Nature Based Solutions and Mitigation Measures
IBZ: Integrated BufferZones
RW: Riparian Wetlands
CW: Constructed Wetlands
BS: Buffer Strips

_____

Deliverable title: Final portfolio of NBSs and MMs
Deliverable number: D5.1
Work Package number: WP5
Due month: M8
Delivery date: 30th April 2023 (M8)
Dissemination level: Public
Lead beneficiary: Aarhus University (AU)
Beneficiaries: All partners in NORDBALT-ECOSAFE
Authors: Katrin Bieger (AU), Brian Kronvang (AU), Anne-Grete Buseth Blankenberg (NIBIO), Katarina Kyllmar (SLU), Pasi Valkama (SYKE), Ainis Lagzdiņŝ (LLU), Mikołaj Piniewski (SGGW)

Introduction

The main objective of WP5 is to foster the implementation of innovative Nature Based Solutions (NBSs) and mitigation measures (MMs) in the Nordic-Baltic region of Europe to reduce diffuse nutrient losses from agriculture and forestry under current and future climate conditions and stay within safe ecological boundaries in different water bodies (rivers, lakes, marine waters) under special consideration of stakeholder preferences. The Nordic-Baltic region has a long tradition of developing and testing different mitigation measures within agriculture and forestry. It is therefore well-suited for the development of a novel decision-support tool guiding river basin managers and stakeholders in the selection of the most effective NBSs and MMs for reaching the required nutrient load reductions and their optimal placement in a river basin. The first step in the development of such a tool and thus the first task in WP5 was to identify the NBSs and MMs that are most well-established in the Nordic-Baltic region and compiling them in a NBS and MM portfolio.

NBS and MM portfolio

The portfolio includes the 33 most common and well-established NBSs and MMs in the Nordic-Baltic region as identified from national catalogues, reports, and river basin management plans in the six countries represented in the project, the recent international literature, and stakeholder perceptions and preferences. The measures are classified in three groups, agricultural/forest management measures, transport control measures, and in-stream measures. The first group, the agricultural/forest management measures, includes the largest number of NBSs and MMs, as preventing and reducing nutrient pollution at the source is the foundation to managing water quality and transport control and in-stream measures cannot function efficiently if they are overloaded by nutrients or water flows.
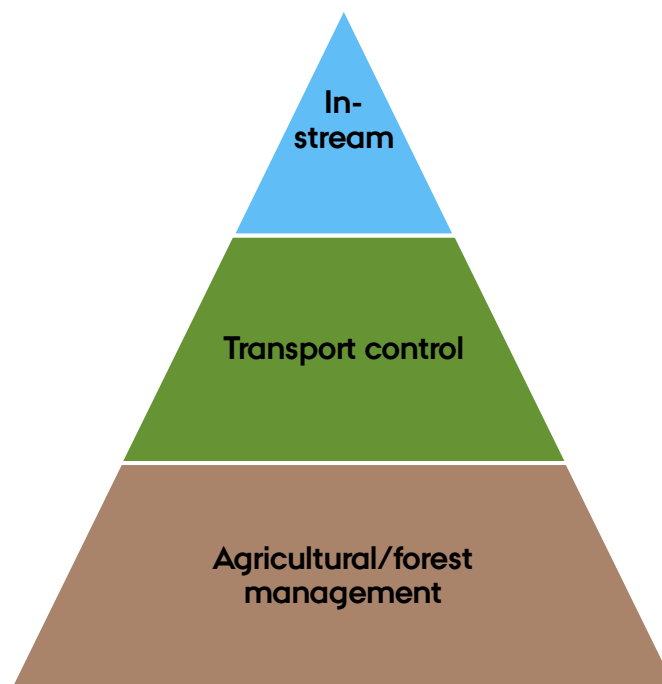

Figure 1: The three groups of NBSs and MMs included in the NORDBALT-ECOSAFE portfolio

	Denmark	Norway	Sweden	Finland	Latvia	Poland
Field mitigation measures						
Crop rotation					x	x
Catch crops and intermediate crops	x	x	x	x	x	x
Early seeding of winter crops	x					x
Permanent set aside	x		x	x		x
Set aside in rotation	x		x	x	x	x
Permanent grassland, meadows, and pastures					x	x
Energy crops	x		x		x	x
Afforestation	x		x			x
Reduced tillage and direct seeding	x	x	x	x	x	x
Reduced tillage - no tillage in autumn		x	x	x		x
Mulching						x
Subsoiling						x
Application of gypsum or structure lime			x	x	x	x
Precision fertilization (fertilizer & manure)	x	x	x	x	x	x
Reduced fertilizer use	x				x	x
Nitrification inhibitors to slurry	x					
Manure application regulations			x		x	x
Limits for N- and P-use in manure	x		x			x
Transport mitigation measures						
Surface constructed wetlands	x		x		x	
Restored wetlands	x	x	x	x	x	x
Bioreactors with wood chips	x			x		
Controlled drainage	x		x	x		x
Inundated meadows with drainage water	x					
Paludi cultures	x			x		x
Buffer strips with grass or trees	x	x	x	x	x	x
Integrated and Saturated Buffer Zones	x					
Grassed waterways		x	x			x
Grass cover/no tillage in areas with high flood and/or erosion risk		x	x		x	x
In-stream mitigation measures						
Constructed wetlands	x	x	x	x	x	x
Sedimentation ponds in forests		x	x	x		x
Re-meandering of river channels	x	x	x			x
Two stage ditches and channels	x		x	x		
Stream bed re-naturalization						x

Figure 2: Final portfolio of NBSs and MMs for the Nordic-Baltic region

Outlook

Based on the NBS and MM portfolio, NORDBALT-ECOSAFE will develop a comprehensive, yet concise classification framework considering various factors that are essential for selecting, designing, and evaluating a particular measure under consideration of location, multifunctional benefits, and potential disservices. Furthermore, a factsheet will be developed for each measure. The classification framework will be an integral part of a novel management support system for selection and placement of NBSs and MMs within catchments based on geo-spatial analysis tool and SWAT+ outputs, which will be developed and tested in the six NORDBALT-ECOSAFE demonstration river basins. The river basin management support system will assist in discussions of future solutions with stakeholders in river basins and thereby support river basins managers and stakeholders in reaching ecologically safe concentrations and loadings for water bodies.