakeholders have suggested that agreements should be extended to at least 10 years, and preferably 15 years in length, to ensure long-term maintenance of implemented measures and verifiable results. Stakeholders from the Berze case-area have indicated that although longer-term contracts are preferred, additional environmental designations on land use should be avoided as this entails long-term restrictions, whereas financial support to offset or compensate resultant obligations is more difficult to secure in the long term.

Although a multi-level governance system has been put in place in the RDP to address different environmental objectives and the provision of multiple ES at different scales (EU, national and regional level) in the case-areas, an ES framework is not explicitly used to structure planning of AEMs. Similarly, RBMP in the case-areas are not based on the ES approach, but instead programmes of measures are targeted to reduce pressures on the quality and quantity of water resources generally following the *driving force-pressure-state-impact-response* (DPSIR) approach (Borja *et al*., 2006). In both programmes, measures target single and not multiple ES benefits.

Coherence within and between policy frameworks and sectors. Different spatial scales and timetables for planning RDP and RBMP make coordination of programmes of measures difficult and at times results in measures with conflicting objectives. For example, in the Helge case-area, some measures in the RBMP involve widening and restoration of natural features of the river to improve the chemical and ecological status of the river. This includes removal of old water regulating dams that will ultimately lead to draining pastures and meadows, which, according to local ecologists, currently act as important ecosystems that have emerged since the establishment of agriculture and forestry. However, the removal of old water regulating structures contradicts a specific objective of the RDP – supporting investments for the preservation of cultural environmental features in the landscape, such as heritage water retention structures.

In the Berze case-area, an imbalance exists in the legal status of the RBMP and the RDP resulting in a weaker mandate for the RBMP. The RBMP is approved by the Minister of Environment and is binding only on national environmental institutions, including the Regional Environmental Boards when issuing permits and technical regulations, but only has the status of guidance for other government jurisdictions and private-sector actors. On the other hand, the RDP is approved as a national regulation and thus is binding on all government institutions, as well as private-sector stakeholders.

In the case-areas, a coordinated approach to funding is missing in relation to the RDP, RBMP and FRMP. The RDP has a dedicated source of funding whereby funding priorities are, in principle, decided based on the needs and priorities identified in the ex-ante evaluation of the RDP and discussions with key stakeholders in national steering committees. However, a lack of earmarked funding makes implementation of RBMP and FRMP measures tenuous. In the Berze case-area, RBMP supplementary measures, which are targeted at water bodies at risk of not meeting 'good water quality' status or NVZ, are typically funded by the RDP, if funding priorities can be aligned. Upgrades to wastewater treatment plants are most often funded by the European Regional Development Fund (ERDF). In the Reda case-area, national funding for the implementation of programmes of measures is usually available through the National Fund for Environmental Protection and Water Management. Funding for the RBMP programme of measures is in part organized through the National Programme for Wastewater Treatment, which addresses water quality issues in urban areas, whereas the RDP supports water quality issues in rural areas. In the Helge case-area, private households, companies and municipalities are obligated to cover the cost of RBMP measure implementation, but measures are also supported by local and national funds such as the Marine Environment Fund and Local Investment Programme.

Clear definition of institutional mandates, programme rules and enforcement procedures. Case-area stakeholders indicate that the complexity and diversity of rules of the different policy programmes makes it difficult for farmers to understand and fulfill their obligations. This, in turn, can impact negatively on the uptake and effectiveness of measures. Stakeholders in the Selke case-area have pointed out that in intensive agricultural areas, the rules and procedures associated with voluntary AEM are too time-consuming to be considered viable within overall farm management decisions. Furthermore, the RDP agri-environmental support payment rates are insufficient to compete with the larger CAP direct payments.

In the Helge case-area, stakeholders indicate that existing rules and regulations of the RBMP are unclear and weakly enforced. During the most recent phase of RBMP (2016–2021) planning in Sweden, water delegations with regional water authorities, who are responsible for approval of RBMP programmes of measures implemented by national and municipal authorities, expressed concerns on the lack of clarity regarding responsibility for financing measures. This resulted in a delay in the approval of the latest RBMP. Additionally, some authorities at the national level expressed reservations about being governed by 'regional' authorities which are below them in the state hierarchy and thus perceived programmes of measures as lacking full legitimacy.

Discussion

The previous section presented the institutional and governance challenges facing the four case-areas regarding the implementation of agricultural and environmental policies to effectively deliver multiple ecosystem benefits. This section discusses the opportunities for improving policy-making for a more

effective delivery of multiple public goods in the BSR by increasing coordination between policy frames, ensuring a greater role for intermediaries in the implementation of cooperative measures and promoting a more systematic approach to pilot-testing of new measures.

Increasing coordination between policy frames

Currently, the role of case-area farmers and non-agricultural stakeholders in the development of programmes of measures in the RDP is limited. Measures more often grow out of data and models from 'experts' rather than from stakeholder involvement via participatory processes. This results in measures that frequently are not adapted adequately to the contexts in which they are being applied, thus reducing their effectiveness. This, in part, is also influenced by the lack of accountability of MS to the EC for the quality of stakeholder involvement. Likewise, in their reporting to the EC, countries are not responsible for documenting how they arrive at payment levels for measures, nor whether actors outside responsible agencies have been involved (European Court of Auditors, 2011). The institutionalization of 'stakeholder participation' varies between countries depending on governance culture – the degree of hierarchy and authority exercised by government offices (Powell *et al*., 2012). In this regard, the mandate of local stakeholder discussion forums could be strengthened by specifying their role during different stages of the RBMP planning process. Similarly, the RDP planning process could be made more inclusive of multiple interests through the creation of local stakeholder discussion forums that include state and non-state actors from the environmental sector and farmers. This would better facilitate the incorporation of the needs and knowledge of local stakeholders and environmental interests in AEMs.

Similarly, increasing coordination between the key policy frameworks (RDP, RBMP and FRMP) by aligning planning, funding and consultation processes could increase the number and effectiveness of measures implemented, thus strengthening nutrient management delivering multiple ES benefits. However, the ability of countries to factor in diverse national interests in their agri-environmental programmes is dependent on inter-sectoral coordination between ministries and agencies who are caretakers of different agendas and objectives. This coordination poses a significant challenge in most BSR countries, where the agricultural and environmental sectors often maintain their institutional boundaries in order to retain control over their respective policy processes (Powell *et al*., 2012).

To ensure a stable source of funding for RBMP and FRMP measures in case-areas, opportunities to earmark a share of the national RDP agri-environmental budget for catchment-based management could be investigated. Funding allocation could be delegated to RBMP and FRMP stakeholders. Incorporation of a river basin-based approach or catchment sub-programme of measures within RDPs based on water management priorities identified in RBMPs and FRMPs could also be considered. Similarly, opportunities for pooling funding from the European Structural and Investment Funds (ESIF), including the European Agricultural Fund for Rural Development (EAFRD) to address common water resource issues (priority landscapes, catchments, river basins, sea sub-basins, etc.) identified in the EUSBSR and the HELCOM BSAP, could be investigated. Greater transnational cooperation in funding and targeting initiatives could increase the effectiveness of nutrient management measures delivering multiple ES benefits. Baltic Sea Region Managing Authorities' networks have recently been created on a voluntary basis for all ESIF funds (European Social Fund (ESF), ERDF, EAFRD and European Maritime and Fisheries Fund (EMFF)), reflecting the need and wish for stronger macro-regional cooperation among BSR countries. This includes, among others, the facilitation, on a voluntary basis of the funding of

transnational collaboration by national and regional Operational Programmes to support the activities of the EUSBSR. As a first step, pilot projects have been developed to facilitate coordinated transnational activities, although not yet in relation to water governance and ES provision (EC Directorate-General Regional and Urban Policy, 2017).

Increasing the role of intermediaries in cooperative measures

Presently, the role of the private sector, foundations and other intermediaries in financing and implementing AEMs is limited in the case-areas. The new Dutch agri-environmental programmes show that collectives can play a meaningful role as intermediaries in the coordination of the provisioning of ES at the landscape-scale and can enable increased flexibility at the farm level. Making collectives the final beneficiaries of agri-environment support allows for a simpler scheme design with room for local fine-tuning of activities and payments according to the actual situation in the field, environmental innovation and making optimal use of local knowledge (Molenaar, 2013).

In the Selke case-area, Water Maintenance Collectives presently assume an intermediary role on behalf of landowners in the implementation of water flow maintenance measures in and along the riparian zone of the Selke River in Saxony-Anhalt. An expanded role in relation to implementation of AEMs is a possibility to be explored. Experience from the Netherlands shows that the functions of previously existing social structures (producer cooperatives) can be extended to include AEMs under the RDP (Ministry of Economic Affairs, 2016) in line with the 2014 EU Rural Development Regulation (Regulation (EU) No. 1305/2013, Article 28) that introduced the option of group applications for AEM (European Parliament and the Council of the European Union, 2013a). The role of water companies and the private sector as intermediaries or financiers in future measures also merits further investigation. Water companies are able to address pollution closer to where it arises and raise money through water bills to generate revenue that can be spent on incentivizing change in agricultural practice through result-based payments, payment for set-aside land or for on-farm infrastructure investment (Brouwer *et al.*, 2003). A good example of this is the South West Water company, which provides drinking water and wastewater services in the southern UK, but also finances investments in farm infrastructure and land use management practices in upstream watersheds to improve surface water quality in drinking water supply source areas (Upstream Thinking, 2017).

The EC's proposal for the CAP beyond 2020 could result in an increased role for intermediaries, farmers and other stakeholders as it foresees a greater observance of the subsidiarity principle, greater focus on a result-driven approach and less prescriptive compliance elements. According to the proposal, MS will need to define quantified targets which will ensure that the agreed environmental and climate objectives defined at EU level are achieved, but MS will have the flexibility to formulate strategic plans addressing climate and environmental needs at local level. This approach is expected to encourage the promotion of cooperative approaches, involving farmers and stakeholders in a result-oriented delivery of environmental and climate public goods and developing schemes that integrate the provision of knowledge and environmental investments (EC, 2017b).

Pilot-testing of new concepts and measures

Central to adaptive and integrated water resource management is the explicit design of learning processes as an integral part of the policy management cycle (Pahl-Wostl *et al.*, 2007). At the

operational level, this requires a more systematic approach to pilot-testing of new concepts and measures in order to verify and increase effectiveness and cost-effectiveness before deploying as part of mainstream schemes such as the RDP and RBMP. Currently, AEMs tend to be mainly activity-based rather than result-based. The potential for result-based payments as an alternative approach is being increasingly recognized, as it has been shown that result-based schemes can improve the environmental targeting of agri-environment measures in comparison to the activity-based management prescriptions and thus can provide greater environmental benefits (Herzon *et al.*, 2018). Local pilot-testing on the ground is suggested by Berze case-area stakeholders to evaluate the environmental impact and cost-effectiveness of result-based measures over a longer period of time and under varying conditions and configurations. The EC has indicated that there is a need to further invest in demonstration projects in relation to agriculture and sustainable water management in the EU (European Commission, 2017a).

A modelling-based approach to testing and monitoring of the implementation of measures can be a viable alternative to validating the effectiveness of agri-environmental and water measures particularly in light of existing difficulties and complexities with in situ monitoring of the performance of measures. Quantifying the performance of measures at the farm level with the aid of models has been demonstrated previously in cases where measurement at the edge of fields was not practical (Matzdorf *et al.*, 2014). Similarly, modelling can be relevant for the assessment of the minimum participation level needed to ensure that, for example, water measures provide the expected environmental effects in RBMP (European Commission, 2017a).

Pilot-testing could also be used more in the RDP and RBMP to investigate complex programming issues and problem settings for specific water bodies. ES, such as water purification and flood mitigation, are delivered at landscape rather than at farm scale; therefore, measures and payments need to encourage coordinated action and collective approaches across farm boundaries (Plieninger *et al.*, 2012). Pilots on new cooperative AEMs with intermediaries such as Water Maintenance Collectives in the Selke case-area could build on existing institutional settings. To date, RDP technical assistance funds have been under-utilized and could be used more for pilot scheme and measure testing.

Case-area stakeholders indicated that existing 5-year AEM RDP and RBMP contracts are of insufficient duration to ensure the continuity and demonstrate the effectiveness of ES provision from land and water management. Long-term contracts premised on result-based measures could help to achieve and safeguard outcomes as demonstrated by the 'Florida Ranchlands Environmental Services Project' (FRESP, 2016), where a minimum 10-year contracts are foreseen. Likewise, in 'Upstream Thinking' (Upstream Thinking, 2017) in the UK, 10- to 25-year contracts are signed based on the economic life of the farm infrastructure improvements and to ensure that the improved farm infrastructure usage and specific land management practices continue even if ownership of the farm changes hands.

It is thought that a more systematic use of the ES approach in planning RDP, RBMP and FRMP for nutrient and flood risk management and the provision of multiple ecosystem benefits in the case-areas could assist in the identification of synergies and trade-offs between measures and support more effective policy outcomes. Vlachopoulou *et al.* (2014) investigated the methodological linkages between the ecosystem approach and the implementation of the WFD and found that the ecosystem approach can encourage more systematic thinking as it can provide a consistent framework for identifying shared aims and evaluating alternative water management scenarios.

Conclusions

Planning of RDP, RBMP and FRMP measures to reduce nutrient loading and flood risk in the BSR is largely characterized by a top-down process from the EU, national and regional levels by state actors and experts. Local conditions and the needs, knowledge and initiative of farmers and other state and NGO actors are not sufficiently taken into account in the planning and design of measures. Although it might be expected that the Helge and Selke case-areas in Sweden and Germany, with their different political culture and longer experience with participative governance than the Reda and Berze case-areas in Poland and Latvia, would demonstrate a higher degree of stakeholder empowerment in relation to the planning and design of measures; this, however, is not evidenced. It can be argued that in the former case-areas, greater opportunities exist to inform, consult and include stakeholders in discussions, but that, nevertheless, stakeholder participation remains essentially tokenistic in relation to decision-making. Across all the case-areas, partnership approaches, where stakeholders are fully embedded in and responsible for decisions, are lacking.

Measures remain typically focussed on the provision of single ES benefits in accordance with the objectives of the respective sectoral policy, whereas regulations and planning processes are insufficiently flexible to allow for spatially differentiated or targeted approaches taking into account local landscape variability in nutrient loading and retention capacity. The impact of measures, including the provision of multiple ES benefits, could be increased by strengthening bottom-up stakeholder involvement in the RDP, RBMP and FRMP planning processes and fostering the participation of local land managers and state and non-state environmental actors in the design and adaptation of measures to local priorities. Actions that could be initiated in this regard include:

- development of local stakeholder discussion forums for the RDP and co-planning initiatives between the RBMP, RDP and FRMP;
- strengthening cross-sectoral cooperation between ministries in the development of programmes of measures through joint planning initiatives;
- administratively and financially incentivizing local cooperative actions to increase the targeting, efficiency and effectiveness of measures.

The initiation of the above-mentioned approaches is to some degree contingent on the adoption of a less prescriptive approach to the planning and implementation of measures on the part of the EC and entrusting national and regional authorities with the flexibility to decide on how best to achieve policy objectives based on local needs and conditions. It is thought that this would help foster greater local initiative and policy innovation in the pursuit of more cost-efficient and effective policy solutions.

As the management of nutrient loading to the Baltic Sea is ultimately a shared responsibility of all BSR states, greater cooperative action is warranted, such as targeting nutrient management measures to priority BSR landscapes, catchments and sea sub-basins through joint transnational programmes of measures within the context of the EUSBSR macro-regional strategy and through the pooling of funding using ESIF (e.g. ERDF, EAFRD) instruments. At the national or regional level, better coordination and targeting of nutrient management measures could be achieved through the incorporation of a river basin-based approach or catchment sub-programme of measures within the RDP based on water management priorities identified in RBMP and FRMP. Similarly, to ensure a stable source of funding for RBMP and FRMP measures, opportunities to earmark a share of the national RDP agri-environmental budget for catchment-based management could be investigated.

The establishment of a more systematic approach to pilot-testing of new concepts and result-based measures nationally and cooperatively at the BSR level within the context of the HELCOM BSAP and EUSBSR would help verify the effectiveness of measures prior to mainstream implementation. Additionally, this would provide necessary impetus for the exploration of result-based ES schemes with differentiated payments based on the intensity of ES provision.

The application of an ES approach in the development of programmes of measures would facilitate designing measures for different policy goals and multiple ES benefits (e.g. nutrient management, flood control and climate change) and would enable the assessment of trade-offs and synergies which would help increase the cost-efficiency of measures.

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