BONUS RETURN
Reducing Emissions by Turning Nutrients and Carbon into Benefits
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Dissemination level

X	PU	Public.
	PP	Restricted to other project partners.
	RE	Restricted to a group specified by the consortium.
	CO	Confidential, only for members of the consortium.

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EXECUTIVE SUMMARY

This deliverable provides an overview of the published article “Identifying barriers and opportunities for a circular phosphorus economy in the Baltic Sea Region” (Barquet et al., 2020)

The article employs an analytical framework that merges an innovation systems perspective with elements from the socio-technical transitions literature. Combining a literature review with key informant interviews, the article finds that lack of appropriate policy steering and insufficient knowledge on the performance of technologies for reuse remain key obstacles for closing the Phosphorus loop. There are, however, opportunities from emerging from the new EU Fertiliser Regulations that are likely to level the playing field between conventional and waste-derived fertilisers. Despite some opportunities, the system appears to nevertheless be moving towards a narrow focus on a few new technologies for P recovery and reuse which could lead to new lock-ins.

1 INTRODUCTION

The degradation of the Baltic Sea is an ongoing problem, despite investments in measures to reduce external inputs of pollutants and nutrients from both diffuse and point sources. Available technological and management measures to curb eutrophication and pollution flows to the sea have not been adapted adequately to the contexts in which they are being applied. Furthermore, measures are often designed based on single objectives, thereby limiting opportunities for multiple benefits.

In addition, there is a general sense that measures to address the deterioration of the Baltic ecosystem are primarily technologically-driven and lacking broader stakeholder acceptance – the “experts” who define these measures have little engagement with industry, investors, civil society and authorities. This problem is magnified by governance and management, taking place in sectoral silos with poor coordination across sectors.

As a result, research shows that regional institutional diversity is presently a barrier to transboundary cooperation in the Baltic Sea Region (BSR) and that actions to achieve national environmental targets can compromise environmental goals in the BSR (Powell et al. 2013). The regional dimension of environmental degradation in the BSR has historically received weaker recognition in policy development and implementation locally. However, developments in recent years suggest a new trend with growing investments in environmental protection supporting social, economic, and territorial cohesion.

The BSR is an environmentally, politically and economically significant region and like other regions globally, its rapid growth needs to be reconciled with the challenges of sustainable development in a global setting that demands unprecedented reductions in GHG emissions. This poses a truly wicked problem exacerbated by the fact that many of the challenges in the BSR will also magnify in a changing climate. In order to navigate the uncertainties and controversies associated with a transformation towards a good marine environment, BONUS RETURN will enact an innovative trans disciplinary approach for identifying and piloting systemic eco-technologies.

The focus is on eco-technologies that generate co-benefits within other interlinked sectors, and which can be adapted according to geophysical and institutional contexts. More specifically, emphasis is placed on eco-technologies that reconcile the reduction of present and future eutrophication in marine environments with the regional challenges of policy coherence, food security, energy security, and the provision of ecosystem services.

1.1 Project Objectives

The **overall** aim of BONUS RETURN is to improve the adaptation and adoption of eco-technologies in the Baltic Sea Region for maximum efficiency and increased co-benefits.

The **specific objectives** of the project can be divided into six categories presented below. These categories are interlinked but for the purpose of providing a step-wise description, the following overview of each category proves useful. BONUS RETURN is:

1) Supporting innovation and market uptake of eco-technologies by:

- Contributing to the application and adaptation of eco-technologies in the BSR through an evidence-based review (systematic map) of the developments within this field.

- Contributing to the development of emerging eco-technologies that have the capacity to turn nutrients and carbon into benefits (e.g. bio-energy, fertilizers), by providing an encompassing framework and platform for rigorous testing and analysis.
- Developing decision support systems for sustainable eco-technologies in the BSR.
- Contributing to better assessment of eco-technology efficiency via integrated and participatory modelling in three catchment areas in Finland, Sweden and Poland.
- Contributing to methodological innovation on application and adaptation of eco-technologies.

2) Reducing knowledge gaps on policy performance, enabling/constraining factors, and costs and benefits of eco-technologies by:
- Assessing the broader socio-cultural drivers linked to eco-technologies from a historical perspective.
- Identifying the main gaps in the policy environment constraining the implementation of emerging eco-technologies in the catchments around the Baltic Sea.
- Informing policy through science on what works where and under which conditions through an evidence-based review (systematic map and systematic reviews) of eco-technologies and the regional economic and institutional structures in which these technologies evolve.

3) Providing a framework for improved systematic stakeholder involvement by:
- Developing methods for improved stakeholder engagement in water management through participatory approaches in the case study areas in Sweden, Finland and Poland.
- Enacting a co-enquiry process with stakeholders into opportunities for innovations in eco-technologies capable of transforming nutrients and pollutants into benefits for multiple sectors at different scales.
- Bringing stakeholder values into eco-technology choices to demonstrate needs for adaptation to local contexts and ways for eco-technologies to efficiently contribute to local and regional developments.
- Disseminating results and facilitating the exchange of learning experiences, first within the three catchment areas, and secondly across a larger network of municipalities in the BSR.
- Establishing new cooperative networks at case study sites and empowering existing regional networks by providing information, co-organizing events and engaging in dialogues.

4) Supporting commercialization of eco-technologies by:
- Identifying market and institutional opportunities for eco-technologies that (may) contribute to resource recovery and reuse of nutrients, micro-pollutants and micro-plastics (e.g. renewable energy).
- Identifying potential constraints and opportunities for integration and implementation of eco-technologies using economical models.
- Facilitating the transfer of eco-technologies contributing to win-win solutions to multiple and interlinked challenges in the BSR.
- Linking producers of eco-technologies (small and medium enterprises – SMEs), to users (municipalities) by providing interactive platforms of knowledge exchange where both producers and users have access to BONUS RETURN's envisaged outputs, existing networks, and established methodologies and services.

5) Establishing a user-driven knowledge platform and improved technology-user interface by:
- Developing an open-access database that maps out existing research and implementation of eco-technologies in the BSR. This database will be intuitive, mapped out in an interactive geographical information system (GIS) platform, and easily managed so that practitioners, scientists and policy-makers can incorporate it in their practices.

- Developing methodologies that enact the scaling of a systemic mix of eco-technological interventions within the highly diverse contexts that make up the BSR and allows for a deeply interactive medium of knowledge.

1.2 Project Structure

BONUS RETURN is structured around six Work Packages that will be implemented in three river basins: The Vantaanjoki river basin in Finland, the Słupia river basin in Poland, and Fyrisån river basin in Sweden.

Work Package 1: Coordination, management, communication and dissemination.
Work Package 2: Integrated Evidence-based review of eco-technologies.
Work Package 3: Sustainability Analyses.
Work Package 4: Environmental Modelling.
Work Package 5: Implementation Support for Eco-technologies.
Work Package 6: Innovative Methods in Stakeholder Engagement.

1.1 Deliverable context and objective

The current deliverable 6.6 is part of WP 6. The objectives of WP 6 are to:

"serve as the platform to enable a co-enquiry process between stakeholders and the project. At the regional level the 40 municipalities connected to the Race for the Baltic will act as a sounding board to provide input to the EBR in WP2. Stakeholder platforms will be established at the case study sites to support the identification of eco-technologies for analysis in WP3, WP4 and WP5. These platforms will serve as opportunities to further test, develop, adapt and use the eco-technologies based on the assumption that their effectiveness depends on context, as defined by institutional, economic, social and bio-physical barriers and opportunities. WP6 will thus contribute to understanding historical drivers, policy instruments and governance structures and local needs with regards to implementation of the selected eco-technologies in the three case study sites. WP6 will be responsible for developing and facilitating an innovative game system, using the empirical materials generated throughout the project to support the co-learning environment and more specifically mediating the interactions and critical reflection between the WPs and between the project and stakeholders"

The purpose of Task 6.5 of which this deliverable is part is to carry out "a policy analysis to assess the broader policy environment linked to eco technologies assessed in (T3.3). The analysis will focus on the institutional barriers and opportunities in the implementation process of eco technologies for improved marine ecosystems. Particular focus will be on the broader policy environment to identify systemic decision support for development of eco technologies in the Region"

1.2 Outline of the report

This report presents the main conclusions from the article published in Water Research in January 2020.

2 IDENTIFYING BARRIERS AND OPPORTUNITIES FOR A CIRCULAR PHOSPHORUS ECONOMY IN THE BALTIC SEA REGION

The paper combined and synthesized findings from published research and key-informant interviews. Synthesis of data collected from interviews and literature was conducted using principles of framework synthesis. A total of 29 articles were screened and supported by interviews with 10 key stakeholders. Data extraction was carried out following an analytical framework, which merges an innovation systems perspective with elements of socio-technical transitions to produce what we refer to it as a multidimensional framework for the analysis of barriers and opportunities.

The multidimensional framework consists of seven analytical dimensions designed to capture barriers and opportunities towards a transition. The dimensions include: 1) physical, financial and institutional structures; 2) coordination of processes and system components; 3) interactions between actors via exchange of information and resources; 4) directionality and common vision; 5) actor's capabilities to monitor, learn and act upon knowledge; 6) their values and worldviews; and 7) the system's ability to clearly articulate problems or opportunities, anticipate and act upon them.

Results of barriers and opportunities for development and uptake of innovative technologies to close the P-loop in the BSR are then put in the context of the three overarching themes: 1) innovations for generating nutrient-rich material for reuse; 2) markets for the uptake of P-rich material; and 3) food production and consumption.

The article can be freely accessed at the journal of Water Research through this link:
https://www.sciencedirect.com/science/article/pii/S0043135419312102

3 REFERENCES

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