OPTAIN

Optimal Strategies to Retain Water and Nutrients

D6.2: Legislative recommendations for future harmonisation of water and agricultural policy on local, regional, national and EU level

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Summary

The overall aim of OPTAINs deliverable D6.2 is to derive general and specific recommendations for policy and legislative implementation at different levels to support the future harmonisation of water and agriculture policy, and better balance among different levels of governance. To complete the aim, we firstly analysed policy arrangements and focal policy gaps in the in-depth cross-sectoral survey that included a combination of closed and open-ended questions. The survey included 144 relevant stakeholders, i.e. stakeholders that work on policy making and or policy implementation from 12 countries, situated in three different biogeographical regions (BGR) (Boreal, Continental and Pannonian). Secondly, we identified for each OPTAIN case study country the governance structure for management of water, nature and agriculture (agricultural catchments) by means of literature search and key informant interviews. Accessibility to informants was severely affected in specific environments by the period of the research (winter 2021/2022), when the COVID-19 epidemic was in full swing. In some case studies, the informants were thus not available. In others, CS leaders fell ill. We mitigated this by adjusting and extending the period of the research.

Implementers of measures addressing sustainable solutions for water and nutrient retention should be given generous financial support while implementing the measures is subject to additional training.

When including the measure (voluntary or mandatory) in the program for implementation, the authorities should also foresee implementing educational events and awareness-raising campaigns among key stakeholders.

In order to improve cooperation and achieve policy coordination as quickly as possible, the individual community should define and decide on shared priorities. This would give strategy makers a clear signal and direction for coordination.

Policy and legislation documents should be upgraded to improve the uptake/implementation of water and nutrient retention measures with appropriately targeted financial support, accompanied by informal education (demonstrations, workshops) of the broadest possible population, with administrative simplifications and active help to shorten the time of procedures in the placement and implementation of measures.

It is necessary to actively and professionally advise the stakeholders on implementing the measures, educate them practically by demonstrating good practices, regularly perform measurements, analyse them and provide feedback on the results for possible adjustment of practices.

Authorities should improve the visibility and position of individual sectors and topics in spatial planning legislative documents. This is especially important for landscape water retention in relation to agriculture and water management.

To a large extent, there is a lack of a comprehensive solution for water surplus in all three studied biogeographical regions, where the Boreal and Continental regions stand out. Comprehensive solutions for water scarcity are most needed in the Pannonian and Continental regions. This means that authorities should invest in comprehensive, integrated catchment analysis (under WFD RBMP) and, in cooperation with all sectors,

define potential locations and the required extent of the water retention measures that would mitigate climate change impacts and support adaptation of affected sectors.

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Abbreviations

BSAP	Baltic Sea Action Plan
CAP	Common Agricultural Policy
CS	Case Study Site
CSL	Case Study Leader
CWE	Common Working Environment
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EFA	Ecological Focus Areas
EU	European Union
GAEC	Good Agricultural and Environmental Condition of land
GHG	Greenhouse Gas
IDEFO	Icam DEFinition for Function Modelling
MARG	Multi-Actor Reference Group
MS	Member State
NAP	National Adaptation Plans
NAS	National Adaptation Strategies
NDS	Nationally Determined Contributions
NSWRM	Natural/Small Water Retention Measures
NVZ	Nitrate Vulnerable Zone
RBMP	River Basin Management Plans
RDP	Rural Development Programmes
SAC	Special Areas of Conservation
SMR	Statutory Management Requirements
SPA	Special Protection Areas
WFD	Water Framework Directive
WP	Work Package

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1 Introduction

1.1 Background

The OPTAIN project aims to increase the knowledge and understanding of multiple benefits that spatially targeted combinations of Natural/Small Water Retention Measures (NSWRM) have on managing small agricultural catchments (Figure 1.1). Better management of landscapes that mitigates the amount of surface runoff from the catchments and impairing agricultural production is important and has significant environmental and socio-economic impacts across all biogeographical regions of Europe. An important goal of OPTAIN is therefore to determine the conditions under which NSWRM perform most effectively. Moreover, the project aims at increasing the acceptance and better implementation of NSWRM. To support NSWRM mainstreaming the deliverable D6.2 under the WP6 analyses policy and governance conditions under which the NSWRM are implemented to proposes legislative recommendations for future harmonisation of water and agricultural policy on local, regional, national, and EU level.

Integration and synthesis of the project results across all WPs and case study sites (CSs) will be done in WP6. As a core input, WP6 uses the most relevant NSWRM that were chosen by the Multi-Actor Reference Groups (MARGs) in each CS and whose most efficient combinations will be identified by simulated scenarios (WP4) and optimization (WP5) modelling and the MARGs. Based on this essential information, WP6 will mainstream water and agricultural policies impacting small agricultural catchments. Related to this work, WP6 is also responsible for policy analysis and provides recommendations for supporting mainstreaming of measures in policies and promotion to support the implementation of NSWRMs. A cross-catchment analysis of the physical, environmental and economic effectiveness of NSWRM and their combinations across various spatial conditions in different European biogeographic, pedo-climatic regions and agricultural systems of interest will represent the core of OPTAINs synthesis (upcoming deliverable D6.3). D6.3 will support the development of harmonised incentives and their synchronisation with UN Sustainable Development Goals.

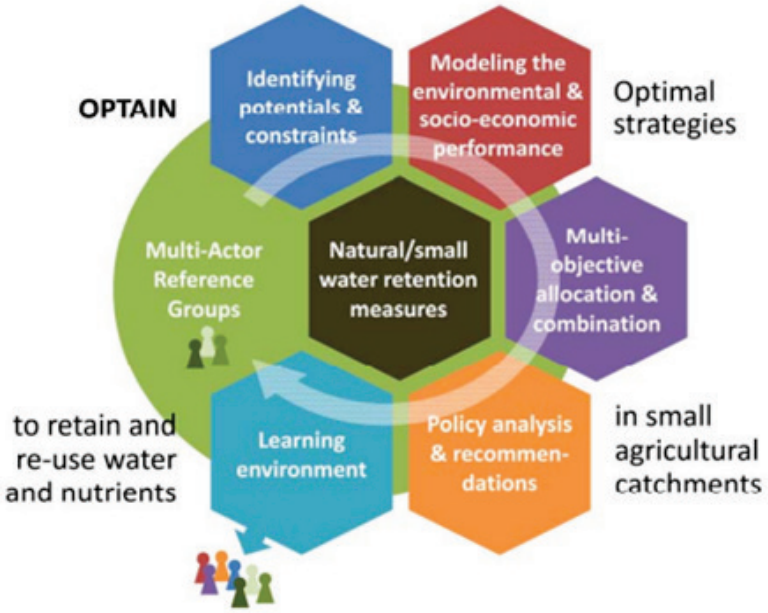


Figure 1.1: Illustration of the OPTAIN project work packages. WP6 will provide policy analysis and recommendations based on integration and synthesis of results from WP1-WP6.

1.2 D6.2 aim, objectives, and main structure

The water and agricultural policy sectors are broad and diverse on every level of governance (local, regional, national, EU), with fragmented responsibility, amongst several policymakers at different levels. The overall aim of D6.2 is to derive general and specific recommendations for policy and legislative implementation at different levels to support the future harmonisation of water and agriculture policy, and better balance among different levels of governance. As part of this, an overview of the agro-environmental governance and policy arrangement situation across twelve countries in Europe was provided. This step provides the ground for the analysis and identification of important governance and policy gaps for mainstreaming and supporting an effective implementation of NSWRM. This will also enable to identify the best possible applications of these recommendations in strategies for agricultural climate change mitigation and adaptation.

Objectives of D6.2 were to:

(i) Analyse policy arrangements and focal policy gaps in-depth cross-sectoral survey. The survey included a combination of closed and open-ended questions with relevant stakeholders, i.e. stakeholders that work on policy making and or policy implementation in each case study country.

(ii) Identifying for each OPTAIN CS county the governance structure for management of water, nature and agriculture (agricultural catchments) by means of literature search and key informant interviews. The boundaries for this system description are the main European and national and decentralised agriculture, water, and climate legislation and policies.

Based on the desktop research and the survey, the D6.2 presents recommendations for EU focal strategies and programmes of measures such as the Common Agricultural

Policy (CAP), Water Framework Directive River Basin Management Plans (WFD RBMP) as well the EU Adaptation Strategy, National Adaptation Strategies (NAS) and National Adaptation Plans (NAP) to cope with climate change impact.

The D6.2 main structure is following: Chapter 2 presents the conceptual and analytical approach to achieve the overall aim of D6.2. Next, Chapter 3 provides the desktop research on policy impact, interlinkages and coherence. It was used as the baseline for defining the focus of the policy and governance arrangements analysis. Based on the data collection approach described under the methods and materials (Chapter 3), Chapter 4 presents the results of data analysis of primary governance and policy challenges for mainstreaming NSWRM as seen by the informants. Chapter 5 provides discussion and recommendations. Here we draw on the main literature review findings to support and explain the challenges to NSWMR mainstreaming and link them to specific policy and governance arrangement in the CS. To conclude, Chapter 6 presents policy brief on key lessons learned and final legislative recommendations. Annexes are provided at the end of the report to support the main findings and legislative recommendations.

2 Conceptual approach

This chapter introduces the conceptual framework for the WP on policy analysis and recommendations. Section 2.1 presents the common working environment for the project representing the conceptual approach for harmonising approaches cross project tasks and case studies. The purpose of section 2.2 is to present the main EU policies being addressed in the policy analysis. Section 2.3 explains the theoretical approach to the analysis of policy gaps and compatibility issues.

2.1 Common Working Environment

The conceptual approach of the D6.2 embedded within the OPTAIN project under region-specific guidelines and incentives is based on the Common Working Environment (CWE) that provides a framework for integrating the knowledge produced. Specific information (stakeholder platform, measures and indicators, physical data on catchment characteristics, integrated modelling, optimisation of solutions, policy arrangements) required by WPs and gathered on the CSs level (horizontally) and will be linked across WPs (vertically) as illustrated by Figure 2.1. Key results of WPs 1-5 will be integrated into a CWE platform allowing project partners to extract information that can be used or linked for further work on the project. This allows WP6 (project synthesis & policy recommendations) and WP7 (learning environment) to extract, compare, integrate efficiently, and present information on the level of CSs or biogeographical regions.

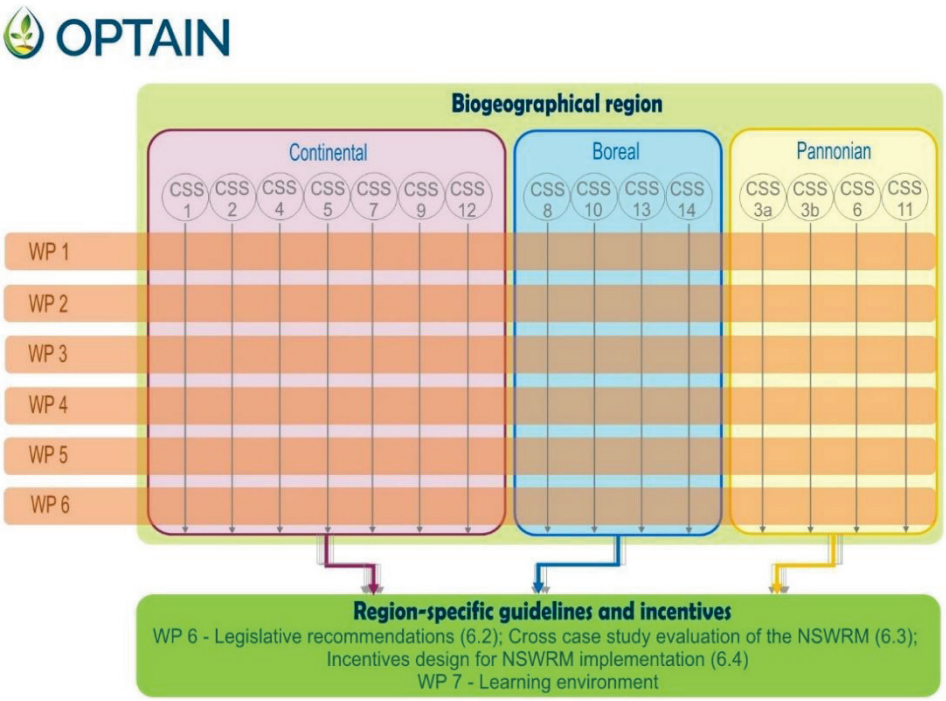


Figure 2.1: Schematic representation of a common working environment (CWE).

For better illustration, the IDEF0 diagram (Figure 2.2) presents input and output deliverables and all interconnections between WP6 tasks. Cross WP and cross CSs analyses are enabled by harmonising tools, data, and process workflows (EC, 2020d). This

figure illustrates the fundamental situation of D6.2 for understanding water and agriculture policy and governance arrangements, including insight into climate adaptation strategies. Understanding the legislative framework in the different CSs will, combined with identified measures characteristics, integrated modelling and multi-objective optimisation in each CSs, enable us to prepare guidelines for the optimal implementation of NSWRM measures (D6.3). Following the ISO 21500:2012 Guidance on Project Management, the Icam DEFinition for Function Modelling (IDEF0) is used as a tool to enable harmonisation, where the database will provide possibilities for cross-CSs analysis (Task 6.3). This will ensure that measures will be as much as possible viable for practical implementation from economic, time management and policy perspectives and will be based on based on Sustainable Development Goals (task 6.4). In this context the WP6.2 will serve as an input to identifying relationships among entities that connect both water and agriculture policies. Meaningful synthesis of individual WP outputs (WP1-WP6) under the WP6 will be ensured through CWE with standardised metadata.

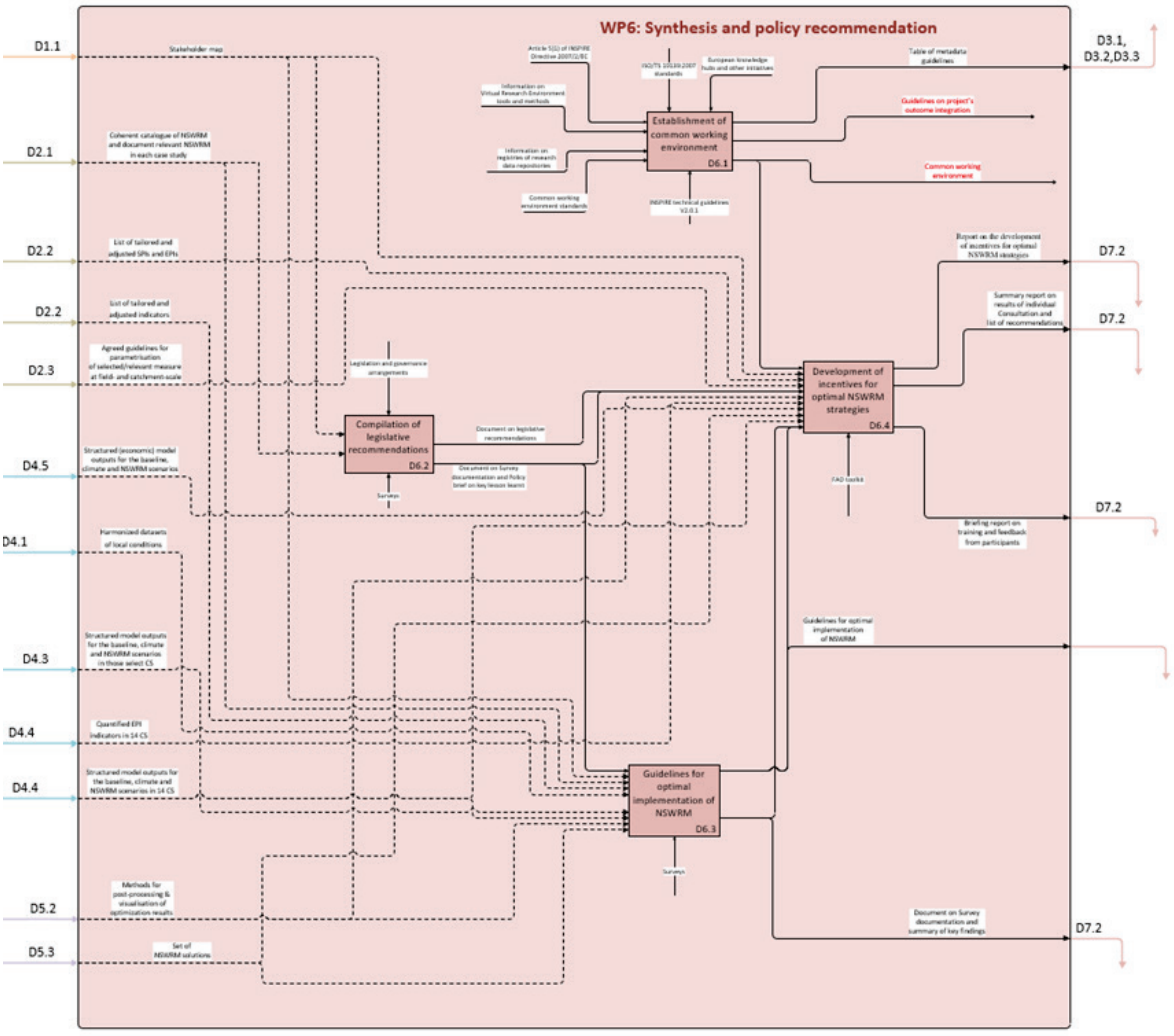


Figure 2.2. WP6 Icam DEFinition for Function Modelling (IDEF0) diagram.

2.2 The project policy domain area

This section presents the main EU policies and strategies to support the water – energy – climate nexus addressed in this report. This includes the Common Agricultural Policy,

the Water Framework Directive, the Nitrate Directive, the Natura 2000 and the Paris Agreement. These policies and their underlying programmes were included in analysis of important governance and policy gaps for mainstreaming and supporting an effective implementation of NSWRM under the D6.2.

The common agricultural policy (CAP) spanning over a six-decade that was launched by the European Commission (EC) in 1962 to support farmers and ensure food security in Europe. The CAP specifies several main objectives including income support for farmers, improving agricultural productivity and ensuring stable food supply, climate change mitigation, sustainable management of natural resources, and maintaining rural areas, landscapes and the rural economy across the EU. The strategy for reaching these objectives is addressed by CAP pillar I 'Income support', and CAP pillar II 'Rural development'.

CAP Pillar I 'Income support' consists of mechanisms for payment schemes, and for sustainable agriculture. The payment schemes include basic payment for farmers according to the area farmed (not its output), and an optional payment scheme for small and medium sized farmers operating in areas of natural constraints. The policy mechanisms to promote sustainable agriculture, includes, (i) EU standards on good agricultural and environmental condition of land (GAEC), (i) incentives for "greening" by means of direct payment to farmers, and (iii) cross compliance mechanisms:

(i) The GAEC standards are designed to prevent soil erosion, maintain soil organic matter and soil structure, maintain permanent grassland, and protect biodiversity and retain landscape features, and protect and manage water quality and quantity.

(ii) The green direct payments are provided to farmers if they comply with mandatory practices that benefit the environment (soil and biodiversity in particular), referring to the following three main practices: (a) crop diversification, (b) maintaining permanent grassland and (c) dedicate 5 % of arable land as beneficial for biodiversity; and includes ecological focus areas (EFA), for example trees, hedges or land left fallow that improves biodiversity and habitats.

(iii) The cross-compliance mechanism imply that farmers receiving CAP support have to respect GAEC standards and the statutory management requirements (SMR). The SMR include EU rules on public, animal and plant health animal welfare; and the environment, linking to Nitrates Directive, the Birds Directive, and the Habitats Directive.

CAP Pillar II aims to strengthen the social, environmental and economic sustainability of rural areas by means of rural development programmes (RDPs). The RDPs are co-financed by national budgets and may be prepared on either national or regional basis. The EU approves RDPs, while national and regional authorities handle the selection of projects and granting payments. Each RDP must aim to achieve minimum four out of six European Agricultural Fund for Rural Development (EAFRD) objectives, for example knowledge transfer and innovation, resilient economy, shift towards low-carbon sectors, preserving ecosystems. When developing the RDP countries select from a 'menu' of 20 broad policy measures, such as investments in physical assets, Agri-Environment-Climate Measures, organic farming, Natura 2000, and Water Framework Directive payments. These are further broken down into more specific sub-measures (predefined

by the EC). The CAP was reformed in 2021. The new legislation is in force from 2023 with the aim of a fairer, greener and more performance-based CAP.

The Water Framework Directive (WFD) 2000/60/EC established a framework for water protection including surface and ground waters across the EU. The WFD aims to achieve a good ecological and chemical status of the water bodies based on a set of indicators, including to preserve and prevent decline in water quality. This requires data collection and monitoring of the water bodies' status. A key feature of the WFD is the establishment of RBMPs, which define measures to reach the environmental objectives in the river basin. The RBMP include economic analysis, governance situation and legal requirements for water management. The WFD also requires public participation and stakeholder engagement in all stages of the planning processes, although the approach to such participation is up to the member states. For water quality threshold values, the WFD refers to another directive on Environmental Quality Standards, but not other directives such as the Nitrate Directive (see below). The WFD has a broad set of objectives and does not include any funding mechanisms or incentives for the measures, which are up to member states' discretion and implementation of the directive.

The Nitrates directive (ND) was adopted in 1991 with the aim of reducing and preventing pollution to water by nitrates from agricultural sources in the EU. The directive requires member states to identify Nitrate Vulnerable Zones (NVZs) which are areas where nitrate concentrations in waters are or are likely to become (if no action is taken) more than 50 mg/l. In these zones, action programmes with special measures to reduce nitrogen pollution are implemented, including for example limits to fertilizer and livestock manure application, extra application limitations under wet conditions and near watercourses. Alternatively, member states can choose to apply national action programmes to their whole territory instead of identifying NVZs. Either way, there should also be put in place voluntary codes of good agricultural practices that apply nationally. Assessment and monitoring of the situation is also required to be reported every four years, including nitrate concentration in ground and surface waters, eutrophication, estimated future trends and revision of the NVZs and action programmes.

Natura 2000 is a network of protected areas for nature and biodiversity conservation across the EU, covering 18 % of land areas and 8 % the marine territory (EU, 2018). The areas are defined according to the EU Birds Directive and Habitats Directive. The objective of the 1979 Birds Directive is to protect wild birds and their habitats, and requires MS to designate Special Protection Areas (SPA) for endangered and vulnerable species. The 1992 Habitats Directive implements the Bern Convention on nature conservation in the EU, and includes more than 1000 species and 200 habitat types that require different levels of protection. The Habitats Directive requires member states to identify Special Areas of Conservation (SAC) that are selected following certain criteria and representing habitat types in different biogeographical regions. The SACs and the SPAs together make up the Natura 2000 network of protected areas where conservation measures and sustainable management is implemented. However, many of the areas are privately owned and human activities are not well regulated. The guidance for management of Natura 2000 sites include agricultural practices, as around 40 % of the sites are on farmland (EU, 2018). The CAP, and especially pillar 2 - the EAFRD is seen as a key funding source for conservation management and socio-economic development of Natura 2000 farmland areas.

The Paris agreement is the first universal, legally binding international treaty on climate change adopted at COP21 in 2015 and ratified by the EU in 2016. The aim is to prevent global warming reaching more than 2°C, and preferably below 1.5°C compared to pre-industrial temperature levels. The parties to the agreement are required to submit and review national climate action plans called Nationally Determined Contributions (NDCs) every five years, and to monitor and report on their progress. In addition to greenhouse gas emission reductions, the Paris agreement concerns climate adaptation and international collaboration. The current NDC of the European Union was submitted in 2020, committing the member states to an emission reduction target of at least 55 per cent by 2030 compared to 1990 levels. This target is in line with the European Green Deal and the policy objectives of the EU 2030 climate and energy framework. The rules for planning and monitoring the progress toward the climate targets are adopted under the EU Regulation on the Governance of the Energy Union and Climate Action (EC, 2021c), requiring member states to submit national energy and climate plans and national long-term strategies.

2.3 Approach to the analysis of policy gaps and compatibility issues

The OPTAIN project proposes a social and scientific journey towards the increase and better understanding of the multiple benefits of NSWRMs. These measures have been identified as a strategy for reaching agri-environmental policy objectives including good water quality, balanced water quantity, protection of natural resources, and adapting and climate change adaptation and mitigation. A policy can be defined as a set of ideas, rules, a strategy or an action plan adopted by an institution or organization. State governments and institutions develop policies in the form of laws, regulations, procedures, administrative actions, incentives and voluntary practices. The outcome of a policy however, is dependent on how the policy is specified or negotiated, how it is interpreted, implemented and enforced by different sectors and actors (Howlett & Ramesh, 2014). Policy coherence can be defined as "systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the agreed objectives" (OECD, 2016).

In D6.2, we analyse gaps and barriers for the uptake and adoption of NSWRM by classifying informants' perspectives and opinions of the policy situation focusing on the *governance* i.e. (i) the legislation; (ii) integration and coherence of sectors; and (iii) administrative capacity, competence and knowledge, and, focusing on the *policy instruments* referring to implemented incentives promoting end-user uptake. The policy instruments addressed include (i) funding schemes; (ii) technical infrastructure and support; and (iii) awareness, and communication efforts. These concepts are further elaborated and defined below, and summarised in Figure 2.3.

Considering the governance situation, where governance can be defined as the processes of governing undertaken by formal or informal institutions or organizations, by means of laws, rules, norms or language (Bevir, 2012), i) insufficient legislation refers to lack of or incompatible rules. This has been addressed in several publications related to agri-environmental policies on EU level (EC, 2017; European Court of Auditors, 2021), and is a significant barrier for policy implementation. Typically, sector specific legislation is developed reflecting the sector's objectives, priorities and competences. Several authors emphasise the need to strengthen connections to environmental and societal holistic objectives (Nilsson et al., 2012). Specialised sectors are structured to handle their

specific responsibilities and areas of expertise well, but strictly structured pillars of governance or "silos" can be problematic when it comes to cross-cutting policy issues (Howlett & Ramesh, 2014; Peters, 2015).

Strictly structured pillars of governance have the tendency to result in ii) insufficient, integration and coherence of actors, which refers to institutional actors across sectors on administrative levels from national to regional and local, and their priorities (Metz et al., 2020). Both regulatory and market-based approaches require enforcement, which in turn requires effective monitoring systems and administrative and legal apparatuses to ensure compliance.

The third governance aspect iii) insufficient administrative capacity, competence and knowledge concerns the ability of governments to efficiently implement preferred choices of action (Davis, 2000; El-Taliawi & Van Der Wal, 2019; Wu et al., 2015). The administrative capacity is defined as the ability of the government to manage its human and physical resources to deliver on its objectives (Painter & Pierre, 2005).

Policy instruments here mean the incentive for end-user adoption of NSWRM, which is ultimately decisive for the policy implementation and impact (Gouldson et al., 2008). It is common to separate between regulatory instruments, economic instruments and informational /educational instruments (Bemelmans-Videc et al., 1998). Regulatory instruments refers to the control of activities, generally defining standards under threat of penalty or sanctions (control). Economic instruments are often market-based in the sense that they influence indirectly the quantitative supply and demand decisions through altered cost-price relations, to render certain practices or actions either less expensive (positive incentives, subsidies) or more expensive (taxation, fees) in terms of money, time or effort. This also includes cross-compliance instruments where economic incentives such as subsidies are conditional depending on implementation of specific measures or practices. Information /education as an intervention tool aims at convincing actors to carry out actions voluntarily. Information is also necessary for the use of other policy instruments, including informing the public about the intervention tools' existence, purpose and availability, and can constitute databases, experiences and instruments (Bemelmans-Videc et al., 1998; Gouldson et al., 2008).

The aspects analysed in this context regarding policy instruments are:

(i) Funding schemes, relating mainly to economic instruments as described above.
(ii) Technical infrastructure and support for implementing various measures and actions by farmers.
(iii) Awareness and communication efforts relates to the informational and educational types of policy instruments.

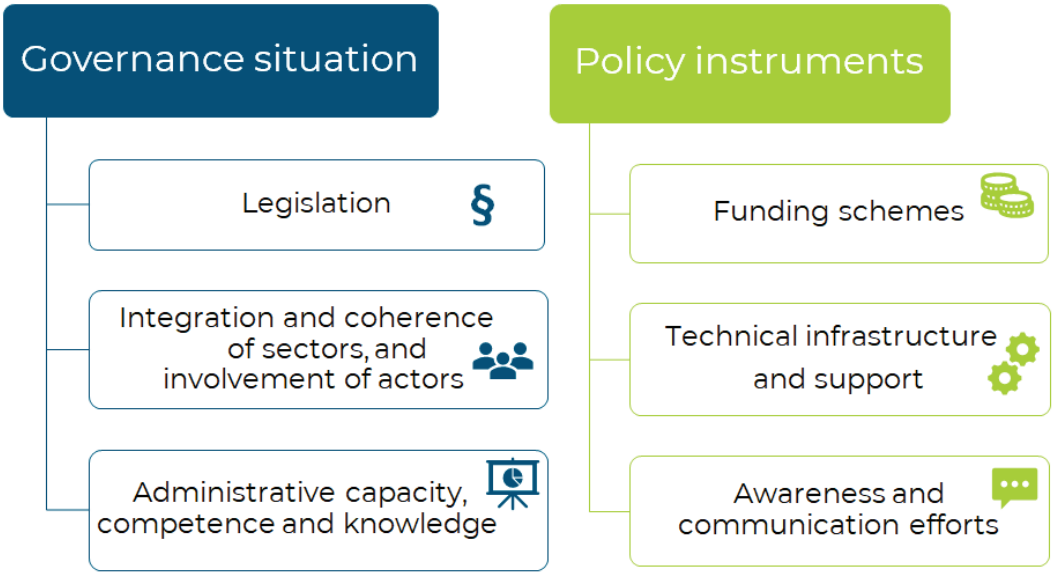


Figure 2.3: Main aspects used to analyse gaps and barriers for the uptake and adoption of NSWRM by classifying informants' perspectives and opinions of the policy situation focusing on the governance and policy instruments.

3 Methods and materials

3.1 Desktop research on policy impact, interlinkages and coherence

Desktop research presents the findings on the impact of the water and nutrient retention policy in agricultural catchments (section 3.1.1.), followed by the interlinkages within the policy (3.1.2) and the policy coherence (3.1.3). The last section discusses tools and techniques for integrating environmental objectives of water and nutrient retention in agricultural catchments into policy and practice (3.1.4). Desktop research was conducted to support the structuring of the approach to data collection for studying the agro-environmental governance and policy arrangement situation across twelve European countries within the D6.2 (section 3.3). The findings of the desktop research on policy efficiency and coherence are integrated into the discussion of the relevance of governance and policy gaps to derive general and specific recommendations for more efficient mainstreaming of NSWRM.

3.1.1 Impact of the water and nutrient retention policy in agricultural catchments

Chapter 3.1.1 addresses the impact of water and nutrients retention policy in agricultural catchments. The chapter is structured thematically into four topics, starting with water quality, followed by water quantity and climate change. The first three sections have a distinct structure, firstly providing the topic policy and the main measures and mechanisms for policy implementation, followed by the main findings of the policy implementation reports. Finally, the expected policy outcomes were analysed through research on policy impact (Figure 3.1).

Figure 3.1: Approach to addressing research on policy impact in an agricultural catchment.

3.1.1.1 Water quality (nutrient recovery, plant uptake)

Policy targeting agricultural pollution prevention (points source and diffuse) in agricultural catchments to safeguard or improve water quality in surface water bodies is based on several regulations that provide environmental standards for water quality protection:

- The Drinking Water Directive (DWD, 75/440/EEC),
- The Groundwater Directive (80/68/EEC),
- The Nitrates Directive (ND, 91/676/EEC),

- The Sustainable Use of Pesticides Directive (SUPD, 2009/128/EC),
- The Urban Wastewater Directive (UWWD, 98/15/EC), and
- The Integrated Pollution Prevention Control Directive (IPPC, 96/61/EC).

The policy mechanisms to support regulation implementation are mainly incentives based on codes of practices supported by voluntary measures financed on the farm level through CAP. This is evaluated at the EU level. The status is summarised at the level of water bodies, river basins, member states, and the EU, and is reported in national and European Commissions reports. At the EU level, a report on the implementation of Council Directive 91/676/EEC (EC, 2021e) is an example.

A meta-analysis reviewed practically all measures for limiting agricultural diffuse nitrates pollution, and the most effective turned out (i) input control, (ii) adjustment of type and/or crop rotation, (iii) growth of cover crops, (iv) minimum tillage and surface mulching, and (v) nitrification inhibitors. Riparian zone buffers, buffer strips, and hedgerows of, for example, green wind-breaks as linear close-to-watercourse green infrastructure showed varied efficiency in terms of limiting nitrates pollution. However, they showed to be highly efficient in limiting pesticides drift towards watercourses, improving micro-climate, contributing to biodiversity to support integrated pest management and to some extent help mitigate greenhouse gases acting as a CO_2 sink. The linear riparian forest along the water courses is considered a nature-based solution that provides multiple ecosystem services and is therefore vital despite its slightly modest contribution to protecting or improving water quality (Oenema et al., 2018). CAP, State Aid and for example INTERREG systematically support the measures mentioned above.

Although there was a definite positive policy impact on improving water quality by implementing the above measures to limit pollution at the source in the last 30 years (EC, 2021) (target 50 mg NO_3^-/l for drinking water), ecosystem recovery takes decades or centuries after limitations are adopted (Kim et al., 2020). Therefore, more advanced measures need to be applied to further improve water quality (EC, 2021e) not only to meet the drinking water quality standard, but also to reach higher environment protection standards. For example, in some agricultural catchments the target is as high as 9.2 mg NO_3^-/l in water as a high limit for amphibians.

An integrated nutrient management action plan recently announced by the EC will help to coordinate the efforts across sectors and scales (EC, 2021). The river basin management plans that are being prepared to support the implementation of the WFD recognise the need to implement more advanced measures than the most efficient ones that are in place already to improve environmental parameters to support the biodiversity directive further. In this context, the mandatory land-use measures that mainstream crop change, land management change, and limit cattle production will need to be implemented as a baseline solution to improving and safeguarding the water quality.

To keep up with the policy implementation focus, there is a high need to establish ecosystem-based nutrient management plans (Murry et al., 2019). Additionally, it is essential continuing voluntarily policy measures that are currently the main instrument that encourages meaningful engagement, building trust and equity, and facilitating knowledge and experience exchange (van den Brink et al., 2021). To achieve policy

targets of both Biodiversity (EU, 2021b) and Farm to fork strategy (EC, 2020b), an Integrated nutrient management action plan will be developed in 2022, building on the Zero Pollution Action Plan. In most areas of the EU, this will "require drastic changes to the measures in place" (EC, 2021a).

Often measures need to be applied on a broader scale, the wider area of an agricultural catchment. Catchments mostly lack governance organisations (Wuijts et al., 2021), which is why there is a need to establish multi-sectoral partnerships to activate a more significant number of stakeholders that bring about a positive environmental change. Bridging this gap, the policy introduced the concept of multi-actor platforms (EU, 2003), which are supported by OPTAIN project in from of MARGs. Multi-actor platforms in different forms became an integral part of any research and implementation project and have been tested successfully in many agricultural catchments. However, multi-actor platform functioning outside research projects proved a promising tool only if stakeholder networking, co-development and shared action are supported on a long-term basis by skilled facilitators and adequate financial resources (Nesheim et al., 2021).

In June 2021, a public FaST digital service platform (https://fastplatform.eu/) was made available to improve agriculture, environment and sustainability capabilities to EU farmers, Member State Paying Agencies, farm advisors and developers of digital solutions. The measure is supported by the European Commission's DG Agriculture and Rural Development, the EU Space Programme (DG DEFIS) and the EU ISA^2 Programme (DG DIGIT). The tool, to some extent, works back-to-back with many helpful decision support tools (DSTs) that are already available for nitrogen management on farms. However, further development and research are needed to improve the available DSTs that target improving the efficiency of the resources used on-farm and measures directed to reducing losses to water (Nicholson et al., 2020; Nicholson et al., 2018). Furthermore, policy evaluation regarding how useful and widespread the FaST digital platform is and its impact on safeguarding or improving water quality in the agricultural catchment is still unknown as it was only recently released.

The policy promotes advanced approaches to further protecting water quality through financing R&I and giving it credit in policy reports (EC, 2021). An example of a more advanced but not yet fully developed, tested, evaluated, or mainstreamed approach is the nutrient recovery of nitrogen and phosphates from livestock manure – see the example given in Figure 3.3 (Pandey & Chen, 2021) or other examples in (Chang et al., 2022; Schott et al., 2022; Zeng et al., 2021). There is also space to improve by reducing nutrient load in manure through the animal feeding strategy by adapting the time and quantity of the feed and by modifying the feed (quantity and availability of nutrients) (Sutton, 2016).

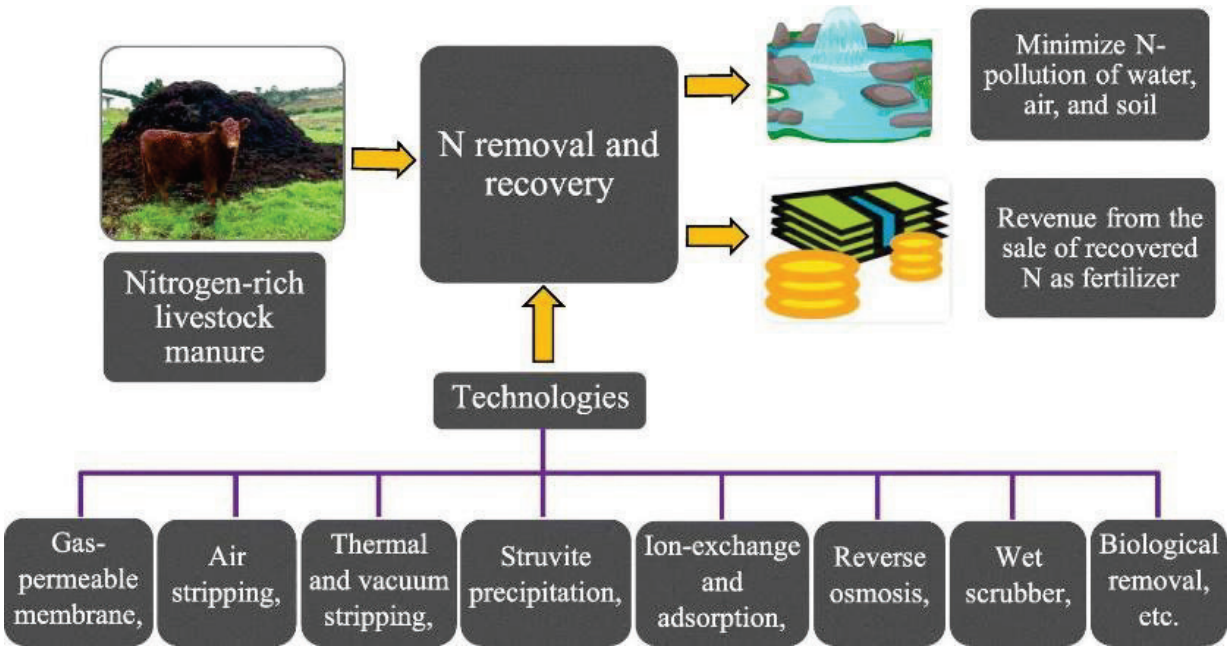


Figure 3.2: Nitrogen recovery from livestock manure (Adopted from Pandey and Chen, 2021).

The fact that a great deal of attention is given to developing new, more advanced measures does not mean that policy implementation to mainstreaming the most efficient measures has reached its maximum success. In some agricultural catchments, policy implementation and mainstreaming of the most efficient measures promoted through CAP are still lagging. A critical review of the effectiveness of EU policy show complexities and inconsistencies between policy regulations are most pronounced at the "local level where cross-sectoral measures have to be taken, and effects monitored" and considerably limit achieving the targeted environmental standard. In this context, there is a need to invest in "capacity at the regional-local level" to improve cross-sectoral decision-making (Wuijts et al., 2021).

3.1.1.2 Water quantity (managing excess and shortage, soil water retention)

Policy targeting managing excess and shortage of water in agricultural catchments to safeguard agricultural land against floods or decrease vulnerability to droughts are based on several regulations and policies. The most important are the Water framework directive (WFD, 2000/60/EC) and the flood directive (FD, 2007/60/EC). In many agricultural catchments, climate change has affected surface, and groundwater flows in a way that the usual extremes (droughts, floods) are more extreme. In the last decade, the average flows have risen not due to a rise in average wet years but due to extreme events. Therefore, each year is a deviation, and excess water needs to be stored for use and recharge in dry years.

Land uses play an important role in the hydrological characteristics of soils in view of facing the high runoff and erosion rates in agricultural catchments (Lucas-Borja et al., 2019). Several good land management practices for increasing soil-water retention are supported by the CAP and adopted by the farmers – from elementary measures such as increasing soil organic matter content and mulching in orchards to more complex measures such as low-tillage (requires adaptation of on-farm mechanisation) and improving irrigation use efficiency by modernising irrigation services (Cvejić et al., 2021). However, apart from responsible management, such as setting aside water for the

environment, placing caps on extractions, and the ability to hold water (Simmons et al., 2022), more needs to be invested in strategies and solutions to retain water in a way that is compatible with retaining high-value agricultural land. For example investing in small-dispersed wet water reservoirs (Lebon et al., 2022) as both flood protection and drought alleviation measures instead of introducing dry detention ponds as solely a flood protection measure (Glavan et al., 2020).

Further, calls for R&I support mainstreaming nature-based solutions to increase retention capacities of agricultural catchments and will be an important focus of research and innovation in the EU. However, this means more needs to be done concerning increasing climate change resilience with the measures within the urban areas, as reservoir effects in agricultural catchments quickly reduce with scale and although they can have satisfying local effects, their importance might be less significant at larger scales (Bezak et al., 2021). Cohesion funds available for improving flood efficiency are a successful example of managing flood risk on a local and sometimes catchment scale. Nevertheless, cohesion is not well aligned with the goal of improving drought resilience. In fact, research shows that CAP and Cohesion funds directed to ensure higher flood resilience sometimes apply measures in the same area but with incompatible outcomes (Glavan et al., 2020).

3.1.1.3 Climate change

Many agricultural catchments in the EU - and also the case studies of OPTAIN - are already challenged by the impacts of climate change. Agriculture is partially a cause of climate change but is also affected by it. Therefore policy focuses on both measures for mitigation and adaptation to climate change.

Agricultural production (crop and livestock) accounted for around 12% of total greenhouse gas (GHG) emissions in the EU in 2018 and 24% at the global level. These mainly originate from methane (CH_4) (livestock digestion processes, manure management, and rice cultivation) and nitrous oxide (N_2O) (originating from agricultural soils with organic and mineral nitrogen fertilisation and manure management). Lowering GHG emissions from livestock production to mitigate the climate change effect is a measure that has a strong environmental goal. A strong driver for the reduction of livestock production and consumption of meat is also found in growing health concerns and societal demand. The promotion of plant-based diets is strongly supported by scientific evidence (McGrath & Fernandez, 2022; Siqueira et al., 2022), and innovation is persistent in the direction of developing efficient meat substitutes (Penna Franca et al., 2022). Livestock production also has positive environmental effects. The maintenance of permanent grassland through livestock grazing enhances biodiversity and represents a significant carbon sink. Therefore, policy measures to enhance the mitigation effects of livestock production on climate change and support environmentally sound livestock production are a part of the CAP.

Research shows that in the past, more attention was placed on the impact of food production on climate change (than vice versa) and that policy-supported mitigation strategies are rather general than food-oriented (Filho et al., 2022). This is why the current European Green Deal and the Farm to Fork strategy policies promote transiting to a “sustainable food system” that meets the social demand whilst protecting the climate

(EC, 2022), recognising that various actors in the food system have different impacts on climate change (Filho et al., 2022).

Climate action for climate change adaptation of agricultural catchments is promoted through several mechanisms, namely (i) cross-compliance, (ii) green direct payments and (iii) rural development (EC. 2022). Measures are mainly directed towards diversity of crops and farming systems, investment support for adaptation to new climate conditions, limiting soil erosion and improving resilience to floods (Cvejić et al., 2019; Lorite et al., 2022; Vizinho et al., 2021).

The EU strategy on adaptation to climate change adopted in 2021 is there to support decision-making cross-sectors and governance levels by (i) integrating adaptation into macro-fiscal policy, (ii) developing nature-based solutions for adaptation, and (iii) promoting local adaptation action. However, there is significant uncertainty regarding the efficiency of nature-based solutions to enhance water retention and reduce flood risk across Europe and beyond (Raška et al., 2022).

A growing wide public availability of climate change projections shows in their increased use in strategic planning on a local scale. Several frameworks organise adaptation strategies to help coordinate stakeholders on the ground (Vizinho et al., 2021). However, as research and innovation currently indicate, there is less consensus on effectively using this data at a regional or local scale, and there is a general lack of guidance on harmonised CC risk assessments at the municipal or regional scale, on which the development or improvement of cross-sectoral community-based risk management plans can be based on.

There is a need for more operational, consistent and more advanced multi-risk assessment framework tools across scales and levels of governance that can be used by municipalities in a given statistical region so that they are better equipped to develop site climate resilience plans (if not available yet) or improve the ones that might be already existing. The improvements are mainly required to increase the policy implementation rate for more complex measures requiring coordinated action of a larger group of stakeholders and monitoring the impact of policy implementation.

3.1.2 Policy interlinkages between the EU Green Deal and the focal EU policies

To be able to understand and interpret specific governance and policy situation in the CS regarding the mainstreaming of NSWRM measures we analysed the interlinkages between EU Green Deal and the Focal EU policies. The European Green Deal resets the urge to confront climate and environmental-related challenges. It is a new growth strategy that aims "*to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use*" (EC, 2019). To support the European Green Deal the European Climate Law (EC, 2021f) established the framework for achieving a binding objective of (i) target of a net domestic reduction in greenhouse gas emissions for 2030 and (ii) climate neutrality by 2050.

The WFD and the Green Deal: Integrated Water Management in small agricultural catchments directly reflects perspectives of the European Green Deal. It includes a set of eight profoundly transformative objectives (clean energy supply across the economy,

industry, production and consumption, large-scale infrastructure, transport, food and agriculture, construction, taxation and social benefits), being strongly interlinked and mutually reinforcing and having a background in UN Sustainable Development Goals (SDG) (UN, 2015). To minimise the potential trade-offs, different types of policies may be used (regulation and standardisation, investment and innovation, national reforms, dialogue with social partners and international cooperation). The EC argues that only new measures on their own will not be enough to achieve the objectives and that the EU will ensure that legislation and policies relevant to the Green Deal are enforced and implemented (EC, 2019).

Climate change and the Green Deal: Part of the Green Deal is also the European Climate Law, which binds member states to adopt and implement national adaptation strategies taking into account the most vulnerable sectors (water systems, agriculture, food systems and security) and promote nature-based solutions and ecosystem-based adaptation to protect and mitigate impacts on biodiversity (EC, 2020c, 2021f). Moreover, early preparation can increase cost-effectiveness and bring substantial co-benefits for natural and artificial ecosystems (EC, 2020c).

The Farm to Fork Strategy and the Green Deal: The Farm to Fork Strategy is at the core of the European Green Deal by addressing the development of the EU's fair, healthy and environmentally-friendly food systems (EC, 2019, 2020b) as the global standard for sustainability. The EC desires to substantially reduce air, water, and soil pollution, increase biodiversity, and mitigate and adapt to climate changes. To achieve that the EU will, by shifting the focus from compliance to performance, promote in its plans the use of sustainable practices (e.g. precision agriculture, organic farming, agroecology, agroforestry) and incorporate eco-schemes measures (mandatory in CAP Pillar I). From the policy implementation point of view, the EC stands behind the system of rewarding farmers for improved environmental and climate performance (managing carbon in the soil, nutrient management to improve water quality, and emissions reduction) (EC, 2019, 2020b).

The Nitrates Directive and the Green Deal: Regarding the excess nutrients (nitrogen, phosphorus) in the environment, the EC aims to reduce nutrient losses by at least 50% and reduce fertiliser use by at least 20% by 2030 (EC, 2020b). The plan identifies the following indicators: (i) no loss in soil productive capacity, (ii) effective absorption of nutrients by plants, (iii) applying balanced fertilisation and sustainable nutrient management, (iv) managing nitrogen and phosphorus better throughout their lifecycle, and (v) reduced impact on the biodiversity of water bodies. Implementation will be secured by enforcing environmental and climate legislation in cooperation with the member states to define nutrient load reductions in an integrated nutrient management action plan. Furthermore, EC will, in cooperation with the member states, further work on promoting precise fertilisation techniques, sustainable agricultural practices, and recycling of organic waste into renewable fertilisers as part of measures in CAP Strategic Plans involving Farm Sustainability Tool for nutrient management, investments, advisory services and of EU space technologies (Copernicus, Galileo) (EC, 2020b).

The CAP and the Green Deal: The Green Deal significantly re-shaped the CAP formally adopted in December 2021 and due in 2023, paving the way for a more fair, greener and performance-based CAP (EC, 2020a, 2021d; EU, 2021a, 2021c). The revised CAP fully

integrates EU environmental (e.g. Water Framework Directive, Nitrate Directive, Habitat Directive, Sustainable Use of Pesticides) and climate legislation (European Climate Law) (EC, 2021f) and contributes to the targets of the Farm to Fork (EC, 2020b) and Biodiversity Strategies (EC, 2020c). The CAP has the following specific objectives: (i) addressing climate change mitigation and adaptation, (ii) improved management of natural resources used by agriculture, such as water, soil and air, and (ii) reinforced protection of biodiversity and ecosystem services within agrarian and forest systems, (iv) effective sustainability of food systems following societal concerns regarding food and health, (v) ensuring a fair economic return and improving the position of farmers in the food supply chain (EC, 2020a, 2021d; EU, 2021a, 2021c). All objectives will have to be addressed by each member state in the National Agricultural Strategic Plan. Complying with the Green Deal will require (i) high quality of the data obtained to perform the monitoring and evaluation of the CAP, and (ii) the development of common data approaches and sharing of data between policy sectors (water, agriculture, climate, biodiversity, etc.) to ensure timely, accurate, and effective delivery of indicator information on the effect of policy instruments and policies (EC, 2020a).

The new CAP sets up principles of conditionality (each farm has to dedicate a particular share of its arable land to biodiversity and non-productive elements, all wetlands and peatlands will be protected), eco-schemes (mandatory for the member states to offer - a new voluntary instrument rewards farmers for implementing climate and environmentally-friendly practices (organic farming, agroecology, integrated pest management)), agri-environment commitments in rural development funds (to promote environmental, climate and animal welfare practices), contribution to Union's overall spending on climate and biodiversity (40% of the CAP budget will have to be climate-relevant and 10% of the EU budget dedicate to biodiversity objectives) (EC, 2021d; EU, 2021a, 2021c).

Regarding the EU's water management objective of good status for water bodies (Directive 2000/60/EC), the CAP requires that rules are set to support needed investments in modernisation and the development of infrastructures (e.g. irrigation) so that agricultural water use does not put that objective at risk (e.g. EAFRD should not provide support for investments that would harm the environment) (EP, 2000; EU, 2021a). In addition, the National CAP Strategic Plan may, where appropriate, include regionalised interventions (measures, schemes, incentives) adopted to address local challenges (EU, 2021a).

The WFD shows the necessity to develop an integrated community policy on water protection and sustainable management of water in dialogue with other policy areas such as energy, transport, agriculture, fisheries, regional policy, spatial planning and tourism (EP, 2000). Furthermore, the directive points out diverse conditions and needs in the community, which requires specific solutions in the planning and execution of measures with decisions taken as close as possible to the locations of the affected water body (EP, 2000).

Member states are bound to prepare the RBMP and for each river basin district, or the part of an international river basin district within its territory, a programme of measures referenced to measure in existing national legislation. Implementation of measures aims to achieve good ecological potential and good surface water chemical status at the latest 15 years from entry into force of the WFD. Extensions are limited to a maximum of

two further updates of the river basin management plan (in 2022, we are in the second extension) except in cases where the natural conditions are such that the objectives cannot be achieved within this period (EP, 2000).

Each programme of measures shall include the basic measures with minimum requirements to comply with (e.g. measures to promote efficient and sustainable water use, measures to prevent or control the input of pollutants from diffuse sources). Moreover, where necessary, supplementary measures are designed and implemented in addition to the basic measures (legislative instruments, administrative instruments, codes of good practice, promotion of adapted agricultural production, efficiency and re-use measures, such as promotion of water-efficient technologies and water-saving techniques, construction projects, educational projects, research, development and demonstration projects) are supported (EP, 2000).

The European Commission adopted the EU strategy on adaptation to climate change in 2021. The strategy aims to forge a climate-resilient Europe by promoting smarter, faster and more systematic climate change adaptation (EC, 2021b). The umbrella strategy provides a framework that supports decision-making cross-sectors and governance levels through Climate-ADAPT (https://climate-adapt.eea.europa.eu/as) - a platform for sharing the climate change related evidence base and showcasing and exchanging knowledge on adaptation. The strategy's purpose is to continue actively mainstream climate resilience considerations in all relevant policy fields. Furthermore, the strategy promotes and supports the development and implementation of adaptation strategies and plans at all levels of governance, focusing on (i) integrating adaptation into macro-fiscal policy, (ii) nature-based solutions for adaptation, and (iii) local adaptation action. It is how it supports, connects, and integrates the focal EU policies. Specific linkages between focal policies are provided more in detail in Annex A.

3.1.3 Policy coherence between the CAP and the WFD

Improved coherence between the focal EU policies is one of the aims of the OPTAIN project. Here we present examples of two EU well-established policies – the Water Policy and the CAP. Two main domains, one for CAP and one for water policy, are identified and related to the project (Figure 3.3):

- Domain on processes of agricultural production is defined by the EU CAP with main objectives set out in article 39 of the Treaty on the Functioning of the European Union: (i.) to increase productivity by promoting technical progress and ensuring the optimum use of the factors of production, in particular, labour; (ii) to ensure a fair standard of living for the agricultural community; (iii) to stabilise markets; (iv) to secure availability of supplies; (v) to provide consumers with food at reasonable prices.
- Domain on processes of the EU Water Policy (WFD) is considered as an umbrella directive with the overall objective of at least “good environmental status of water body” status with main objectives: (i) prevent deterioration and enhance the status of aquatic ecosystems, including groundwater; (ii) promote sustainable water use; (iii) reduce pollution; (iv) contribute to the mitigation of floods and droughts.

Achieving a single domain-based objective is a challenge while resolving the conflicts and improving the synergies among the two mentioned is a task on another level (EN,

2014). With the OPTAIN project addressing all presented domains, it is essential to identify the processes and units that address WFD and CAP implementation (Figure 3.3).

Several strategic EU documents have already recognised the gaps between WFD and CAP. The most important are:

- EC ENV.D.1. – Water, 2011 "Guidance for administrations on making WFD agricultural measures clear and transparent at farm level";
- EU Court of Auditors, 2014: Integration of EU water policy objectives with the CAP: a partial success;
- EC, July 2020: "Agricultural land management & flood risk management: closer coordination for the benefit of both";
- EC, April 2019: CAP SPECIFIC OBJECTIVES explained Brief No. 4 – "AGRICULTURE AND CLIMATE MITIGATION";

Therefore, the WP6 aims at (i) identification of relationships among the entities that connect both water and agriculture policies; and (ii) identification of relationships that connect both main policies to the processes of nature and climate change policies. In addition, both domains provide domain-specific standards and procedures (i) WFD Guidance documents (https://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm); and (ii) Common Agricultural Policy, with a specific focus on cross-compliance, rural development and polluter pays principle.

The listed key documents all recognise the gap between the two policies and the necessity to fill the gap, making improved interaction between the two policies effective. Generally, it was recognised that the impact of cross-compliance on water issues has so far been limited. Cross compliance has increased awareness among farmers and has triggered changes in farming practices concerning water. However, the impact of cross-compliance has been limited because several important water-related issues are not included in cross-compliance. The sanctions applied under cross-compliance are not calculated based on the cost of the damage caused and thus, may represent only a portion of this cost. Moreover, weaknesses found in cross-compliance applications in the Member States further reduce its potential impact.

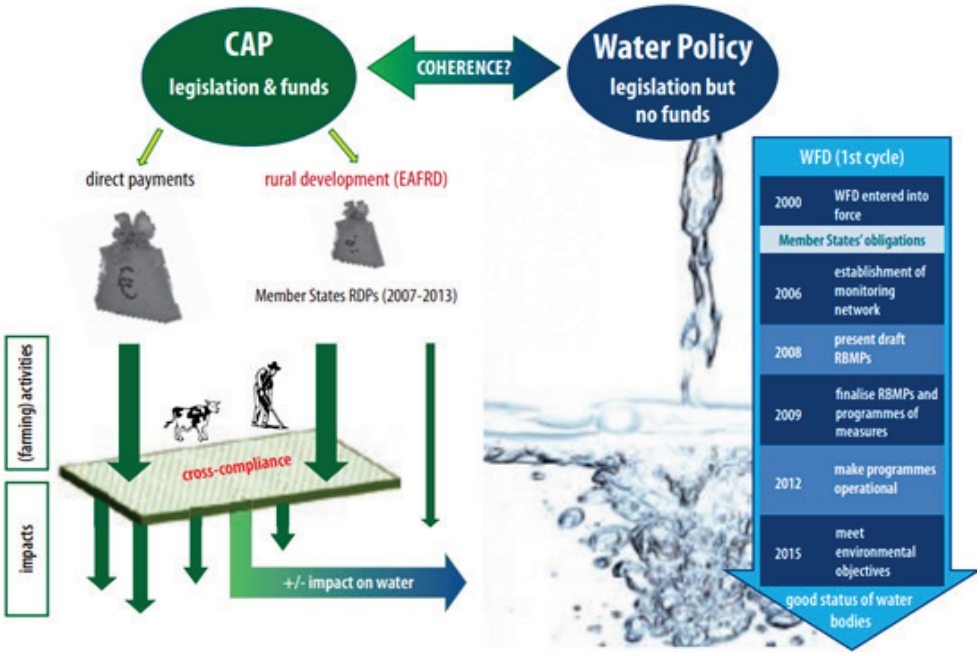


Figure 3.3: Linkage between CAP and EU Water Policy.

The Court of Auditors (European Court of Auditors, 2014) has recognised that there is only minimal availability of the systematic analysis of the effects of the cross-compliance concerning waters, which is a worrying result. The challenges relate to limiting the use of phosphorus and pesticides near water bodies that are not included within cross-compliance. The report summarises low application efficiency rate of pesticides leaving the bulk of the pesticides to impact the environment. Some member states have nonetheless taken the initiative to address these issues, even where not obliged to do so (e.g. by including restrictions on the use of pesticides in the GAEC on buffer strips)". More recently, reducing pesticide use has become a shared objective of several European countries and one of the key topics in reforming CAP (Jacquet et al., 2022).

The most frequently observed breaches of water-related cross-compliance requirements at the farm level, most of them being infringements by beneficiaries of SMR4 (protection of water in nitrate-vulnerable zones): inadequate storage facilities or insufficient storage capacity for manure, incomplete or erroneous fertiliser records, absence of a nitrogen analysis, nitrate output higher than 170 kg/ha, and storage of manure on land during a prohibited period (European Court of Auditors, 2014). Other observations relate to SMR2 (protection of groundwater), SMR9 (plant protection products) and the GAEC on buffer strips. The system of cross-compliance checks has weaknesses at the Member State level. Member States are responsible for the implementation of cross-compliance. For SMRs, this includes introducing the relevant elements of the specific legislation into the scope of cross-compliance. For GAECs this includes enacting the relevant standards in national or regional legislation and defining the practical obligations which farmers are expected to observe. Member States are obliged to inform farmers about these requirements and establish an administration and control system that allows a sample of beneficiaries to be checked on the spot and sanctioned in the event of non-compliance.

One intrinsic limitation of the system of cross-compliance checks is that some requirements are complicated to check by their nature. As an example, one of the requirements refers to the timing and method of use of pesticides. The difficulty here is that cross-compliance checks are usually notified in advance. Therefore, it is most unlikely that an inspector will come across a farmer spraying a crop with a forbidden product or in an unlawful manner. In addition, other requirements can only be checked during a certain period of the year or in the absence of certain meteorological conditions (e.g. strong wind, frost), which may not necessarily coincide with the timing of the on-the-spot visit.

Recognising the importance of the improved cross-compliance and other components of both policies was a guiding principle in developing the analytical framework provided in Annex A. Accordingly, key components defining both main policy strategies (CAP, WFD) were cross-analysed to identify the connectivity between the two policies serving as a procedural framework for developing the Deliverable 6.2 recommendations. The focus is on information integration and identifying proposals to improve policy frameworks in the domains addressed by the OPTAIN project.

The comparison also recognised that drinking water protection zones, which are defined as specific protection zones also on the EU level by the WFD (2000/60), and more explicitly by the Recast of the Drinking Water Directive (2020/2184), are at least recognised as a specific management entity. On the other hand, buffer strips along the water bodies are currently only weakly defined; the status of heavily modified water bodies (modified for agricultural production) is mainly open, and improvement measures are not binding at the EU level.

Besides developing the improved mechanisms applicable on the farm level, we have to confirm the recommendations provided in the key document (European Court of Auditors, 2014), recognising the importance of the control and systematic follow-up of the measures, including sanctions the breaching of the defined measures. Any legislation not followed with the entire implementation framework could be considered merely as a list of recommendations, especially if its implementation framework is missing (programming, planning, financing, supervision, enforcement).

3.1.4 Instruments for integrating environmental objectives into policy and practice

Based on the analysis of above literature review we identified several various tool and techniques for integrating environmental objectives in policy and practice (Figure 3.4). Some instrument are targeting more the policy (weight of influence indicated with a wider surface of the triangle). Such are strategies, periodical reviews and policy evaluations. Other tools are more directed toward reaching the environmental targets to comply with the legislative requirement through practice. Such are developments programmes, farm advisors services and decision support tools. Finally, specific instrument have the tendency to affect both policy-programming and reaching changes in practice. Such are for example multi-actor platforms, branding and modelling, which is indicated by the same surface of the rectangle going to both policy and practice. We also made a judgement about the expected level of mainstreaming of individual instruments in CSs – whereas highly weighed instruments are probably highly

adopted, less frequently adopted are instrument that target reaching both policy and practice simultaneously.

We expected that each governance structure represented by the CS country uses specific tools – some might use all the tools, we expect those to be more effective, flexible, and inclusive. Others use only a few tools; we expect those to be less flexible, less inclusive, and still not reaching environmental targets. Although the toolbox is not complete and new tools ca be added, it provides a quick overview – Which tools are available, to further improve integration of desired environmental standards into either policy or practice or ideally both.

Tools and techniques	Aim	target		Level of tool mainstreaming (L, M, H)
		POLICY	PRACTICE	
• strategies	• setting goals and targets			high
• development programmes	• defining measures			high
• codes of good practices, written recommendations, technological guidelines	• providing support through widely understandable and practical guidance			medium
• policy recommendations	• based on research and consultation with stakeholders, indicating policy deficiencies and proposing optimisation solutions			high
• periodical reviews of implementation and management plans	• review of efficiency and implementation deficit through periodical (e.g. six years) update of implementation and management plans			high
• policy evaluation by a court of audit	• financial and/or legal audit (i.e. Statutory audit or External audit) on the executive branch of power			high
• policy implementation reports	• national policy implementation stats reported to the European Commission			high
• financial incentives, insurance mechanisms	• ensuring gradual uptake, high motivation and compensation for yield loss in mainstreaming mandatory and optional measures			medium
• public and private farm advisory system	• advisors sharing new knowledge and best practices, helping farmers to implement appropriate solutions for their specific situations, knowledge brokerage and practical guidance			high
• environmental and health monitoring	• tracking environmental change, checking suitability and efficiency of measure, monitoring implementation			medium
• modelling	• integrating monitoring results, extrapolation, support of decision making			low
• decision support tools	• decision support tools for integrating different data sets into practical interpretation supporting action on the ground			low
• adaptation frameworks	• structuring local implementation of a larger set of measures, aiding decision-making at the local level			low
• risk and vulnerability assessment; driving forces, pressures, state, impacts, responses	• integrating local climate change projections, establishing potential impacts and adaptive capacity for increasing the local environment resilience			low
• multi-actor platforms, learning alliances, learning labs, local action groups, initiatives	• stakeholder engagement platforms for facilitation co-development of measures, actions, solutions, common understanding of environmental problems and approaches to integrating environmental objectives into programmes of actions			low
• European innovation partnership AGRI focus groups	• discuss document, best practices, further research needs; taking stock of the state of the play of practice, identifying needs, highlighting priorities, to some extent, guide policy on research and innovation			low
• research and development	• integrating environmental and policy monitoring and helping co-develop a shared understanding of environmental challenges cross-scales and levels of governance			medium
• promotion and training	• accelerating performance of local, regional and national stakeholders			low
• governance and management	• governance and management systems to ensure the maximum effect of measures and long-term financial sustainability of measures			medium
• branding	• establishing a marketable pathway to promotion of environmental standards			low

Figure 3.4: Instruments for integrating environmental objectives into policy and practice.

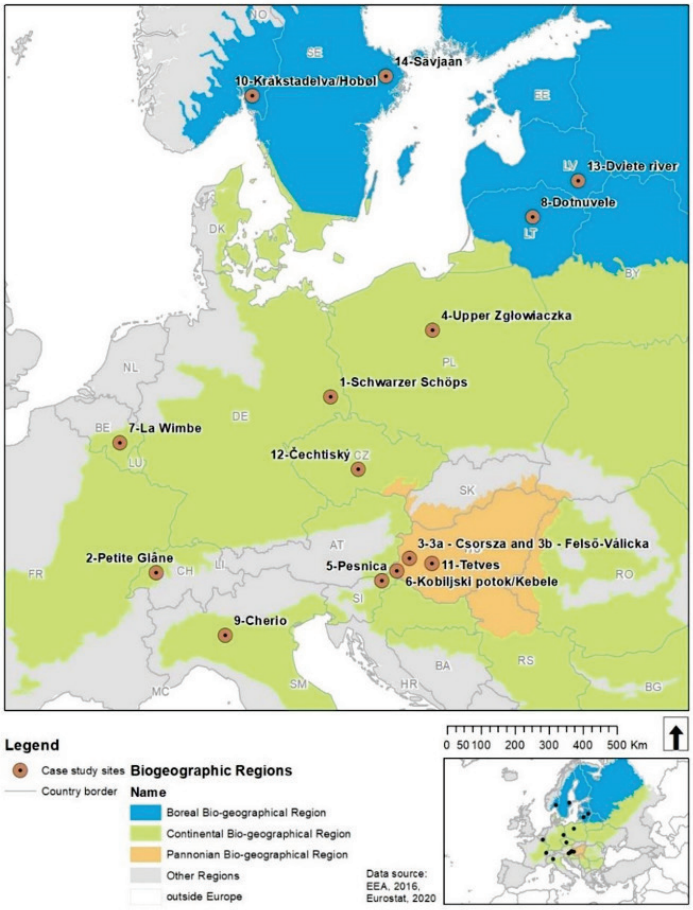
3.2 Case study sites description

The D6.2 focuses presenting governance structure for management of agricultural catchments and governance and policy gaps for mainstreaming effective implementation of NSWRM. To present the diversity of examples and situations D6.2 draws on the situation from 15 CSs, from 12 countries, situated in three different biogeographical regions (BGR) (Boreal, Continental and Pannonian) (Figure 3.1). From Hungary (3a, 3b, 6, 11) and Slovenia (5, 6), multiple catchments were included, out of which one (6 - Kebele/Kobiljski potok) is a transboundary catchment shared between Hungary and Slovenia.

Except for Norway and Switzerland, all countries are member states of the European Union. Both Norway and Switzerland keep out of some EU activities, such as the Common Agricultural Policy. However, they bring many of their laws into line with EU rules, particularly on the single market. Being a member of the European Economic Area (EEA) following the European Free Trade Association agreement, Norway has full access to the single market and implements several EU directives for the protection of water resources. In contrast, Switzerland has more limited access to the EU market. Economic and trade relations are mainly governed through a series of bilateral agreements where Switzerland has agreed to take over certain aspects of EU legislation to access part of the EU's single market.

Most CSs are highly agricultural, with cropland shares exceeding 40% of all land. The most challenging issues are high flood and drought risk, soil erosion, soil compaction, and humus loss. In combination with abiotic factors and hydrogeological background, land use practice causes eutrophication. Existing soil measures adopted to reduce soil erodibility and increase soil-water holding capacity are mainly limited to conservation or no-tillage systems, contour farming, and winter or permanent greening.

The soil measures in the CSs to manage nutrients load in soil and reduce nutrient loss primarily relate to intercropping, green manure fertilisation, adapted fertilisation, organic farming, crop rotation, and catch crops. The structural measures in the CSs are used to minimize inter alia flood risk. The involved drainage systems are also seen as a negative measure contributing to eutrophication, which is why they are sometimes coupled with drainage filters and sedimentation ponds. To reduce drought risk and increase water retention in the landscape smaller ponds, bigger reservoirs, river weirs, and constructed wetlands are developed. To reduce nutrient losses grassed waterways, riparian buffer zones, and grass buffer strips are implemented to some extent. Key stakeholders dealing with the challenges are farmers, farmers' associations, and government agencies.



CS1	Schwarzer Schöps
CS 2	Switzerland's Petite Glane
CS 3a and CS 3b	The Czorsza catchment (CS 3a) and Felső-Válicka (CS 3b)
CS 4	The Upper Zglowiaczka catchment
CS 5	The Pesnica catchment
CS 6	The Kebele patak (HU)/Kobiljski potok (SLO) transboundary catchment
CS 7	The La Wimbe catchment
CS 8	The Dotnuvėlė
CS 9	The Cherio
CS 10	The Kråkstadelva/Hobøl
CS 11	The Tetves catchment
CS 12	The Čechtický catchment
CS 13	The Dviete catchment
CS 14	The Sävjaån catchment

Figure 3.1: Geographic position of case study sites.

To analyse the agro-environmental governance and policy arrangement situation across twelve countries in Europe and discuss the relevance of governance and policy gaps with the objective to derive general and specific recommendations for more efficient mainstreaming NSWRM we used the following approach.

3.3 Data collection

3.3.1 The survey

The survey was developed to collect information from authorities and experts working in the agriculture, water and environment sectors with the aim to identify challenges and possible solutions in legislation and governance arrangements. The survey questionnaire is provided in Annex C.

The informants were asked to share their views on challenges and possible solutions in legislation and governance arrangements impacting water-use efficiency, the use of tools and techniques for water and nutrient management and the economic sustainability of technologies at the farm and small agricultural catchments level. They were also asked to provide concrete examples of this.

In the survey, the following environmental concerns/challenges were addressed:

- water quantity - managing excess water (flood protection)
- water quantity - shortages of water (drought-irrigation)

- water quantity - in-field water retention measures
- water quality - in-field nutrient retention measures
- water quality - nutrients recovery from streams

The survey also focused on the degree that there are support for water use and nutrient use efficiency, and it addressed support and monitoring of economic and environmental sustainability at farm and catchment level. The effectiveness of the communication of agricultural, water, and nature management policies to end-users were also covered.

The survey was developed to identify and investigate possible main knowledge gaps: (i) regarding knowledge on policy arrangements of studied environmental challenges and legislation impacting implementation and maintenance of NSWRM, (ii) the situation of compatibility issues, or possible synergies between different national policies, (iii) the situation of communication strategy effectiveness at the CS/local level, (iv) upgrades of policies to improve measures uptake and propose a new support type to promote implementation among users. Cross-sectoral topics and issues were explored by means of a combination of closed-ended and open-ended questions, and the survey aims to be compatible in terms of water quantity and quality. The survey was developed for the objective to contribute to policies' early preparation for increased cost-effectiveness (EC, 2021f). It was an aim to investigate the need for additional measures on the case country level, reflecting the EC perspective that new measures are needed for nutrient uptake and water retention (EC, 2021d; EU, 2021a, 2021c).

3.3.2 Secondary data collection for overview of agri-environmental governance

The case study leaders (CLSs) gained information for developing the diagrams and the text by means of searching secondary literature, ministries' official website, reports. A draft overview of illustrative and schematic agri-environmental governance overview were subsequently presented to key informants for commenting and review.

The template and the different steps for developing the diagram were presented to the CSLs in several steps. First, the template including a filled-out example was presented in a virtual plenary meeting for the CSLs. Then, based on preliminary drafts of the diagrams by the CSLs for their respective cases, small virtual groups and individual meetings with CSLs were organised for further feedback.

An overview of the governance structure for management of agriculture, water and environmental concerns in the case studies provided a backbone for the study of the policies for NSWRM adoption. The focus on governance is here limited to address the main legislation and policies and the responsible decision-makers e.g. ministries, departments, agencies etc., within the domains of agriculture, water and climate legislation and policies (Rowbottom et al., 2022). Although the governance framework might not be fully comprehensive it provided a good starting point for better targeting the challenges and possible solutions with respect to mainstreaming the NSWRM. The mapping has been an important background and part of the process for addressing and understanding the situation of gaps and compatibility issues in the governance, and the relevance of possible suggested solutions. Yet as the overview of the governance situation is extensive, this is presented in the Annex B.

3.4 Data analysis

For the quantitative analysis of aggregated collected data from the survey across case studies, the SPSS 20.0 for Windows (IBM Corp., New York), The R Project for Statistical Computing (R version 4.2.0) and Microsoft Excel were used. Data were presented using descriptive statistics (frequencies, % and average). We analysed combined nominal variables (answers YES / NO) with the Likert scale variable that participants answered conditionally if participants chose to answer "YES". Firstly, we recoded the values of the Likert scale (1-7) in three ordinal categories (low – 1, 2; intermediate – 3, 4, 5; high – 6, 7). Secondly, we calculated the average rate of the participants that conditionally answered the question with a rate (1-7). Because the distribution of answers was recorded into three categories (low-intermediate-high) and average rate has been calculated on the original scale (1-7), average rates in general can differ, even when distribution of answers on three level ordinal scale for different questions was identical. Finally, we employed structural bar charts to show % of answers on the simple nominal scale (yes / no / no answer / missing) or employed ordinal scale (no / low / intermediate /high / no answer / missing) and utilised a twin y-axis, presented conditional average rate of participants with a diamond-shaped point on the same chart. The main task in interpreting the results was to display the results of numerical and closed questions illustrative. Therefore, numerical results were presented using a three-level scale (low / intermediate / high), which shows the distribution of answers according to efficiency, incorporation, appropriateness, magnitude or compatibility. Quantitative analysis includes aggregating results at the project level, at a biogeographical region, and detailed analysis at an individual case study/country level. Differences between biogeographical regions reflect focal problems at the CSs, and cannot be regarded as general issues at the level of the biogeographical region as such.

For the qualitative analysis the content analysis of the collected data was used to analyse answers to the open-end questions, which were formed to look for gaps and solutions in implementing and promoting NSWRM. To simplify the presentation of the survey results, informants' answers were classified according to keywords or the meaning of the answers. We analysed challenges, i.e., gaps and compatibility issues in policies. The classification results are presented in tables with the absolute number of responses and shares. The general survey analysis of informants' responses at the project level was carried out by combining all responses into one sample (European-project level) and three sub-samples (Pannonian, Continental, and Boreal project levels).

The CS level analysis mainly involves qualitative content analysis of the informants' statements and explanatory comments and semi-quantitative descriptive analysis. The purpose of the case study analysis is to present the main trends in responses, not details or differences among the informants' perspectives. Gaps and barriers and solutions for the improved uptake and adoption of NSWRM are analysed by classifying informants' perspectives and opinions of the policy situation focusing on the governance and policy instruments (see conceptual framework 2.3).

The semi-quantitative analysis undertaken involved using descriptive categories to present semi-quantitative results. Such descriptive categories refers to "most of the informants", "about half", "less than half" or "few". When responses and comments reflect a general perspective, such descriptive categories are not always useful, and the more general term "the informants", was used. Results are not analysed statistically on case

study level similar to the analysis of aggregated data (from all case studies), because on case study level the number of responses to questions are in most cases too few.

3.5 Approach for formulation of legislative recommendations

The recommendations were formulated considering expert informants perspective of gaps and compatibility issues and their suggested solutions to the challenges experienced. Particular attention was paid to best practice storylines explained by the informants. Their answers and evaluations of the measures may be considered as subjective. The recommendations were based on combining the findings of two analyses: (i) individual analysis of individual CS/countries and (ii) general analysis of survey results at the level of the entire project and biogeographic regions, and from the literature review (Chapter 3).

Finally, the recommendations were grouped into the most pressing ones based on the analysis of the answers to question on “How should the implementation of measures addressing environmental concerns be supported in policy/legislation by decision-policy makers in your country (Environmental mainstreaming)?” In the recommendations, we included the numerical and descriptive answers of the informants of the entire survey. In addition, the recommendations were further supplemented based on the analysis of the legislative structure for specific measures. The recommendations are grouped around two main analytical categories: (i) governance and (ii) policy instruments.

3.6 Uncertainties and limitations

The main uncertainty is related to the fact that we asked the informants about their personal opinions, experiences and findings in the study. The informants differ from each other in terms of the environment in which they operate, the sectors in which they operate, their personal and professional interests, and their experience with the studied measures. We tried to minimize the effects of this with a suitably large sample of informants from each research area, with a wide range of fields in which they work and dispersion among different administrative levels of professional activity. However, in many CSs there are only few answers indicating data could be improved by increasing the number of informants.

Accessibility to informants was severely affected in specific environments by the period of the research (winter 2021/2022), when the covid-19 epidemic was in full swing. In some case studies, the informants were thus not available. In others, CS leaders fell ill. We mitigated this by adjusting and extending the period of the research.

Uncertainty is also related to the open-ended questions in the questionnaire. On the one hand, this widened the content of the received answers. On the other hand, however, in order to adequately display the answers to the questions dealing with examples of good practice, challenges and solutions, we had to classify the answers into groups. There may have been a subjective assessment by this report's authors in classifying the informants' answers into recommendation groups.

Further, Hungary having 33 informants makes bias towards the perspective of the Hungarian informants, whereas Sweden, Belgium and Lithuania have only few informants.

Finally, only few informants answered some questions. Several informants did not provide an answers for the same question. Results are also interpretation of written qualitative information in a questionnaire, not much room for follow up/in-depth info. Hence the information provided as based on the perspectives of only few, makes it challenging to know if this reflects the general understanding. As the selection and number of informants in each case varies greatly, we were caution on comparing results between CSs. For that reason results are presented as illustration of the issues and legislation was highlighted in each case study separately.

Cross-sector surveys have several benefits. They are (i) inexpensive, (ii) relatively fast, (iii) get large amounts of data from a large pool of participants, (iv) enable correlation of several variables with a critical variable of interest, (v) can be utilised as a tool for evidence that can serve as a guide for developing further policy recommendations (Levin, 2006). This type of research also has shortcomings. First, other variables may affect the relationship between the identified cause and the outcome. Second, it does not allow conclusions to be drawn about causality. Third, differences between individual groups of participants (cohort differences) may arise according to their experience (period of birth, geographical area of operation). Furthermore, responses obtained through questionnaires on specific aspects of people's actions may not always lead to accurate reporting (Biased reporting), but there is usually no effective mechanism for verifying the information obtained (Levin, 2006).

4 Results

4.1 Challenges and possible solutions in governance and policy instruments for mainstreaming NSWRM at the European and biogeographical level

This chapter presents policy arrangements across all project CSs as perceived by informants. The purpose of the research conducted under deliverable D6.2 was to:

(i) record and analyse the competencies of the informants who are involved in the promotion and implantation of the considered measures;
(ii) carry out a measures situation analysis of implementation in the policy;
(iii) analyse challenges, i.e. gaps and compatibility issues in policies;
(iv) analyse communication strategies on promoting the implementation of measures;
(v) present solutions in legislation and governance arrangement to improve the promotion of water and nutrient retention measures (i.e. water-use efficiency, tools and techniques for water and nutrient management and economic sustainability of technologies).

The presented results are based on a survey conducted among informants between 1st December 2021 and 28th February 2022. Altogether, 144 filled-in questionnaires were obtained by CSLs out of 216 expected. Survey results Statistics Tables, and Survey results - Graphical – Figures are provided in more detail in Annex C and Annex D.

4.1.1 Basic information on informants

A Group of 144 informants came from ten EU and two non-EU European countries. They were represented by 40% of females and 56% of males (4% no answer). Informants were evenly distributed among age groups, with approximately 18-20% in three age groups between 18 and 55 years. Professionally, they were primarily active in the public sector (75%) and had an MSc education (55%). Most informants came from Hungary, Poland, the Czech Republic and Slovenia (Figure 4.1).

The informants belonged to five stakeholder groups (50.7 % authorities, 25.0 % experts, 17.4 % research and science, 4.2 % NGO and 1.4 % other) and presented three different governance levels (47.9 % national, 34 % regional, 16.7 % local) and five sector groups (27.4 % agriculture, 32.6 % water management, 26.5 % environment and nature, 7.4 % spatial planning and 6 % climate change).

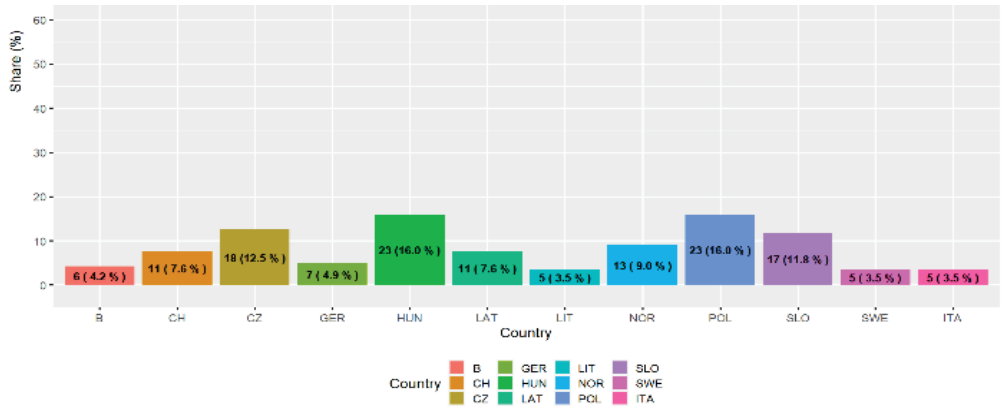


Figure 4.1: Distribution of informants over the case study countries.

4.1.2 Competences of stakeholders - basic and advanced knowledge about policies

In this group of questions, the knowledge of policy arrangements addressing the relevant environmental challenges was recorded (floods, droughts, nutrient loss and recovery, climate change and nature conservation). In addition, the participant's familiarity with the environmental challenges and agri-hydro-environmental measures studied in the project was observed and recorded. These answers were helpful to group stakeholders based on their practical and theoretical experiences.

For instance, question 4 was of special importance in this relation, since it asked the informants to select a central field of expertise and rate the level of knowledge on selected policies of interest for the project. Since with almost 49 % water management is the primary expertise, it was expected that informants would have the highest rate of knowledge (4.9/7) in this field (Figure 4.2). On the other hand, informants had the fewest knowledge of spatial planning in all three biogeographical regions.

The majority of the informants in the Pannonian biogeographical region indicated that their central fields of expertise are in agriculture and environment, whereas for the Boreal region most informants have their key expertise in environmental and water management, and for the Continental region most respondents quoted water and environment as main expertise.

To check whether they are familiar with environmental challenges addressed in the project, we asked the informants which of the listed challenges they had already addressed at work and how central they are to their expert work on a scale from 1 to 7 (Figure 4.3).

Overall, informants responded that nature conservation challenges, followed by mitigation/adaptation to climate changes and excess or water shortage, were most often addressed in their work, with an average score above 4. Conversely, the least often addressed challenges were nutrient recovery from streams with a score below 4 (Figure 4.3).

Regarding challenges, essential differences between bio-geo-regions were observed. For example, in the Pannonian region, challenges dealing with shortages of water resources and soil water retention measures were of high importance, while nutrient recovery was of low importance. On the other hand, the nutrient recovery and in-filed

nutrient retention were the least important one for the informants' work in the Continental region, where nature conservation, climate change mitigation/adaptation, and excess and water shortage were equally important. Interestingly, in contrast to the Pannonian and Continental regions, high importance of in-field nutrient retention and nutrient recovery and low importance of water shortage, and in-field water retention was observed in the Boreal region.

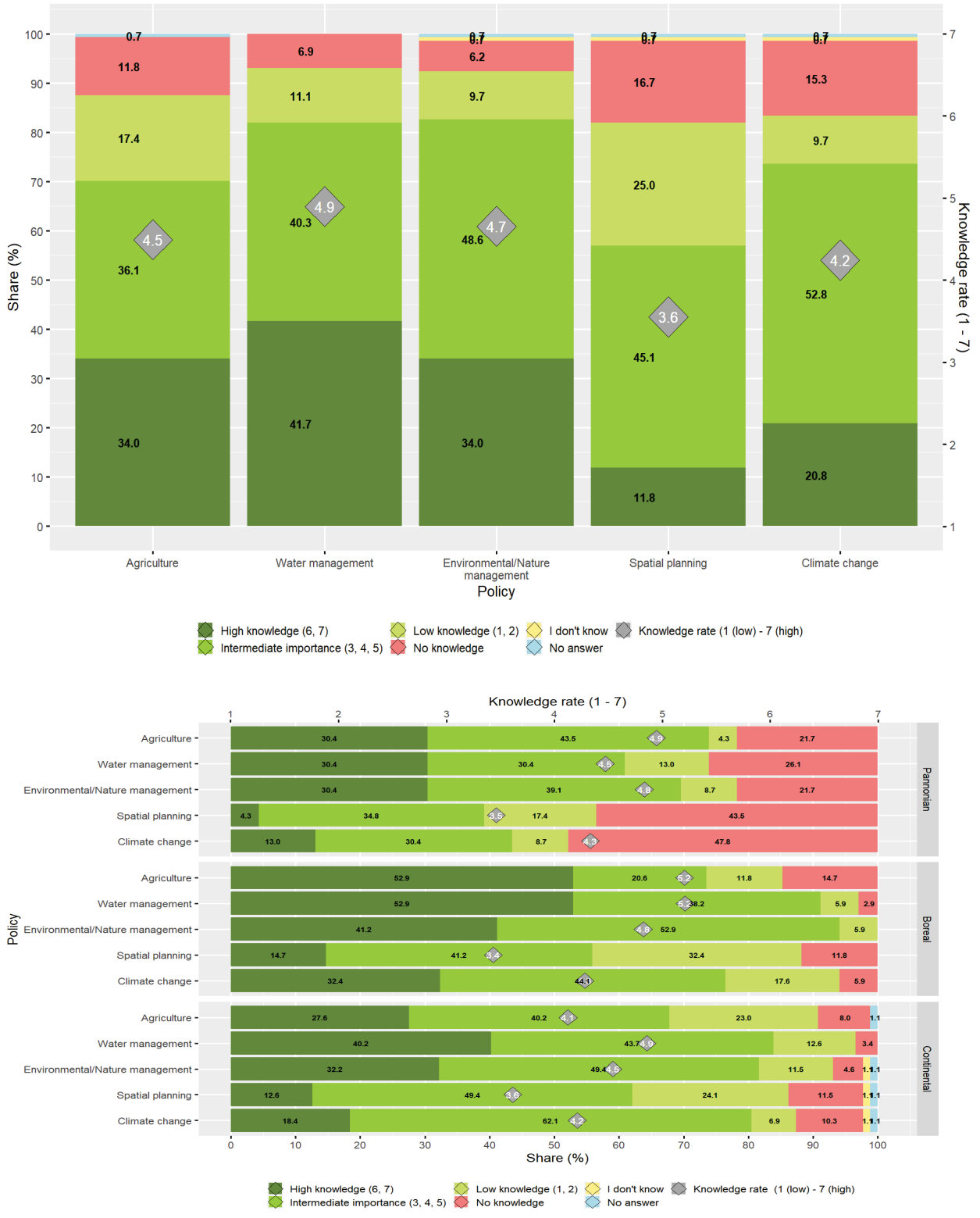
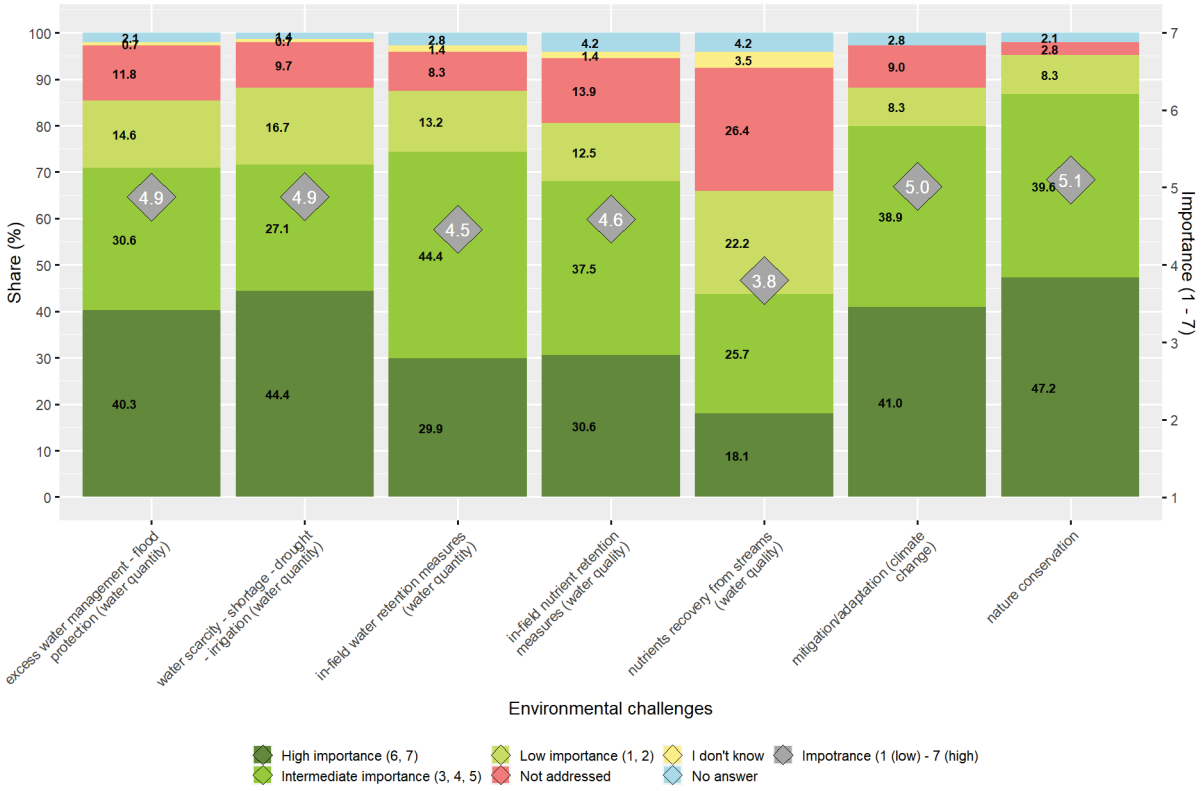


Figure 4.2: Central field of expertise and self-rate of the level of knowledge on policies, legislation, regulation, strategies, and programmes for all presented fields of expertise (rate 1-7) as given by the informants.



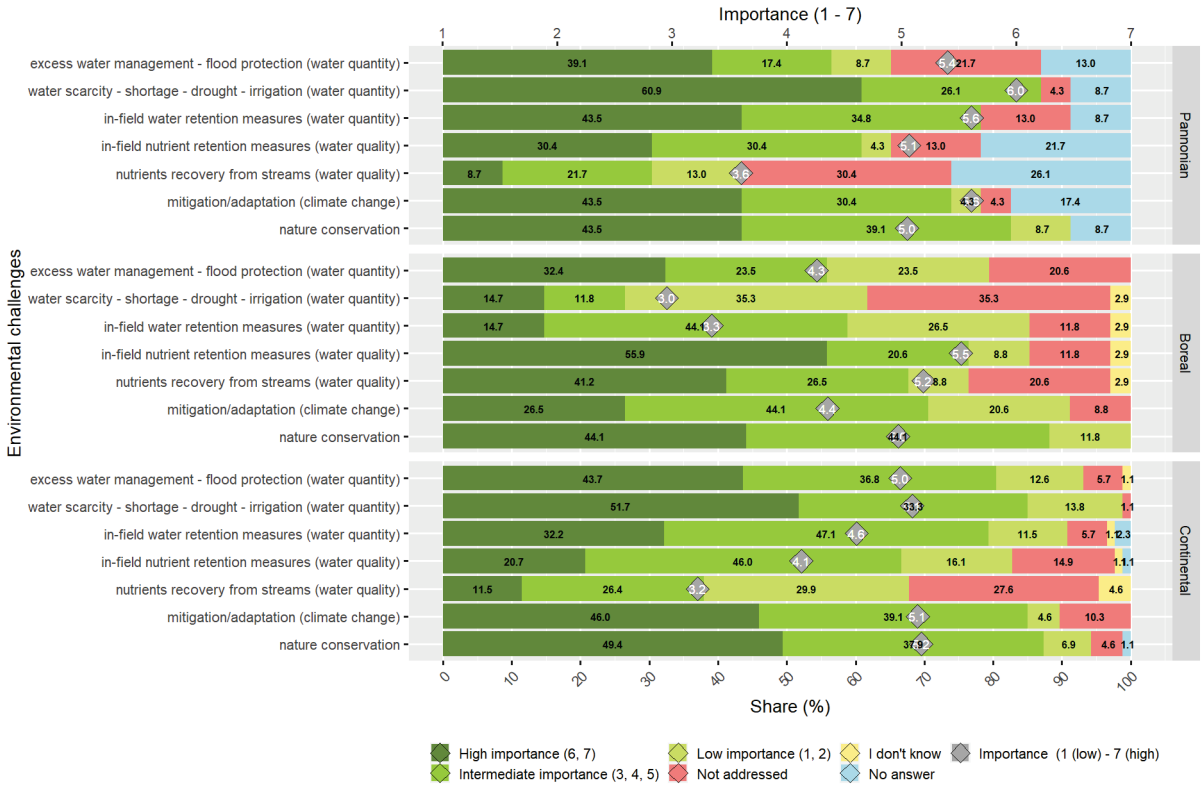


Figure 4.3: Environmental challenges that the informants have addressed at work, rated for the importance to their expert work (1-7).

Overall, 40% of informants were involved in implementation or planning of at least one of the stated measures (Figure 4.4). From the point of view of agricultural measures, they most often dealt with buffer strips and hedges with an average score of 5, followed by a green cover, low till, crop rotation, and management of meadows and pastures with an average score higher than 4.5. At work, informants rarely encounter traditional terracing, early sowing, and strip cropping along contours with a score below 4.

Figure 4.4: Responses of the informants to the question on the frequency of encountering any of the following agri-hydro-environmental measures at informants' work and frequency of dealing with them (number of cases, frequency) on a scale from 1 (rare) to 7 (regular).

The results at the regional level were slightly different (Annex C). In the Pannonian region, most informants encountered the measure of managing meadows and pastures. They often dealt with measures related to crop rotation, controlled traffic, and green cover at work. However, only the no-till measure received a score lower than 4. In the Continental and Boreal regions, most informants encountered measures related to buffer strips and hedges. Furthermore, they often dealt with measures of green cover, crop rotation and low till (in Continental region grade higher than 4) and additionally no-till and green cover measures (at Boreal region score higher than 5).

Considering hydro-morphological measures, informants most often dealt with basins and ponds, with an average score of 4.9. This was followed by wetland restoration and stream bed re-naturalization with an average score higher than 4.5. Informants rarely encountered restoration and reconnection of seasonal streams and nutrient recovery from streams, which was represented by a score lower than 4.

The results at the regional level were slightly different (Annex C). In the Pannonian region, most informants encountered measures related to wetland restoration and management. Informants often dealt with measures related to the re-connection of oxbow lakes, the restoration of natural infiltration to groundwater, and establishing basins and ponds. However, only eliminating riverbank protection and re-naturalising polder areas received a rating lower than 4. In the Continental region, most informants encountered the basins and ponds measure. Informants often dealt with basins and ponds and stream bed re-naturalization measures with a score higher than 4.5. In the Boreal region, most informants encountered wetland restoration and management measures. Informants most often dealt with nutrient recovery measures, wetland restoration and management and basins and ponds, all with a score higher than 4.5.

4.1.3 Measures situation analysis of implementation in the policy

Informants were asked to identify at least one type of legislation that, in their opinion, has the greatest impact on implementing agricultural and hydro-morphological measures for water and nutrient maintenance. They mentioned 94 times national (65%), 25 times regional (17%), and 5 times local (3%) level governance documents (Table 4-1).

Table 4-1: Responses of the informants to the request to "Name at least one document (act, regulation, decree, strategy, programme) that has, by informants' knowledge, the most significant impact on NSWRM (agriculture or hydro-physical) implementation in CSS/Region/State."

Type of policy/legislation	Level of governance				Total	
	National	Regional	Local	All levels	No.	%
EU - WFD - RBMP	25	4	2	2	33	22.9
Water management	21	1		1	23	16.0
EU - CAP	13	6			19	13.2
Environment	2	8		3	13	9.0
EU - ND	7	1			8	5.6
Agriculture	5	1			6	4.2
Nature	2	1	2		5	3.5
Climate	2	2			4	2.8
Drought	4				4	2.8
EU - Biodiversity	3				3	2.1
Spatial planning	2			1	3	2.1
Agricultural land	1				1	0.7
Building	1				1	0.7
Drainage systems				1	1	0.7
EU - Green Deal	1				1	0.7
EU - NATURA			1		1	0.7
EU - Wastewater management	1				1	0.7
Forest	1				1	0.7
Land consolidation	1				1	0.7
Regulation NSWRM	1				1	0.7
Soil	1				1	0.7
Water damage mitigation plan		1			1	0.7
no answer					12	8.3
Total (No. of response)s)	**94**	**25**	**5**	**8**	**144**	**100**
Total (%)	**65**	**17**	**3**	**6**	**100**	

* EU - informants directly stated EU directive or to directives connected legislation; no EU - national/regional/local level legislation

At the level of all CSs, the informants pointed out the legislation in the field of water policies was the most important (39%), i.e. the Water Framework Directive (22.9%), to

which we can add the national/regional legislation in the field of water management (16%). It was followed by legislation in the field of agriculture (21%), i.e. the Common Agricultural Policy (13.2%), the Nitrates Directive (5.6%) and National Agricultural Legislation (4.2%). Informants also mentioned legislation in the field of nature and the environment (15.3%), i.e. national legislation in the field of the environment (9%) and nature (3.5%), EU Biodiversity Strategy (2.1%), Natura 2000 (0.7%). Climate change adaptation legislation was mentioned less frequently (7%), namely national programs and strategies on climate (2.8%), drought management (2.8%), NSWRM regulation (0.7%) and water damage mitigation plan (0.7%).

At the level of bio-geographical regions, informants in the Boreal region highlight national environmental legislation (35.3%) and the Water Framework Directive (26.5) as most important (Annex C). In the Continental region, national water legislation (25.3%), the Water Framework Directive (17.2%) and the Common agricultural policy (17.2%) was indicated as most relevant. Finally, in the Pannonian region, the Water Framework Directive (39.1%) and the Nitrates Directive (21.7%) were highlighted.

Informants were asked whether the listed environmental concerns/issues (excess of water, shortages of water, in-field water retention, nutrient recovery from streams, in-field nutrient retention, sustainable agriculture, climate change mitigation, nature conservation) were included in the legislation and how thoroughly this is considered, rated on a 1-7 scale (Figure 4.5). Overall, the informants most often mentioned the legislation on nature conservation (93.8%) which was followed by the management of water shortages (78.5%) and excess water (77.8%). The issue of nutrient recovery from streams was mentioned the least (56.2%). In assessing the degree of incorporation of themes into policies, nature conservation (5.2), excess of water (5.2) and sustainable agriculture (4.6) were more relevant than water shortages (4.3). In contrast, nutrient recovery from streams (3.8) and in-field water retention measures in agri-production (3.6) had a score lower than 4 (Figure 4.5).

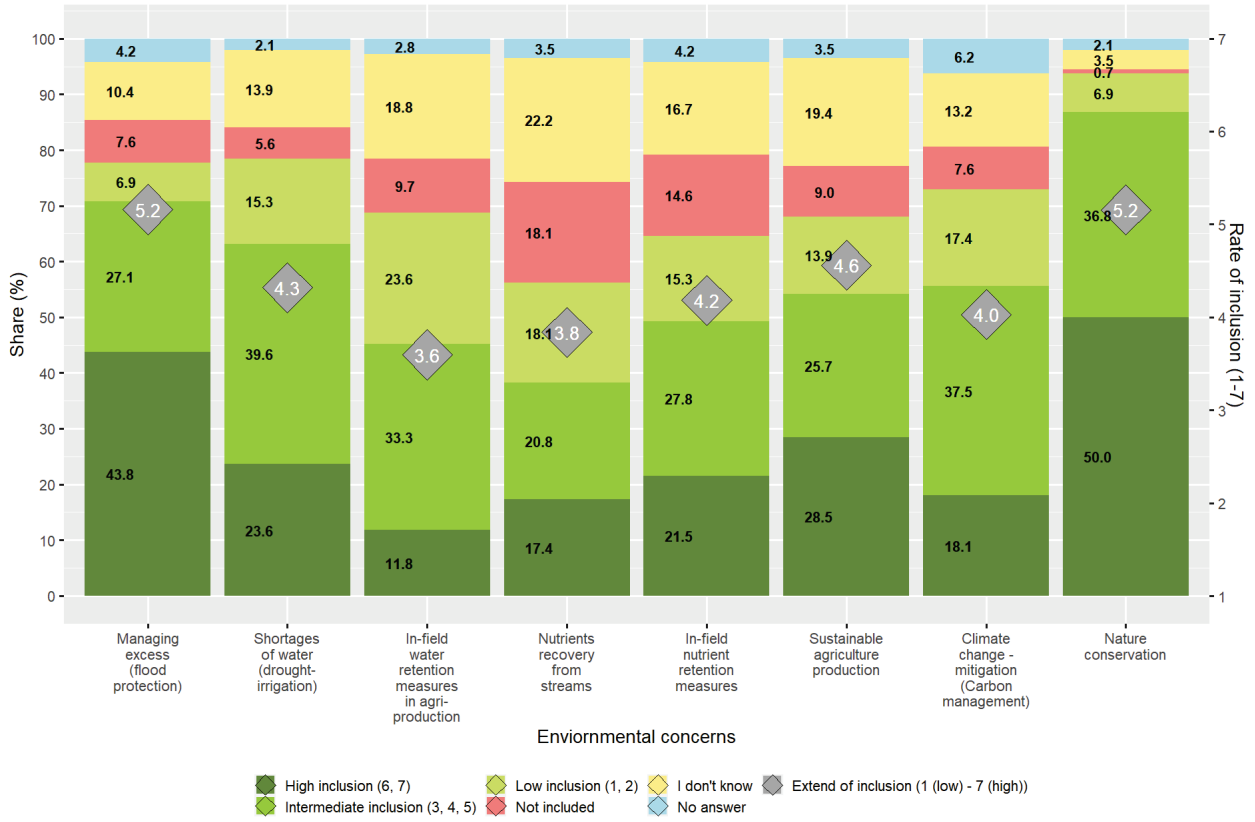


Figure 4.5: Inclusion of listed environmental concerns in legislation - degree of incorporation of project topics into legislation by rating 1-7 given by the informants.

At the level of the three bio-geographical regions, nature conservation was most often mentioned as most comprehensively included in the policy (85-98%). In the Pannonian region, it was followed by water shortages (drought), in-field water retention, sustainable agricultural production and management of water excess (floods). A similar pattern was repeated in the Continental region, where the topic of climate change mitigation joined with a high share (80.6%). In both regions, in-field nutrient retention and nutrient recovery from streams were identified as relatively poorly integrated into legislation (3.4-3.9). Conversely, in the Boreal region, the latter topics were most often recognized as highly incorporated into legislation, which was also confirmed by the high inclusion score in legislation (4.5-5). In this region, the topics of water shortages (drought) (3.7) and in-field water retention (2.9) had the lowest levels of inclusion (Annex C).

Informants were asked to rate the degree of inter-compatibility of the central policies covered by the project (water, agriculture, spatial planning, nature conservation, climate change) in terms of water quantity and quality (excess of water, water shortages, in-field water retention, nutrient recovery from streams, in-field nutrient retention). Figure 4.6 depicts the results of this part of the survey.

Overall, about a quarter of the informants did not have enough knowledge to assess the compatibility. About a tenth of the respondents believed that policies are incompatible in addressing the same environmental concerns/issues. According to the informants, the policies were most inter-compatible in excess water management (flood protection), followed by water shortages (drought-irrigation). Only a tenth of informants believed that policies were highly compatible. A compatibility assessment score of less than 4 for

all the environmental concerns addressed by the project indicated considerable space for improvement in achieving better coherence between the central policies.

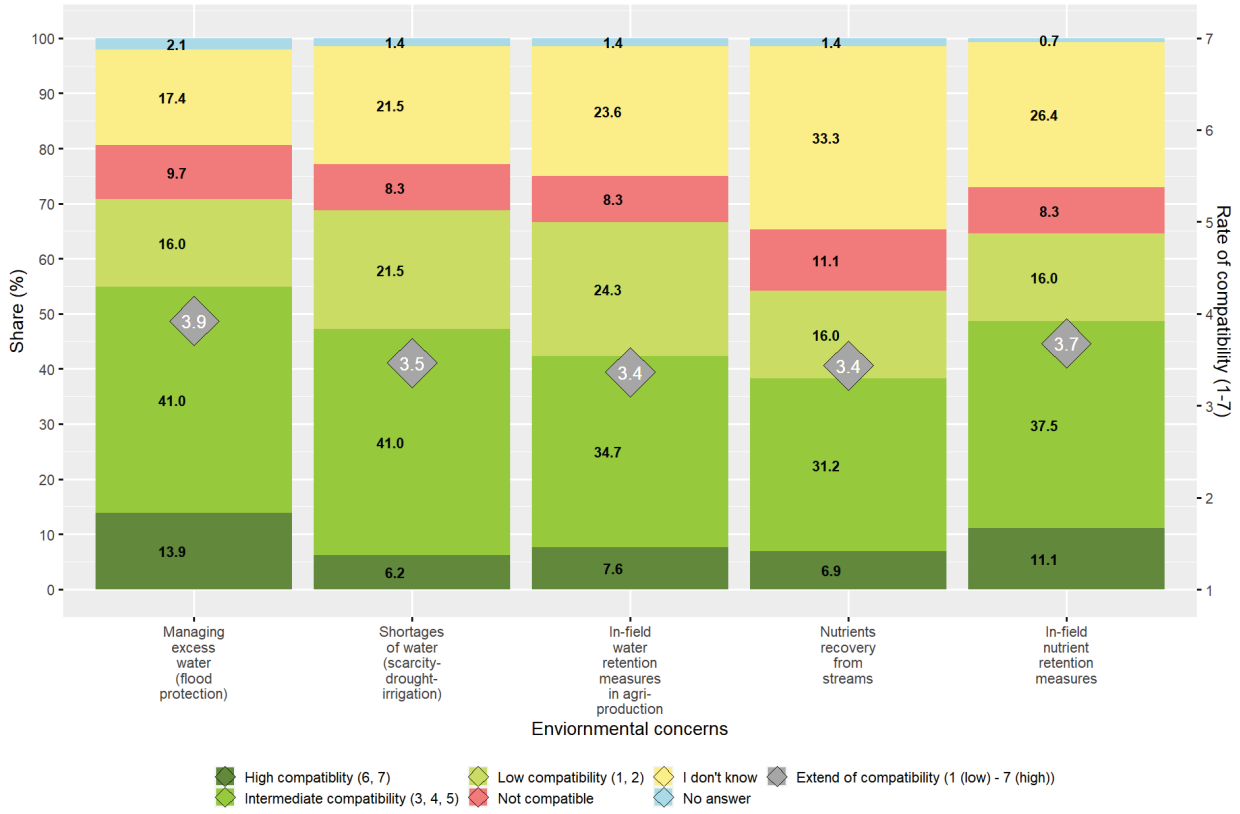


Figure 4.6: Compatibility of national policies on water, agriculture, spatial planning, nature conservation and climate change in terms of water quantity and quality and rate of compatibility (1-7) as given by the informants.

The perceived high policy compatibility of flood and drought management stands out at the Pannonian and the Continental region (Annex C). In contrast, informants in the Boreal region estimated that the policies on these two environmental concerns/issues were least compatible. As the most compatible, they recognize in-field nutrient retention measures. Informants from the Pannonian region were the least critical, and only a small part claimed that policies were not compatible (0-8.7%), followed by informants from the Continental region (5.7-11.5%) and the most critical (14.7-23.5%) informants from the Boreal region (Annex C).

Comments of the majority of the informants could be joined in three statements. The first one is from Poland, pointing out different aims, principles and perspectives of sectors: "*Policies and programs at the declarative level contain many positive elements (e.g. proposals for restoration measures), but in practice, they come down to anachronistic management of surface water resources aggravating the problems of drought and floods and leading to the degradation of river ecosystems".* The second statement (from Slovenia) is about improving implementation dynamic and execution: *"At the level of principle, it is harmonized, the question is how this is then implemented in practice or how it comes to life".* The third one comes from the Czech Republic, it proposes an improvement of cooperation between sectors: *"Strategies should be prepared in a better way. The strategy is to solve a problem in a way where work would be divided between responsible ministries, and the solution would be proposed in*

cooperation, based on competencies. However, currently strategies are developed in individual departments without a common connection point or only by sharing a basic awareness of their origin. This creates multiple strategies that solve the same problem in a quite different or contradictory way."

Table 4-2: General comment on compatibility issue from informants' (expert) perspective. The table shows the number of comments, grouped in different topics.

Comments on compatibility issues	Biogeographical Region			Total	
	Boreal	Continental	Pannonian	No.	%
Different aims between sectors	3	10	3	**16**	11.1
Improve cooperation	2	9	5	**16**	11.1
Implementation dynamic should be better	3	6	1	**10**	6.9
Different principles and perspectives between sectors	1	3	1	**5**	3.5
Differences between policies are getting smaller	1	3		**4**	2.8
Financial support of measure - improve compatibility	2		2	**4**	2.8
Low level of inclusion in policies		2	1	**3**	2.1
Water resources management - based on data	2	1		**3**	2.1
Derogations for selected areas and sectors	1	1		**2**	1.4
Include new knowledge/science in the process	2			**2**	1.4
Full compatibility is not achievable	2			**2**	1.4
Impact studies on the Implementation of measures from various sectors		1		**1**	0.7
Lack of long-term strategy, motivation and dedication		1		**1**	0.7
Less bureaucracy and more professionalism.			1	**1**	0.7
Only one sector supports beneficial activities		1		**1**	0.7
Policy favours one sector	1			**1**	0.7
Social interactions between actors determine compatibility			1	**1**	0.7
Spatial planning		1		**1**	0.7
Spatially larger challenges are more legally compatible		1		**1**	0.7
No response	14	47	8	**69**	47.9
Total	**34**	**87**	**23**	**144**	**100**

Informants were asked to assess how sound current policies address environmental concerns and issues at the CS level (Figure 4.7). Informants most often mentioned agriculture and water management policies, whereas spatial planning and climate change policies were indicated least often.

Overall, the informants estimated that local problems were currently best addressed by water management policy in the field of water quantity (floods, droughts) (5.1), water quality (protection against pollution) (4.7) and nature conservation (4.3), followed by the agricultural policy in the field of water quality (prevention of nutrient leaching) (4.3). This was followed by nature conservation policy with the area of water quality (4.2) and quantity (4.1) and climate policy with the area of water quantity (4.2). Finally, the lowest impact of policies on local areas was rated spatial planning policy on climate change (3.3) and water quality (3.5), agricultural policy on climate change (3.6) and climate policy on water quality (3.7) and nature conservation (3.8).

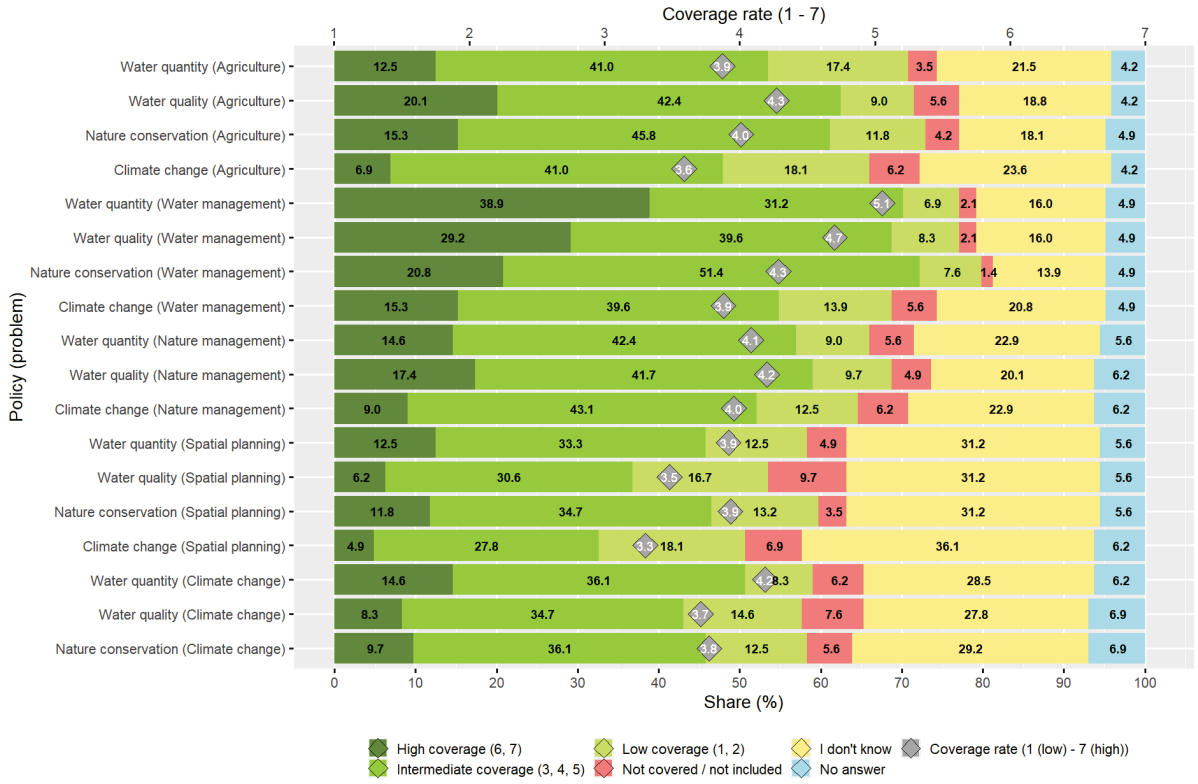


Figure 4.7: Responses of the informants to the question "Do policies cover/address presented matters/problems related to water quantity, water quality, nature conservation and climate changes at the CSS/local level?" The coverage was rated (1-7)."

In the Pannonian region, the water management policy in water quantity and quality, and climate change have the highest coverage rate (above 5) at CSS/local level (Annex C) stands out. On the other hand, the lowest score (below 4) was given to agricultural policy (water quantity and climate change) and spatial planning policy (nature conservation area).

In the Boreal region, with a score of 4.7, water management policy (quality and quantity) and agricultural policy (water quality) stand out positively. The lowest scores are awarded to climate policy in the field of nature conservation (2.9), spatial policy in the field of climate change (3) and nature conservation policy in the field of climate change (3.3).

In the Continental region, the water management policy in the field of water quantity (5) and quality (4.6) and nature conservation (4.2) stands out positively. On the other hand, the lowest rating of the impact of policies on local problems was given to spatial policy in the field of water quality (3.2) and climate change (3.2) and agricultural policy in the field of climate change (3.5) (Annex C).

4.1.4 Analyse of challenges, gaps and issues in policies

We asked the informants if they noticed any gaps in the policies that are the subject of this research regarding the integration of important environmental concerns/problems (water quantity, water quality, nature conservation and climate change) that affect the implementation of policies at the local level. Informants highlighted 257 gaps, which were classified into 26 groups (Table 4-3).

Table 4-3: Gaps in policies related to the inclusion of relevant environmental concerns (water quantity, water quality, nature conservation and climate changes) present at the CSS/local level, as identified by the informants. Legend: blue cells – 50% of all suggestions, green cells – 30% of all suggestions.

Gaps	Policy					Total	
Grouped in classes	Agriculture	Climate change	Nature conservation	Spatial planning	Water management	No.	%
conflicting policy objectives/goals	6	1	14	6	7	34	13.2
implementation/realisation of measures in practice		7	5	4	7	23	8.9
lack of local/regional agricultural/water/nature/climate strategies	6	8	3	2	4	23	8.9
lack of knowledge on costs and benefits	5	3	3	4	6	21	8.2
administrative/regulatory burden	8	1	1	1	6	17	6.6
lack of water and climate measures	7	2		1	7	17	6.6
promotion of sustainable management practices	13				2	15	5.8
lack of communication between stakeholders	2	2	3	5	2	14	5.4
lack of control in the field	5			2	6	13	5.1
increase funding of measures	7		2		3	12	4.7
site-specific spatially targeted measures/protection	5	1	3	1	2	12	4.7
long-term condition of the environment (water quality and quantity, biodiversity)	4	3	1	1	1	10	3.9
lack of river-basin approach planning and management	1	1	1	1	3	7	2.7
low integration in environmental policies		1		5		6	2.3
lack of human resources			1	1	2	4	1.6
lack of technology		1			3	4	1.6
lobbying of interest groups	1		1	1	1	4	1.6
low integration in agricultural policies				4		4	1.6
low legal requirements		1		3		4	1.6
individuals are not heard	2		1			3	1.2
lack of mandatory subsidised measures	3					3	1.2
increase protection sites			2			2	0.8
exemplarity of the state is missing			1			1	0.4
conflicting policy objectives/goals"			1			1	0.4
lack of effective mechanisms to acquire rights to properties for renaturization purposes.				1		1	0.4
no legal acts		2				1	0.4
Total	**75**	**34**	**43**	**43**	**62**	**257**	100

As many as 80% of all gaps were classified into 12 groups (Table 4-3 – blue and green colour). The first six groups of gaps represent more than 50% of all informant suggestions (Table 4-3- blue colour). Among the most frequently mentioned gaps were: i) conflicting policy objectives and goals; ii) implementation and realization of measures in practice; iii) lack of local or regional strategies on policies; iv) lack of knowledge on costs and

benefits; v) administrative or regulatory burden, and vi) lack of water and climate measures. A detailed description of individual gaps is provided in Annex C – Q12.

The most extensive group of gaps referred to the broad definition of "conflicting policy objectives and goals" (13.2%). A detailed view shows that informants pointed out the unresolved relations between the desire to maximize food production and the protection of natural habitats and water resources. Or on the other hand, flood safety (grey infrastructure) and habitat protection are mentioned. They also pointed out that the NSWRM measures that were already included in the schemes were not designed to achieve the objectives of the WFD, BSAP (Baltic Sea Action Plan) and others. The water issue is addressed in several policies, and corresponding strategies at different administrative levels and rarely involves all sectors comprehensively. One exception are the River Basin Management Plans (RBMP) under the Water Framework Directive, which combine all policies, but their implementation relies heavily on the goodwill of other sectors. At the same time, for example, the financial period of the CAP and the WFD is not compatible, and the funding of measures is strongly linked to the adoption of annual state budgets. Informants point out that access to water resources is seemingly high, but often not adequately assessed. They observe a one-sided presentation of reservoirs' water retention effects, missing clearly defined ecological effects on wetlands or ecosystems in general. Construction projects that only superficially include local hydrological conditions are highlighted. Some informants point out the subordinate position of legislation in the field of biodiversity outside protected areas, where water elements on agricultural land are difficult to protect, as professional services only give opinions. Many of the reported gaps are related to drainage ditches and an understanding of their ecological or agricultural function. The respondents also point out the beneficial effect of buffer zones along watercourses, but draw attention to their maintenance problems. Due to the results of the survey, gaps are also present in the water management of protected areas. Among the proposals is the regular updating of sectoral legislation to increase policy coherence.

We asked informants which policy documents, at various administration levels, contain the most significant barriers to better promotion, implementation and enforcement of water and nutrient retention measures at farm or river basin level (water-use efficiency/use of tools and techniques for water and nutrient management/economic sustainability of technologies) (Table 4-4). We then asked them to rate the magnitude of the barrier effect in practice (Figure 4.8).

Four types of documents were most frequently mentioned: i) National - Water Act; ii) Local – Municipal Spatial Plans; iii) Regional/National - Rural Development Program / Strategic plan of Common Agriculture Policy; iv) National - Spatial Management Act (Table 4-4). The results strongly emphasise spatial policy as such significant barriers, especially concerning land ownership rights. Often the implementation of measures interferes with i) land use type, which affects the quantity and quality of the crop (agriculture-environmental protection), or ii) land use rights such as restriction of rights to freely cultivate the land, prohibition of construction and expropriation (construction of water infrastructure, water bodies, establishment of protected areas).

In relation to the Rural Development Program/Strategic Plan of the Common Agriculture Policy (regional/national), we noted conflicting views. Some informants viewed that the agricultural policy places too little emphasis on the implementation of

effective targeted measures and that the emphasis is only on increased production ("*Lack of focusing in agricultural production on pro-environmental aspects of production - environment is often neglected in agricultural production costs*").

Informants pointed out that the system is too rigid and weakly adaptable from the point of view of funds for new measures (*"Lack of flexibility of funding programs, requirements for farmers, limited extent of funding opportunities, limited compatibility among water, nature protection and agricultural funding legislation"*).

Table 4-4: Responses of the informants to the question "Which policy documents contain the barriers/issues in legislation that prevent better uptake of the water and nutrient retention management measures (water-use efficiency/use of tools and techniques for water and nutrient management/economic sustainability of technologies at farm and catchment level)?

Legal document	Policy					Total	
	Agriculture	Climate change	Environment and Nature management	Spatial planning	Water Management	No.	%
EU - CAP	5	1	1		1	8	5.4
EU - Fork-to-table strategy			1			1	0.7
EU - Green Deal		1				1	0.7
EU - INSPIRE Directive				1		1	0.7
EU - Law on state aid	1					1	0.7
EU - NATURA 2000			1			1	0.7
EU - Soil Strategy 2030	1					1	0.7
EU - Waste water directive					1	1	0.7
EU - WFD					7	7	4.8
Local - Climate adaptation plans		2		1		3	2.0
Local - Nitrate directive	1		1		1	3	2.0
Local – Municipal spatial plans	1	1	3	10	1	16	10.9
Local - WFD management plans					6	6	4.1
National - Act on fertilisers use	3				1	4	2.7
National - Act on the National Land Fund	1					1	0.7
National - Agriculture Act	2					2	1.4
National - Agriculture Land Act	3			3	2	8	5.4
National - Building Act				1	1	2	1.4
National - Environmental Protection Act			5		1	6	4.1
National - National Energy and Climate Plan		2	1			3	2.0
National - Nature conservation Act			7	1		8	5.4
National - Regulation on fertilisation	2				3	5	3.4
National - Regulation on Material Flow Balancing	1					1	0.7
National - Spatial Management Act	2			7	3	12	8.2
National - Waste management Act	1					1	0.7
National – Water Act	3	2	3	1	19	28	19.0
Regional - Rural Development Program / Strategic plan of Common Agriculture Policy	13	1			1	15	10.2
Regional - Water					1	1	0.7
Total	**40**	**10**	**23**	**25**	**49**	**147**	**100**

In conjunction with the National - Water Act, the Water Framework Directive and River Basin Management Plans on the national or local level were often mentioned. Among

the barriers the informants pointed out: poor water management planning; favouring of grey infrastructure; complexity of regulations and high-regulatory requirements; and lack of financial motivations for landowners.

Informants were asked to estimate the magnitude of the severity of indicated barriers on a scale of 1 to 7 (Figure 4.8, Annex C). The results show the importance of all barriers, as the magnitude rating exceeds the grade 4 for all policies. The highest rate was achieved by agricultural (5.2) and spatial planning (5.1) policies, followed by water (4.9), environmental/nature (4.7) and climate change (4.5) policies.

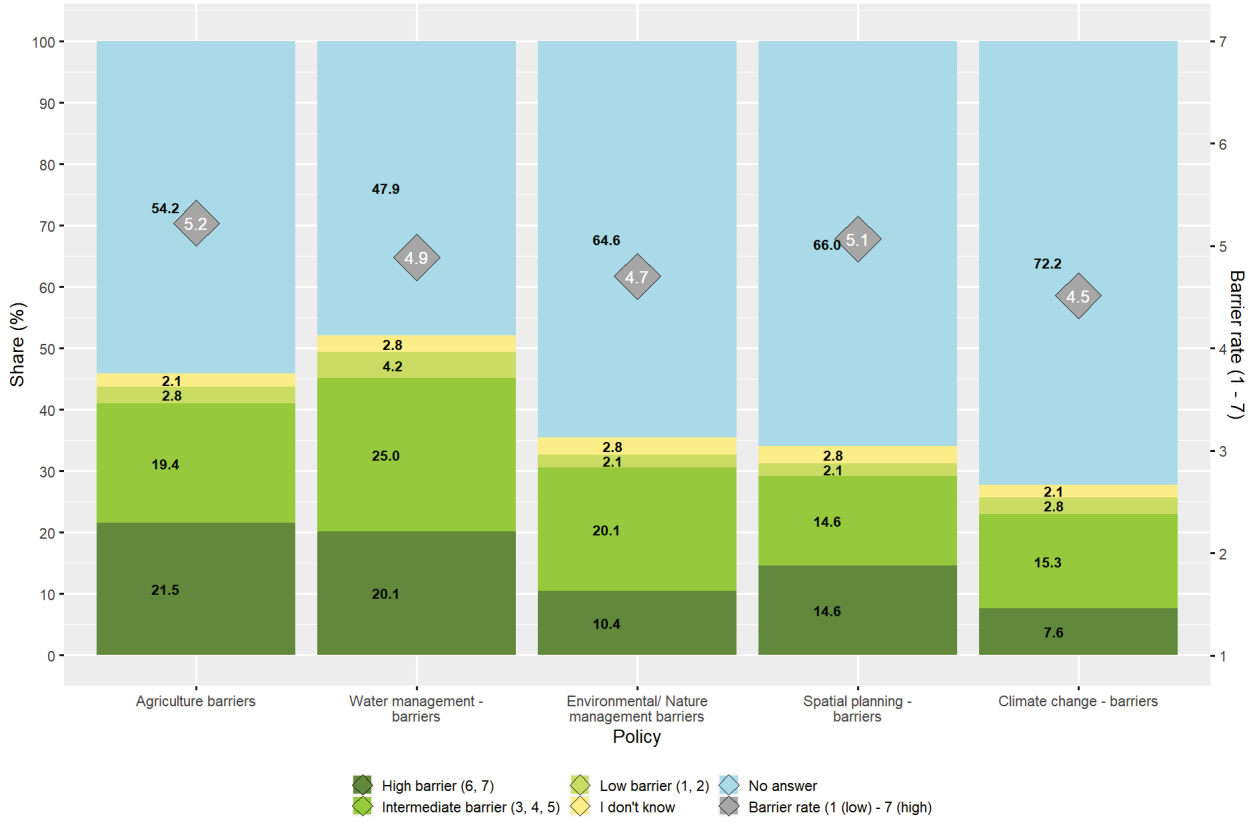


Figure 4.8: Rating of the magnitude of the barriers/issues effect in practice that originate form legislation and prevent better uptake of the water and nutrient retention management measures (water-use efficiency/use of tools and techniques for water and nutrient management/economic sustainability of technologies at farm and catchment level) as given by the informants.

We asked the informants to select the barriers that prevent better implementation of water and nutrient retention measures when the basis for implementation are EU legislative documents (CAP, WFD, ND, NATURA 2000) (Figure 4.9). The five most frequently mentioned barriers that also had the highest importance (above 4) were: (i) landowners, (ii) farmers, (iii) policy implementation/regulatory agencies/control, (iv) national legislation/plan/programme, and (v) water managers. The EU legal documents and their content are considered to be a less critical barrier. Informants noticed the emergence of barriers in the transfer of EU directives to national legislation and then in the policy implementation, regulation and control of accepted commitments. When landowners and farmers lack interest in the implementation of the measures because they are not properly motivated (governance issues) and this is joined with implementation deficit related to inappropriate policy mechanisms for implementation

of measures, then efficient placement and management of the NSWRM measures is challenging. Measure implementation requires a considerable investment of energy from various stakeholders, especially public advisory services and local communities. The importance of reaching and properly motivating landowners and farmers to uptake nutrient and water retention measures is strongly expressed in all three biogeographical regions (Annex C).

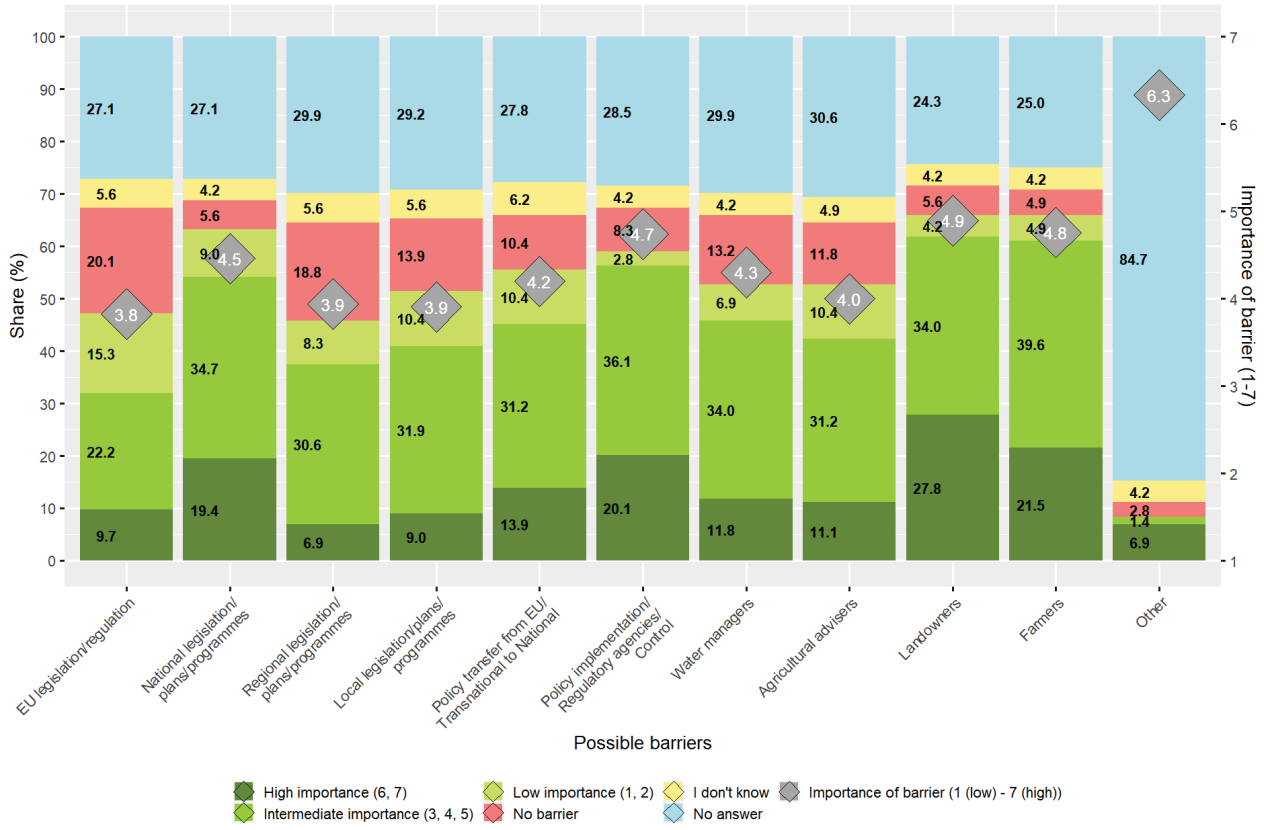


Figure 4.9: Origin of the barriers when legislation/governance originates in the EU and rating of the importance of each reason of barrier (1-7) as given by the informants.

Why is the emphasis on the importance of reaching and properly motivating landowners and farmers so strongly expressed in all three biogeographical regions? Is it the right to private property, lack of knowledge, fear of bureaucracy, state control over implementation, or a belief in the negativity of measures that reduce economic efficiency? We asked informants to specify general reasons for the barriers in two different questions, one focussing on soil management measures (SMG) and the other one on structural measures (SME) (Figure 4.10). SMG is how land/fields/soils are managed to generate impacts on the field scale – no-till, cover crops, crop rotation, mulching, strip cropping. SME affect the way the landscape is managed to change the processes and have an impact beyond the field scale (neighbouring fields, sub-catchment, catchment): Buffer strips, hedges, grassed waterways, terracing, wetland restoration, re-meandering, renaturation.

In the case of soil management measures (field scale impacts), the most frequently mentioned reason is the unfavourable cost-benefit relationship in the placement and implementation of measures. Additional reasons are the lack of communication and information, complicated implementation (in reality), administration and the fact that

decisions on the implementation of measures are voluntary. Informants attribute the most significant effect of indecision on implementation to the ratio between costs and benefits (4.7), legal ownership of land (4.7) and administrative barriers (4.5). According to the informants, the possible complexity of implementing the measures has the smallest effect (4.0).

In the case of structural measures (large-scale impact), the most frequently mentioned reasons for barriers in the implementation of measures are (i) complicated implementation in actual conditions, (ii) low cost-benefit and (ii) administration barriers, followed by (v) landownership. The informants attribute the most significant effect on the decision-making on the implementation of measures to the same five reasons (5). According to informants, possible control or inspection of implementation has the smallest effect on decision-making (4.1).

As a summary it can be stated that the informants believe that soil management measures are easy to implement, but the operators are concerned about the cost-benefit aspect and the lack of information about the measures. The informants believe that the structural measures are not demanding from the point of view of control and inspection. However, they are complicated to implement, with questionable cost-benefit economics, a lot of administration and problems due to land ownership in the implementation area.

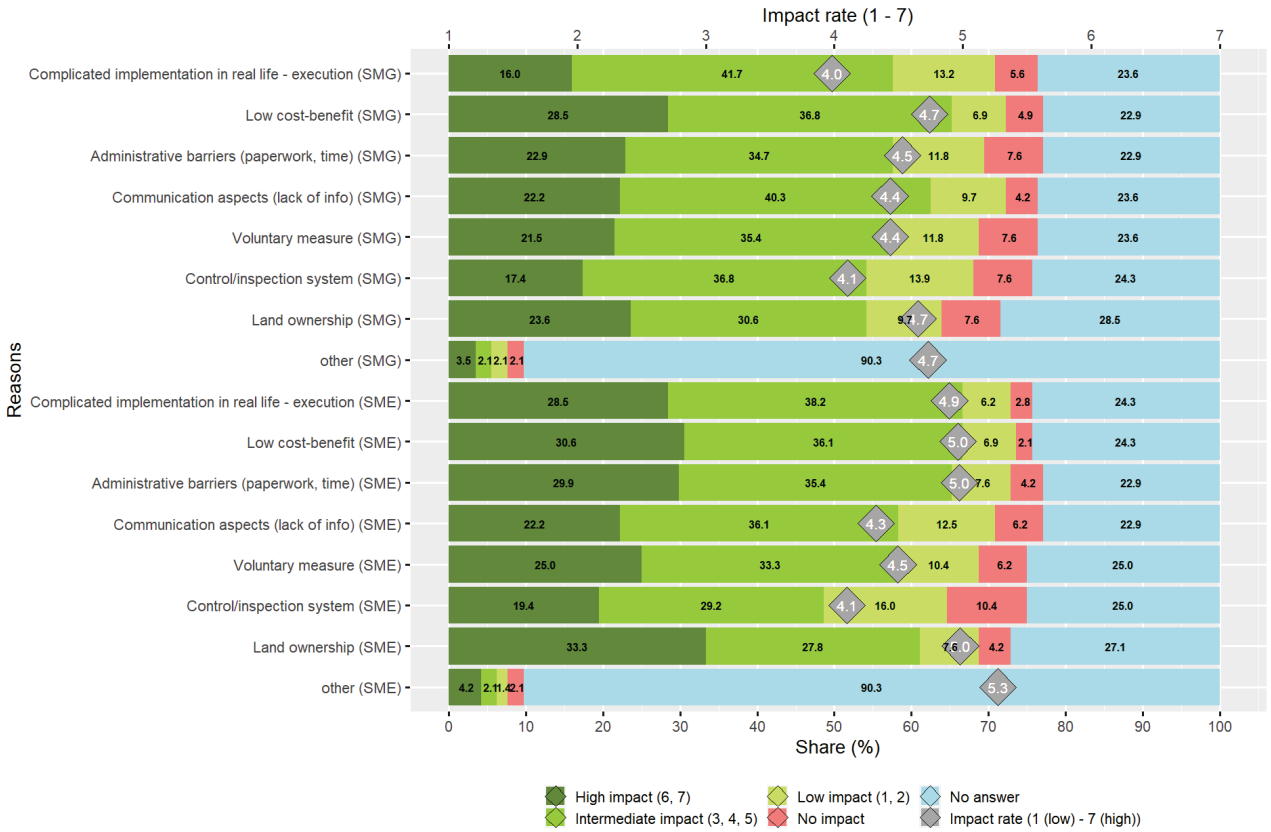


Figure 4.10: General reasons for the barriers in the implementation of soil management and structural measures by end-users as given by the informants.

4.1.5 Analysis of communication strategies to promote the implementation of measures

We asked the informants about the effectiveness of the existent communication strategies of the focal policies (agriculture, water management, nature management, spatial planning, climate change) with end-users at the local or catchment level (Figure 4.11).

Water, agricultural and nature protection management policies were mentioned most often as example for policies having the most effective communication strategies. From the point of view of communicating with the public at the local level, the informants rated agricultural policy as the most effective (4.3) and spatial planning policy as the least effective (3.6). Approximately one-tenth (6-16%) of informants estimate that policies are highly efficient in communicating measures foreseen in policies.

Figure 4.11: Effectiveness of policies communication strategies with the end-user at the CSS/local level as given by the informants.

In the Pannonian region, climate change (5) and nature management policy (4) are rated as the most effective and spatial planning policy (3.3) as the least effective in terms of communication. In the Boreal region, agricultural policy (5) and climate change policy

(4.4) are rated as the most effective and spatial planning policy (3.7) as the least effective in communicating with the public. In the Continental region, agricultural policy is rated as the most effective in communication (4.1) and climate change policy as the least effective (3.3).

Informants were asked to suggest possible improvements to the communication strategy to be more effective in promoting the implementation of studied measures at the CS/local level (Table 4-5). The open-ended question yielded 391 answers, which we classified into 14 groups. Over 58% of all answers fall into three groups of answers or suggestions, respectively:

- informal forums/meetings/workshops/demonstrations for interested stakeholders/focus groups (28.1%);
- improving the general knowledge of the stakeholders on the topic (communicating benefits) (18.9%), and
- active personal advice for farmers/landowners/stakeholders (11.3%).

Table 4-5: Responses of the informants to the request to provide proposals to improve communication of policies to be more effective at the CCS/local level to support the implementation of measures.

Possible improvement of the communication strategy to be more effective	Policy					Total	
	Agriculture	Water management	Nature management	Spatial planning	Climate change	No.	%
informal forums/meeting/workshops/demonstrations for interested stakeholders/focus groups	28	27	22	16	17	110	28.1
improving the general knowledge of the stakeholders on the topic (communicating benefits)	17	20	14	11	12	74	18.9
active personal advice for farmers/landowners/stakeholders	15	10	6	7	6	44	11.3
digitalisation of communication (web pages, social media, newsletter)	5	10	5	5	6	31	7.9
media information campaigns in public media (journals, newspapers, TV, Radio, web)	10	6	5	2	4	27	6.9
involve stakeholders in projects	3	4	4	4	3	18	4.6
changes not needed - a diverse set of communication strategies exists	6	4	2	2	2	16	4.1
the communication strategy should be a mandatory part of funded schemes (advice, information, practice)	10	2	2	1	1	16	4.1
formal education/training/workshops	3	3	3	2	4	15	3.8
improve communication between farmers/landowners and authorities	4	4	3	2	2	15	3.8
short communication materials (guidelines, instructions, practical examples)	2	5	1	2	1	11	2.8
adapt legislation / develop sectoral strategies		4		1	1	6	1.5
avoid political/lobbying interference	1	1	1	1	1	5	1.3
discussion among stakeholders based on local data and observations			1		2	3	0.8
Total	104	100	69	56	62	391	100

There are no major differences between the proposals for individual policies or biogeographical regions. However, among the other suggestions greater digitization of communication using the World Wide Web and extensive information campaigns in traditional public media stand out (Table 4-5).

Regarding the suggestions for advancing the communication strategy to improve NSWRM policy implementation **by using informal forums, meetings, workshops and presentations for stakeholders or target groups**, we provide few views from the informants in the text box below.

"Discussions with farmers through the Village Farmers Network about how different solutions can reduce costs."

Informant from Switzerland

"Throughout organizing meetings for a small group of interested people and organizing excursions to locations (towns, communities etc.) where changes have already taken place. Training and workshops for farmers with demonstrations on farms using solutions worth following. Demonstrating the long-term economic effects of applying specific practices"

Informant from Poland

"*Meetings (physical), webinars, presentations. It is a prerequisite that those who are to implement measures have a good understanding of problems, measures, what to do, and why.*"

Informant from Norway

"Practical seminars for representatives of regions and municipalities and end-users with memoranda of cooperation".

Informant from Czech Republic

"*Better use of River basin Boards consisting of all stakeholder groups for reaching their constituencies and broader audience.*"

Informant from Latvia

Regarding the suggestions for advancing the communication strategy to improve NSWRM policy implementation **by improving the general knowledge of the stakeholders on the topic (communicate benefits)** we provide we provide few views from the informants in the text box below.

"*In general, the peer-to-peer-communication can be enhanced, e.g. exchange of good practices between land users.*"

Informant from Germany

"*Presentation of good practices, education, raising of awareness. Improving expertise also in public extension service in agriculture. There is a lack of knowledge within the agricultural sector in some areas, and this should be upgraded and improved.*"

Informant from Slovenia

"*Better training for agricultural advisory services.*"

Informant from Sweden

"*Better introduce/explain to farmers the long-view behind and the rationale behind the policies, to enhance their interest and long-term vision of their investments/choices (more active involvement of end-users).*"

Informant from Italy

"*Improve the general knowledge of the stakeholders on the topic (communicate benefits) of such management, in particular by creating a 'give-receive' system of reversible (direct) benefits.*"

Informant from Lithuania

Regarding the suggestions for advancing the communication strategy to improve NSWRM policy implementation **by using more active personal advice for farmers/landowners/stakeholders,** we provide we provide few views from the informants in the text box below.

"*Extensive information from the authorities. Extensive area-wide, institutionalized and free consultation at farm level by independent consultants (financed by the public, addressing all environmental concerns).*"

Informant from Germany

"*Farmers "need" more help from advisors, to be able to implement environmental friendly farming.*"

Informant from Norway

"*Communicate via professionals who are responsible, through village administrator to find out what is needed*"

Informant from Hungary

"*Direct communication and offer of water management (revitalization, creation of wetlands, etc.) in areas owned by municipalities.*"

Informant from Czech Republic

"*There is no efficient communication at the basin level, exclusive agriculture organizations which are very active, suggested better involvement of agricultural experts in different ministerial working groups.*"

Informant from Latvia

Regarding the suggestions for advancing the communication strategy to improve NSWRM policy implementation **by using greater presence in digital and traditional media,** we provide we provide few views from the informants in the text box below.

"*Media information campaigns in public media (journals, newspapers, TV, Radio, web) are needed.*"

Informant from Poland

"*To share information on tenders and other opportunities for farmers, social networks should be used.*"

Informant from Slovenia

"*Straight to-point information, short and preferably visual, is needed (for example, informative short films.*"

Informant from Norway

"*Communicate importance of measures via audiovisual channels and social networks*".

Informant from Belgium

"*Produce accessible and understandable content on the internet, increase media involvement, develop strategies. Communicating the cause or purpose of some water management measures does not always reach the target audience.*"

Informant from Hungary

We asked the informants about the common ways to promote or enforce implementation of technologies on farms and in small agricultural catchment (Figure 4.12). Informants assessed the importance of given mechanisms. Incentives (financial support) was seen as the most common and important implementation mechanism. Penalties rated high as a way to enforce implementation of measures. Voluntary actions without legal or financial support (self-initiative) were seen lees important to effective promotion of measures on farms and in small agricultural catchments.

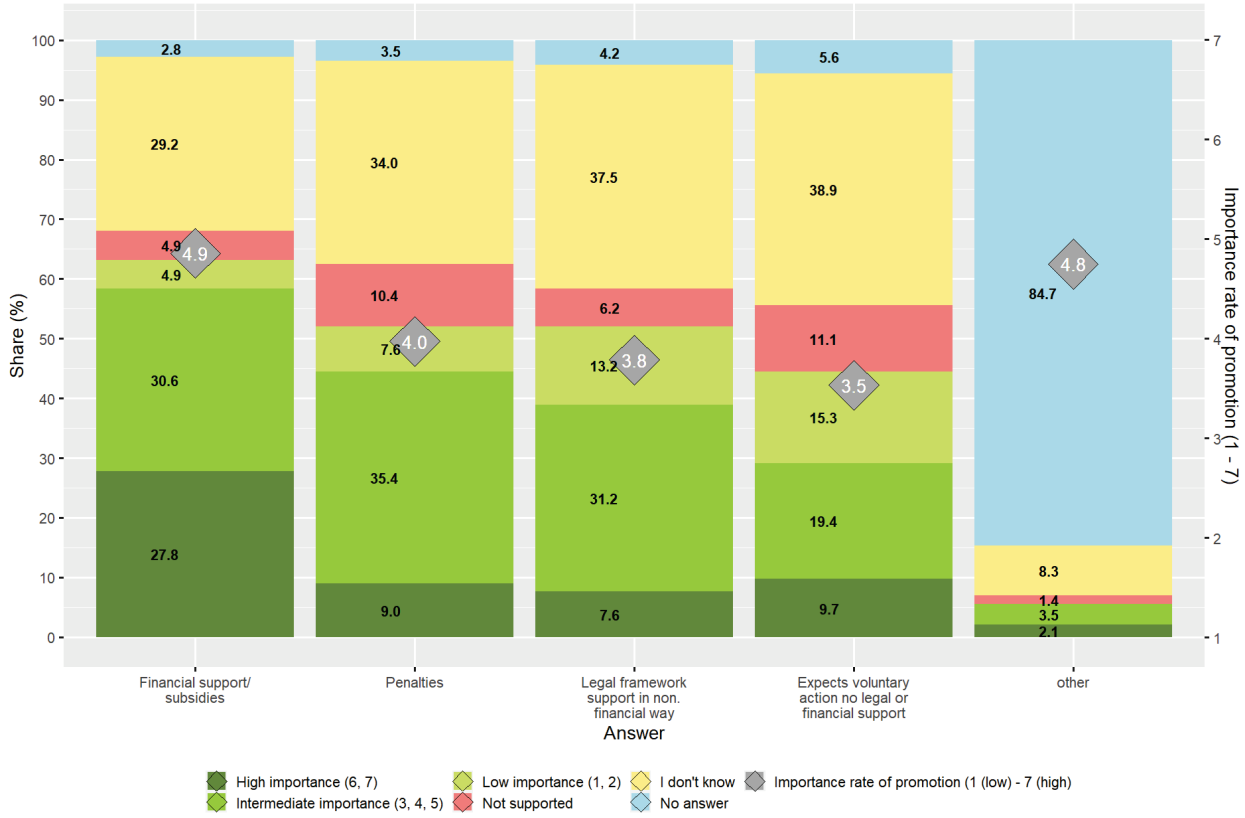


Figure 4.12: Promotion types for implementation of technologies on farms and small agricultural catchment level supported in the policy/legislation - with ratings of the importance of promotion types (1-7) as given by the informants.

We present some examples and opinions on mechanism to support implementation technologies on farms and small agricultural catchment level (Annex C). Informants stated that communication with end-users is essential for successfully implementation and that financial support on its own might not be enough. Informants viewed that using a combination of policy mechanisms (different forms of public intervention and voluntary measures) is the right way to fully and sufficiency promote implementation of measures at farm and at catchment scale.

The informants also touched upon the problem of insufficient financial support, especially when introducing new technologies and that cost-efficiency of measures is not clearly elaborated or defined for the end-users. In relation to that one informant outlined that compensation is often not clearly linked to the standard, stating we should first define clearly *"...what a standard is..."* to be able to define more precisely conditions for rewards (incentives) and conditions for penalties.

Additionally, informants outlined we should look closer at alternative ways to promote measures. In this context, the following example of reducing nutrient loads form agriculture was given "*Farmers respond very well to grant schemes in the regional environmental program. In connection with voluntary action: the price of fertilizer has risen, this impacts the use of fertilizer".* Informants also outlined the focus of policy mechanisms is often directed towards "*...fraud control..." instead "...sustainability of technique used...*".

Informants added it is not only necessary to combine measures but also engage with land-owner and land-users, especially "*..the young generation..*" with whom environmental and social aspects are integrated factors for sustainability.

We asked the informants whether the efficient use of water and nutrients is supported in national policies and legislation and how effectively they are promoted among end-users or stakeholders. We received identical answers to both questions (Figure 4.13).

According to the informants' assessment, slightly more excellent policy support in legislation and promotion of effectiveness is achieved in the field of nutrient use efficiency as compared to field of water use efficiency. However, about 40% of the informants estimate that the support and promotion are at the intermediate level, and about 10% believe that water and nutrient use efficiency is not supported or adequately promoted in the legislation. The average ratings of 3.5 for water efficiency and 3.6-3.7 for nutrient efficiency show that much has already been done in support and promotion, but there is still much space for improvement.

Differences between individual biogeographical regions are noticeable. In the Boreal region, the level of policy support and promotion of efficient use of nutrients, according to informants, is higher (4, 4.3) than that of water use (average rating 3.4, 3.3). In the Continental region, the factors for the support and promotion of water use (3.7, 3.8) and nutrients (3.6, 3.7) are almost equal. Informants from the Pannonian region rated both support and promotion of the efficiency of water use (2.9, 2.8) and nutrients (2.9, 2.9) with the lowest ratings.

We present informants' opinions on the policy support and promotion of efficient use of water and nutrients in Annex C.

Informants from Norway state that efficient water management is not an important topic: "*Efficient water management is not important in Norway.*" At the same time, nutrient use efficiency could be further improved: "*Fertilizer planning is required, but how farmers follow this up is unknown."* Furthermore, they think: "*Many farmers have a good fertilization plan, but not all of them use this tool well enough.*" Regarding promotion, the informants state: "*The communication varies a lot in time and between sub-basin districts. Whether the information provided has been received is also very variable.*" Moreover, they state: "*Farmers are the most important end-users, but the municipalities and advisory services are also important end-users.*" Informants from Latvia point out the abundance of water in the country: "*There is a surplus of fresh water in Latvia. As a result, water efficiency is not an issue to think about; therefore, such activities are not usual in Latvia. There is low awareness of society and low acceptance of water efficiency, as there is almost no need to*" and support of efficient nutrient use in the legislation: "*Regarding nutrient efficiency, there is a regulation on use of fertilizers and requirement to develop fertilization plans, but they are not implemented in most of*

the farms, they rather exist on paper only, here the answer is quite confident". Promotion of efficient use greatly varies: "*Promotion is very limited in the water sector, as this is not an issue in Latvia. Promotion is better regarding using nutrients on fields, with existing training for farmers*".

Informants from Hungary state that stakeholders groups provide information and that implementation depends on individual personal decisions: "*Those for whom ecosystems and ecosystem services are important will find support, those for whom they are not a value will not change much. Therefore, the two groups would be valued differently*". Moreover, they mean: "*The Common Agricultural Policy provides incentives for efficient nutrient use*."

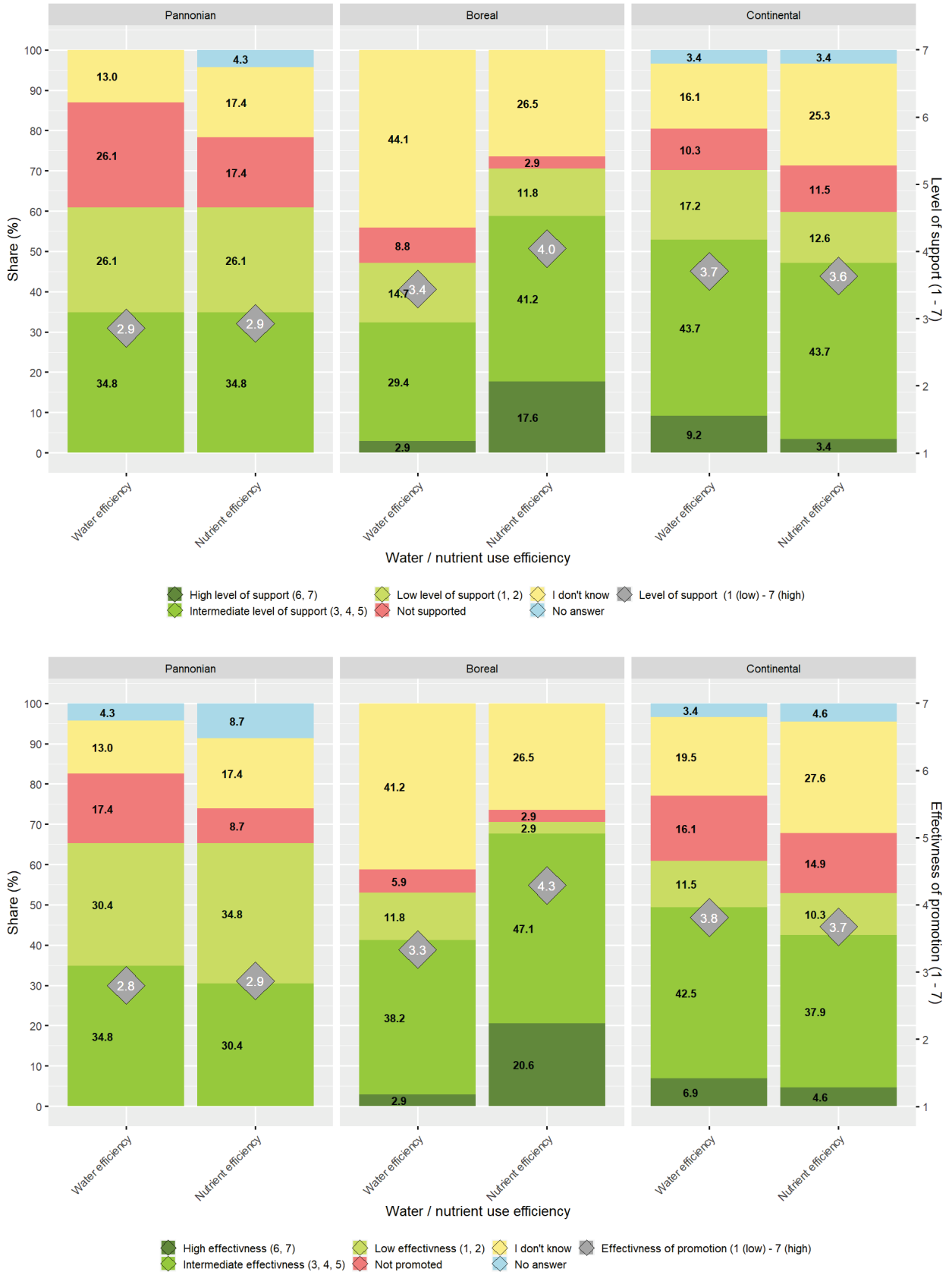


Figure 4.13: Responses of the informants to the question "Is water/nutrient use efficiency supported in your national policy/legislation and effectively promoted among end-users?" – with ratings (1-7).

Informants from Germany state that support and promotion are adequate: "*Support is sufficient by strong regulations on water abstractions and fertilisation*" and "*Specialists advise for the implementation of WFD measures and how to comply with the requirements of the German Fertilizer Act*". Informants from Switzerland state that support and promotion are low, especially in nutrient efficiency where market pressure is high: "*Farmers (end-users) are usually very interested in using natural resources in a sustainable way, but sometimes the market pressure is so high that they cannot do it*" and "*For nutrient efficiency evidence farmers are asked to provide a well-balanced use of fertilizers*". Water efficiency is not a very decisive topic. However, new irrigation systems have to be water use efficient: "*One criterion for subsidies for irrigation projects is water use efficiency*" and "*On cantonal level, there is some support for water use efficiency of irrigation, but only scarce.*" Informants from Slovenia point out legislative documents and their efficiency: "*Nitrates Directive is not optimal, it does not give adequate results*". The informants add here: "*Measures from CAP RDP Agri-Environmental-Climate Measures (AECM) operation (crop rotation, fertilization plans, conservation farming) have a positive effect on the efficient use of water and nutrients*". However, as one informant points out, "*Recent documents, strategies, do not mention water or nutrient efficiency*". On the other side there is "*Great pressure on farmers, too little on the general public".* The respondents suggest a promotion of efficiency by "*Expert recommendations for irrigation, expert recommendations for fertilization, education of farmers.*" Informants from Poland point out the vital role of CAP in the efficient use of nutrients and "grey area" in water abstraction: "*Efficiency in the use of nutrients supports the implementation of CAP policies, e.g. the AECM commitments. On the other hand, effective use of water is imposed by charges for the use of water for business purposes. Users who pay for water ensure its proper and effective use. In agriculture, water abstraction is largely unregistered and belongs to the "grey area". There are legal provisions but no effective enforcement.*" They emphasize that the promotion must also cover groups that usually do not seek information: "*Farmers I have met often take part in training, demonstrations, read and learn, so they have opportunities for it. Although agricultural advisers emphasize that these are usually regular participants (regular training), it is difficult to reach a wider group, especially older farmers.*" Informants from the Czech Republic show good points of legislation and missing links in improving efficiency: "*Economic use of water is supported by strategies but is not linked to legislation (for example, reuse of treated wastewater)*" and "*It does not support enough the use of rainwater and grey water, the absorption of precipitation, the improvements of water soil infiltration, and a coordinated water supply*". Furthermore, they state: "*In general, the use of water and the handling of nutrients and secondary materials are not well promoted in society. Some things the company has learned long and painfully (waste sorting), but we still cannot use water and resources correctly and efficiently.*"

4.1.6 The solutions in legislation and governance arrangements to improve the promotion of measures

We asked the informants where they see the main differences/challenges/problems in the compatibility/coherence of the sectoral policies addressed by the research (agriculture, water management, environment, nature conservation, climate change, spatial policy) (Question 8). We received 196 proposals for policy incompatibility and one for which policies do not have compatibility issues (Table 4-6). Proposals were grouped

into 39 classes, and the top five main general issues of compatibility are (i) conflict of objectives between different sectoral policies, (ii) intensive agricultural production - contradict biodiversity, soil, water, and protection, (iii) too much vertical thinking, lack of cross-sectoral cooperation - horizontal working groups, (iv) standards in nature conservation - contradict agriculture production, and (v) drainage systems - contradict nature conservation (wetlands), climate.

We then asked informants how to improve synergies between policies to achieve greater compatibility/coherence (Question 9). As a result, we received 175 proposals on enhancing the synergies between studied policies for policy incompatibility and four proposals according to which policies are synchronized (Table 4-6). Proposals were grouped into 38 classes.

Among the top 10 proposals to increase synergies between policies, the most common is the establishment of cross-sectoral cooperation in the form of area-sectoral groups (reservoirs, agricultural practices, drought and flood adaptation, nutrient leaching), where vertical decision-making connects horizontal integration. This emphasizes the integration of sectoral offices into close cooperation, especially in the design of joint projects and in the implementation of measures. They also suggest that coordinators should be assigned to individual sector, who should take care of interactions. Cooperation between sectors should be particularly pronounced in areas covered by regional or local offices. The proposals also suggest a procedure for drafting legislation/measures, which should be coordinated across the sector already at the draft level. In this process, individual sectors would check whether the legislation/measure meets, complements or upgrades the objectives of individual sectoral policies. This also fulfils the second suggestion that individual proposals for legislation/measures should combine/integrate the objectives of other policies based on expertise. This would also affect the knowledge exchange between sectors and increase general knowledge about other sectors.

The third proposal builds on cooperation with other stakeholders from the professions addressed by legislation/action through co-creation, knowledge sharing, communication and promotion of actions. It is a process where decision-makers meet other stakeholders (including from other sectors) and gain knowledge and experience, allowing them to understand other policies' objectives more efficiently. Furthermore, when the legislation or measure is implemented, it is also vital that the decision-maker provides education, awareness, meetings, and feedback from key stakeholders who are supposed to implement the legislation or measures. Therefore, it is proposed to create a formal or informal platform for co-creation and mutual knowledge exchange and develop coordinated actions between policymakers, field advisers and managers, and farmers.

This already indicates the solutions of the following proposal for the design of measures that would have a multifunctional role, geographical and time component of implementation addressing the objectives of different policy sectors (soil and water protection, greenhouse gases, biodiversity, climate change). This would allow for comprehensive and sustainable use of environmental resources. In this context, they propose creating comprehensive agri-environment-climate laws with envisaged measures that combine different policies with unified objectives (irrigation, flood safety). Nowadays, laws are often written so that the responsible sector subordinates other

sectors or exercises priority in determining the content with minimal harmonization. Thus, the further proposed solution refers to forming common priorities between sectoral policies (food, water, environment, nature, climate). Furthermore, informants emphasize the importance of creating legally binding strategies at various levels of government (national, regional, and local), which enable the effective implementation of measures.

Among the proposals is stricter legislation, which should strengthen the monitoring of measures and control mechanisms (inspection) of checking restrictions, compliance with obligations and implementation of measures. Informants also point out that new proposals for measures for re-naturalization and water and nutrient retention need to be prepared and adequately supported by financial resources. In particular, they emphasize measures of extensive agricultural practices (holistic farming, regenerative agriculture, organic farming) and measures related to water use in agriculture (irrigation). Furthermore, environmental and socio-economic effects on the measure implementor (farmer, landowner) are also essential factors in deciding on the implementation of measures. Therefore, it is proposed to prepare a cost-benefit analysis for measures that need to be tested in local conditions.

Table 4-6: Comparison between compatibility/coherence issues in policies and solutions to improve synergies between policies as given by the informants.

	Main general issues of compatibility - grouped			Enhance the synergies between policies - grouped		
	Description	No.	%	Description	No.	%
1	conflict of objectives between different sectoral policies	27	13.7	A cross-sectoral policy approach is needed to maximise synergies - vertical and horizontal cooperation	32	18.3
2	intensive agricultural production - contradict biodiversity, soil, water, protection	16	8.1	measures based on knowledge and coherent/integrated agri-environmental law/regulations/rules which combines different policies	19	10.9
3	too much vertical thinking, lack of cross-sectoral cooperation - horizontal working groups	15	7.6	improve co-creation, communication and promotion of sustainable measures (knowledge, awareness raising, meetings) among farmers, professionals, decision-makers, public	18	10.3
4	standards in nature conservation - contradict agriculture production	10	5.1	multipurpose, geographically, temporally targeted measures addressing different aims needed (soil and water protection, GHG, biodiversity)	15	8.6
5	drainage systems - contradict nature conservation (wetlands), climate	9	4.6	define common priorities between food, water, environment, nature, climate sectoral policies	9	5.1
6	renaturation of landscape - high pressure of all sectors - integrated territorial development strategies needed	9	4.6	national/regional/local cross-sectoral legal strategy/action planning is needed for the effective implementation of measures	9	5.1
7	urbanisation - impacts water, environment, agriculture sector	9	4.6	stricter legislation - better monitoring and control mechanism of restriction and obligations related to measures	8	4.6
8	water management - contradicts nature conservation	8	4.1	implementation actions (measures requirements) and funds (subsidies) for re-naturation and retention measures are needed	7	4.0
9	economics of agriculture - high costs of environmental measures	7	3.6	programmes should include cost-benefit environmental as well as socio-economic aspects tested in local conditions	5	2.9
10	lack of funds	7	3.6	extensity agriculture (holistic, regenerative, organic)	4	2.3
11	optimisation of legal acts to support the implementation of measures	7	3.6	no problem	4	2.3
12	the scale of measures - administrative unit vs hydrological units vs farm	7	3.6	better coordination of policies on water abstraction permits (water, agriculture, nature)	3	1.7
13	water quality requirements - agricultural production requirements	7	3.6	climate change impacts and adaptation measures should be emphasised in policies (climate-prone areas - flood areas, sandy soils)	3	1.7
14	lack of incentives addressing water retention	6	3.0	modernise and connect Land Parcel Identification System (LPIS) with other systems (monitoring) - support sustainable production (low till, precision agriculture, fertilisation, integrated production, sustainable use of pesticides) - INSPIRE	3	1.7
15	measures designed to achieve single narrow objectives	6	3.0	solidarity between producer, distributor and consumer - better distribution of the added value along the whole value chain so that also the producers can profit from the measures they implement	3	1.7
16	irrigation systems - water abstraction conditions	5	2.5	spatially targeted measures that allow sustainable production	3	1.7
17	agri-environment climate measure - buffer strips multi-sectoral impacts	4	2.0	waste waters - improve legislation, control and fees on nutrient discharge and re-use	3	1.7

Continuation of Table 4-6.

	Main general issues of compatibility - grouped			Enhance the synergies between policies - grouped		
	Description	No.	%	Description	No.	%
18	flood protection - spatial planning, agriculture	4	2.0	collective approach - catchment programmes - group of land users manage area together with professionals to reach environmental objectives	2	1.1
19	flood protection measures - contradict nature conservation	4	2.0	cooperation among sectors in as early stages of measure development as possible	2	1.1
20	no universal one-fits-all-solution in a complex agricultural system	4	2.0	improve sectoral visibility and position in spatial planning (especially agriculture and water management)	2	1.1
21	the political decision-making process, lobby groups	4	2.0	integration of policies - joint funding of several "sector-specific" standards	2	1.1
22	agriculture measures benefits - long-term impact on water - policies change to fast	3	1.5	the political will to change	2	1.1
23	lack of measures - to reach water quality requirements	2	1.0	sectoral flexibility in search of a common solution	2	1.1
24	less bureaucracy, more qualified professionals	2	1.0	abolish policies that do not support synergies	1	0.6
25	cross-compliance - insufficient controlling capacity	1	0.5	advantage that inconsistency exist - you can follow different definitions	1	0.6
26	difficult to understand rules of measures	1	0.5	consideration of long-term impacts of measures	1	0.6
27	incompatibilities not identified	1	0.5	do not compensate loss - value ecosystem services - conservation should not be constraint	1	0.6
28	increase the promotion of water and nutrient retention measures	1	0.5	economic and political interests should be minimised	1	0.6
29	invasive species if the land is not maintained	1	0.5	equal rules for all stakeholders (small, big, farmers, companies, communities)	1	0.6
30	lack of monitoring of the impact of agriculture measures	1	0.5	extend the right of appeal to national-level NGOs and stakeholders	1	0.6
31	lack of understanding of the circular economy in rural areas	1	0.5	institutions should take decisive actions to speed up the changes	1	0.6
32	large scale investments needed for flood and drought mitigation	1	0.5	more research on organic matter and water management	1	0.6
33	low involvement of regional and local level organisations	1	0.5	nature conservation recommendations should also consider other environmental targets (flood, drought)	1	0.6
34	measures should be fragmented, de-centralized and small-scale structures	1	0.5	nature conservation should focus on improving natural processes rather than the status quo	1	0.6
35	population density - water resources for agriculture are not the priority	1	0.5	a significant change in subsidy policy - do not cover negative consequences in landscape and climate with new compensatory subsidies	1	0.6
36	re-naturation of landscape - more space for water	1	0.5	state defined concrete responsibilities of stakeholders	1	0.6
37	renaturation of landscape - reducing agricultural land	1	0.5	stop supporting biofuels and biogas plants	1	0.6
38	spatial planning - should support farmers	1	0.5	a systemic sectoral approach to checking goals and approving legislation	1	0.6
39	urbanisation - placement of nature mitigation measures on agricultural land	1	0.5			
	Total	**197**	**100**	**Total**	**175**	**100**

We asked the informants how policies/legislation should be upgraded to improve decision-making and implementation of water and nutrient retention measures (Figure 4.14). Among the answers offered, financial support was chosen as the most important with a very high score of 6 out of 7, followed by informal education with practical demonstrations and workshops (5.6), de-bureaucratization of administration (5.5), digital information channels (web, apps) (5.1) and formal education (5.1). A relatively lower score for greater decision-making for measures was attributed to controls and inspections (4.5), licenses and permits that growers obtain for the implementation of measures (4.4) and higher quality product brands (4.2). There are no major differences between individual biogeographical regions (Annex D).

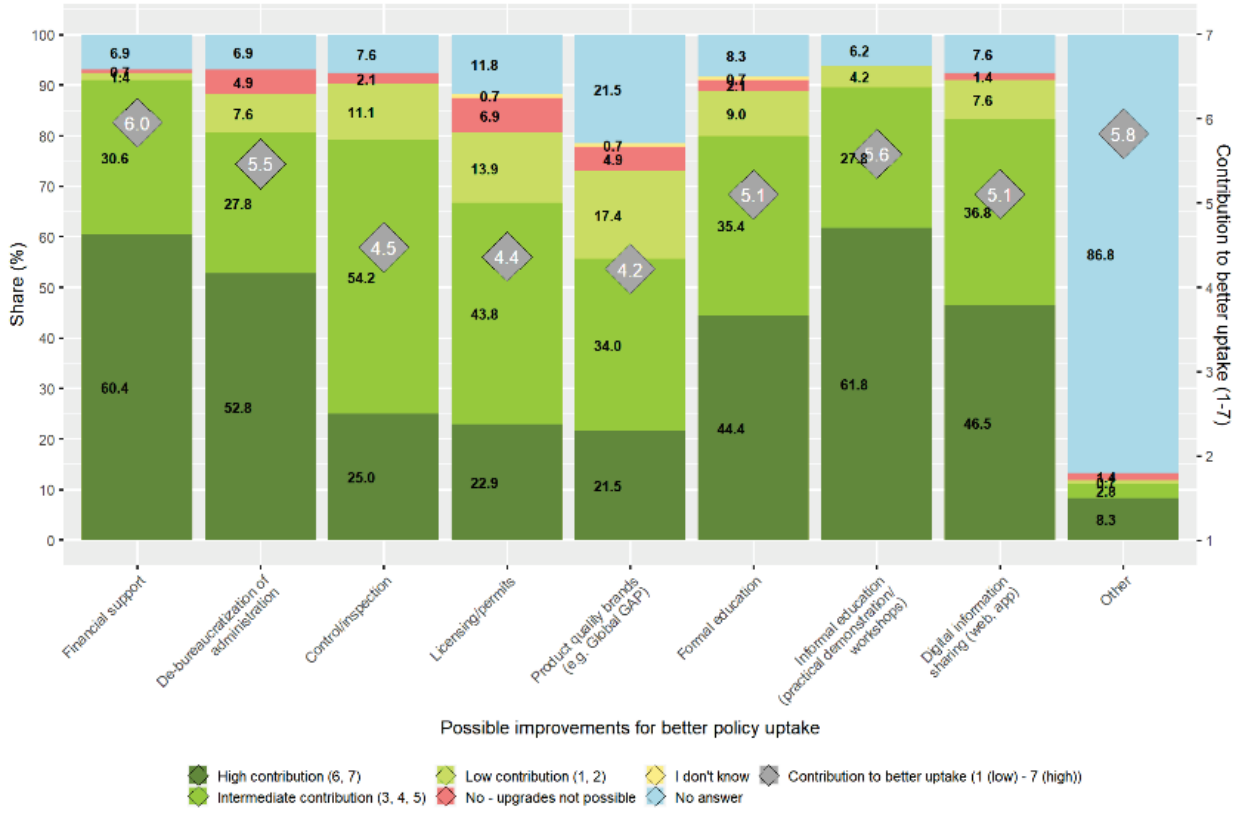


Figure 4.14: Responses of the informants to the question on "How should be the policy/legislation (in general) upgraded to improve uptake/implementation of water and nutrient retention measures?" – with rating for contribution to improvement (1-7).

Among the 'Other' proposals, these improvements were suggested: agricultural advice from experts, solidarity between producer and consumer with the central role of major food distributors, cooperatives, climate regulations, media, flexibility and framework with the need for local adaptation, implementation of proper strategies into legislation are mentioned.

An informant from Hungary points out the administrative and financial intertwining of the existing systems, as well as the possible effects of changes in the incentives for the implementation of measures "*Financial support helps when it does not support other activities that contradict it. The permit system is a means of reconciling the interests of the parties concerned. Its abandonment would therefore lead to the disappearance of a means of preventing conflict, defining substantive legal requirements adapted to local conditions to protect the interests of the community, and will make it impossible to*

achieve a system of integrated water management. It is therefore justified to maintain licensing where its abolition would leave these functions unfulfilled."

We asked the informants how legislators should support the implementation of measures that address researched environmental concerns through policies and legislation to ensure greater visibility and attractiveness of new environmental practices (Environmental mainstreaming) (Question 24). About 80% of informants say that current support mechanisms are not adequate, compared to 20% who say that current support is adequate (Figure 4.15).

Among different environmental concerns for two, nature conservation and flood protection, more than 30% of informants selected that support is adequate. While for others, less than 20% of informants selected that support is adequate.

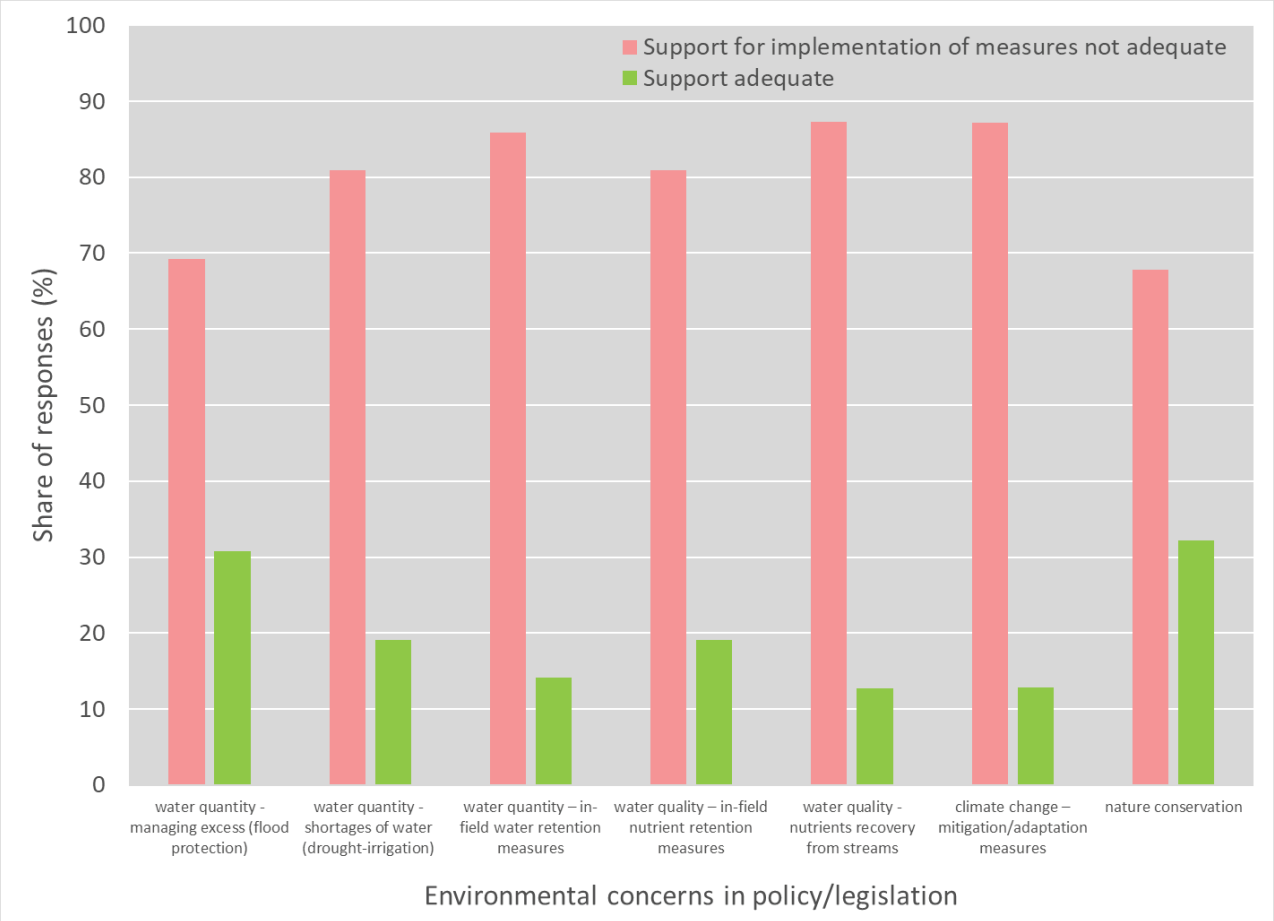


Figure 4.15: Support types for implementing measures addressing environmental concerns in policy/legislation by decision-policy makers (Environmental mainstreaming) as given by the informants.

The results indicate a certain degree of adequacy of support, which can be felt from the statements of several informants from Switzerland "*Currently adequate. There are rarely issues, at least at national and cantonal level.*", "*A lot is done, and knowledge is imparted*", "*At current stage still inadequate but it will be adequate soon*", from Hungary "*Sufficient financial support, but lack of awareness raising.*" and from Norway "*Good schemes - partly sufficient.*", citing an example of financial support "*Can apply for 70% funding for constructed wetland and in addition 100% funding for biodiversity.*"

From the statements of informants, it can be recognized that there is still much room for progress and improvement of support mechanisms on the part of decision-makers in the researched topics. An informant from Sweden supports this with the statement, "*If current support were adequate, then environmental goals would have already been reached.*"

We asked all informants to comment and suggest different support types decision-makers could include in policies and legislation. As a result, we received 516 different content proposals, which we grouped into 20 types of possible support (Table 4-7).

Table 4-7: Support types, as proposed by informants, for implementing measures addressing studied environmental concerns in policy/legislation by decision-policy makers (Environmental mainstreaming).

Group	Environmental concerns							Total	
	Water quantity			Water quality		Climate change			
Type of support for the implementation of measures	managing excess (flood protection)	water shortages (drought-irrigation)	in-field water retention	in-field nutrient retention	nutrients recovery from streams	mitigation and adaptation	Nature conservation	No.	%
Financial support	20	14	22	22	16	15	21	130	25.2
Knowledge support	17	17	18	17	17	21	16	123	23.8
Authorities organisation and strategy	10	9	7	5	13	10	8	62	12.0
Support efficient measures	6	1	3	4	5	8	7	34	6.6
Upgrade legislation / regulation	4	6	6	5	5	4	4	34	6.6
Advice professional and practical	2	2	2	4	2	1	3	16	3.1
Communication between sectors	1	3	1	1	1	4	5	16	3.1
Public media communication	1	1	2	2	3	3	4	16	3.1
Adaptation to the new situation	3	3	2		2	2		12	2.3
Spatial planning (municipal, state)	3		2	2	1	2	1	11	2.1
Support local cooperation	4	2	1	1	1	1	1	11	2.1
Technical efficiency support	2	3	1	2		2		10	1.9
Administrative support	3	3	2				1	9	1.7
Control /Inspection	1		1	3	1	1		7	1.4
Invest in infrastructure		6	1					7	1.4
Support site-specific measures	1	2	1			1	1	6	1.2
Support new/efficient crop varieties	2	2			1			5	1.0
Monitoring and forecasting		3						3	0.6
Maintenance of measures							2	2	0.4
Mandatory measures				2				2	0.4
Total	**80**	**77**	**72**	**70**	**68**	**75**	**74**	**516**	**100**

In all the environmental concerns investigated, the most frequent proposals were made in the areas of financial support (25.2%) and imparting knowledge to various stakeholders at all levels (23.8%), which is a total of 49% of all proposals. Next, with 12%, follows the organization of authorities and preparation of comprehensive strategies that will sensitively address environmental concerns.

Regarding flood protection, nutrient recovery, climate change and nature conservation, it is necessary to emphasise creating more significant support for effective measures with a scientific basis (6.6%). Regarding drought-irrigation, in-field water and nutrient retention and nutrient recovery, informants also emphasise the importance of changing legislation and regulations, which currently limit progress in the abovementioned areas (6.6%).

Regarding drought-irrigation management, support for investments in infrastructure, especially in water reservoirs, is among the important supports (1.4%). In the case of nature conservation, informants also highlight the support that would ensure more and high-quality communication between different sectors (3.1%).

Differences on the regional level are minimal, with financial support, authorities' organization and strategy and knowledge support being in the top three best support types (Table 4-8).

Table 4-8: Best support types by bio-geographic regions, as proposed by informants, for implementing measures addressing studied environmental concerns in policy/legislation by decision-policy makers (Environmental mainstreaming).

No.	Region	Count	Region	Count	Region	Count
	Boreal	**49**	**Continental**	**364**	**Pannonian**	**103**
1	Financial support	16	Financial support	88	Knowledge support	36
2	Authorities organisation and strategy	7	Knowledge support	81	Financial support	26
3	Knowledge support	6	Authorities organisation and strategy	41	Authorities organisation and strategy	14
4	Upgrade legislation / regulation	5	Support efficient measures	26	Public media communication	10
5	Support efficient measures	4	Upgrade legislation / regulation	24	Upgrade legislation / regulation	5
6	Communication between sectors	3	Advice professional and practical	14	Support efficient measures	4
7	Control /Inspection	2	Communication between sectors	11	Adaptation to the new situation	3
8	Technical efficiency support	1	Spatial planning (municipal, state)	11	Communication between sectors	2
9	Monitoring and forecasting	1	Support local cooperation	11	Advice professional and practical	1
10	Maintenance of measures	1	Adaptation to the new situation	8	Maintenance of measures	1
11	Advice professional and practical	1	Administrative support	8	Technical efficiency support	1
12	Administrative support	1	Technical efficiency support	8		
13	Adaptation to the new situation	1	Invest in infrastructure	7		
14			Public media communication	6		
15			Support site-specific measures	6		
16			Control /Inspection	5		
17			Support new/efficient crop varieties	5		
18			Mandatory measures	2		
19			Monitoring and forecasting	2		

We highlight concrete proposals that, through decision-makers support, could contribute to greater enforcement of measures in the project of researched environmental concerns.

In the field of Flood Protection, informants highlight compensation payments for farmers in short-term flood areas, the importance of education, dialogue and cross-sector coordination and the implementation of Nature-Based Solutions: "*It is necessary to be aware that occasional floods are possible in floodplains.*"; "*Compensation payments to farmers for temporary flooding.*"; "*Actually, training, outreach and ongoing dialogue are extremely important.*"; "*The strategy should be to work more on the horizontal than vertical axis - all sectors should work more together.*"; "*Conflict of policies shall be settled by identifying what priorities are.*"; "*In most cases, activities related to flood protection*

focus only on stopping floods, bypassing the environmental aspect, e.g. promoting solutions combining flood protection and increasing water retention."; "To a large extent, there is a lack of a comprehensive solution for water surplus, especially with the help of new reservoirs at the expense of reducing storm waves by measures in the river basin and agricultural/forest landscape."; "Support nature-based solutions to improve the water balance, such as natural water retention measures."; "Currently, solutions based on grey infrastructure dominate, when solutions based on the restoration of river ecosystems and their valleys and increasing landscape retention should be preferred."

In the field of Drought and Irrigation Management, informants highlight relatively poor preparedness for the drought, especially in terms of infrastructure and propose new crop varieties, new agricultural practices, reservoirs, monitoring, and irrigation forecasting system: "*Unlike water excess, we are rather unprepared for droughts. There is a need for a national strategy and financial means (we have not invested much yet).", "Additional infrastructure needed at certain places.", "Support for research on drought resistant crops.", "Agriculture has to prioritize the sectors that suffer most from droughts and adapt the cropping practices.", "Decision makers by their service shall reach directly end-users and explain them in the most practical way supported by examples.", "Development of a drought monitoring and forecasting system.", "Drought prevention measures should be based on the modernization of drainage systems and wetland restoration.", "Support in the construction of multi-purpose reservoirs.", "Simplification of procedures for issuing irrigation permits.", "More promotion on the problem and seriousness.", "Approval requirements for reusing treated water in agriculture for irrigation purposes."*

In the field of in-field management of water retention measures, the informants highlight the fact that this topic is relatively new and that the most significant effects are achieved by imparting knowledge about the implementation of soil management measures to various stakeholder groups, and that the attitude towards the water management sector needs to change: *"Still a rather new topic; the need for education of policy makers-students-farmers-general population"; "Stronger support for permanent low-, no- and strip-tillage."; "There is insufficient financial support for the implementation of some measures."; "Direct payments should be linked to the effective enforcement of good water retention practices in agricultural soils."; "Change of perspective on water management."; "Land-use planning does not take water retention sufficiently into account."; "Enable the involvement of experts".* Some informants from the Boreal region point out that, for example, "*Most of the focus in Sweden is in getting water off the fields, not to retain the water.*"

In the field of management of in-field measures to retain nutrients, the informants highlight the connection between the problems of nutrients in the soil and water sources, the importance of control and monitoring, the increase of financial resources and the scope of training and the enforcement of mandatory measures: *"The problematics of nutrients and water in the soil are often linked."; "Too high concentrations in rivers and lakes; therefore, current support is not adequate. This is due to the lack of control and consequences."; "More subsidies. It is necessary to expand and encourage measures in the national strategy."; "Additional financial support; education."; "Planned eco-schemes measures like winter catch crops/mid-crops seedlings, development and adherence of fertilization plan, mixing the manure on arable land*

within 12 hours of application, application of liquid natural fertilizers by methods other than spray."; "Mandatory fertilization plans, good control and support." Informants point out the *"Need for a simplification and clearer legislation."* and also doubts: "*The possibility to allow the reuse of nutrients is not specified in the legislation."* However, informants from Norway praise the adequacy of the support "*Funding is good*" and "*Good schemes - partly sufficient."*

In the field of managing measures for mitigation and adaptation to climate change, the informants highlight the ongoing debate about approaches to solving the climate problem and how to find the proper relationship between mitigation and adaptation and how to harmonize different wishes and goals between sectors: *"Climate change will increase the frequency of water scarcity problems, and even locally of water excess. In this sense, support is inadequate."*; *"... but currently under discussion."* Various documents are being prepared that include support for measures implementation: "*Government strategy and implementation of the European Green Deal.*" and "*CAP policy measures.*" The informants point to a great diversity of opinions: "*In climate policies, environmental elements are specific for certain economic sectors.*", "*Climate adaptation activities should be harmonized, establish priorities based on cost-effectiveness.*" and "*Better support and information to reduce GHG emissions in synergy with other policies.*" When implementing the measures, they rely on the support and financial resources of the Rural Development Program or the future National CAP Strategic Plan for Agriculture: *"Higher support to agri-environment-climate measures of RDP."; "Direct payments should be linked to the effective enforcement of good practices in increasing soil carbon stocks and reducing CO_2 emissions from agricultural soils."; "To develop site-specific solutions for the area."; "It needs more nature-based climate protection measures."; "Supporting carbon neutral farms, promoting extensive farming practices."* Informants also emphasise raising awareness through "e*ducation, communication*", "*documentary films, educational mobile training lab".* They also point out the need to change water resource management regimes: "*Change in the regime of use of existing water bodies and dams.*"

In the field of nature management and conservation, the informants highlight the central role of nature conservation and that, given the many conflicts, there is still much room for improvement in the area of measures that promote the coexistence of nature and economic activities: "*Nature conservation is an integral part in all projects and actions.*"; "*Not adequate support, as there is room for improvement for all of them. There is always a conflict of interest between nature conservation and the economy. We are operating within an ecological carrying capacity."* The informants emphasise the need to increase financial resources for research and measures that would have a multiplier effect: "*Financial and research support needed.*"; "*Stronger support for agricultural measures which address water, nature conservation and climate simultaneously.*"; "*Consideration of site-specific vulnerabilities of habitats and species within fertilizing and pesticide application regulations.*"; "*A well-financed (financially attractive for farmers) 'retention package' should be introduced, motivating nature-friendly water retention in agricultural areas, including, for example, subsidies for areas naturally flooded, absorbed and occupied by "beaver ponds" and flooded by beavers.*" Informants highlight the need for compensation for farmers in the most vulnerable biotopes: "*Compensations for specially protected biotopes maintenance should be extended, it would enable more measures to be implemented."* The informants also point to the

"*development of sectoral strategies*" for different sectors, investing in education and transfer of experience "*Environmental education, experiential labs for the youth*", "*maintenance of wetland habitats*" and the need to "*Revalorise permanent grassland, grass crops and hedgerow planting*" in agricultural programs.

Based on the informants' knowledge of the issue, we asked the informants to list the existing tools, techniques and technologies that address the investigated environmental concerns (Figure 4.16). We asked them to evaluate their given examples (1-7) from the point of view of the effectiveness of support in resolving environmental concerns (Figure 4.16).

The informants were very coordinated with regard to their different professional expertise, as on average, 8 to 11% of them did not give an answer, and 30 to 35% did not know any tool or technique. The percentage of the latter (I do not know) is noticeably higher (49%) for nutrient recovery from streams. This may indicate the marginality or insignificance of the challenge in some case studies or the untapped potential for developing measures in this area in other case studies.

On the other hand, the areas of flood protection and nature protection received the highest rating for the support effectiveness of measures in solving the investigated environmental concerns (5.1). This is followed by the in-field nutrient retention measures (4.9), drought-irrigation management and water retention measures (4.7) and finally, climate change mitigation/adaptation and nutrient recovery from streams (4.4).

A comparison of bio-geographical regions shows differences in attitudes towards environmental concerns, which are dictated mainly by natural conditions (Figure 5.2.17, Annex D). Low ratings indicate a lag in the development and implementation of tools and techniques, which can have various reasons. These may be related to climatic conditions, environmental conditions, economic reasons or political indecision.

In the Pannonian region, most concerns exceed a score of 5.5, which means that the existing tools and techniques are very effective in practice and give good support in solving presented environmental concerns. Exceptions are in-field nutrient retention measures (5.1) and nutrient recovery from streams (4.8). For the latter area, tools and techniques are the least often mentioned, which is also repeated in the Continental region (4.3). Climate change mitigation and adaptation tools and techniques stand out in the Continental region, with a low score (4.4). Flood protection and nature conservation (5.3) are rated highest. In the Boreal region, the tools and techniques of In-field nutrient retention (4.8) and nutrient recovery from the stream (4.5) are the most frequently mentioned and rated the highest. Tools and techniques from the fields of climate change mitigation and adaptation (3.5) and drought and irrigation management (2.9) are listed the least often and with the lowest rating.

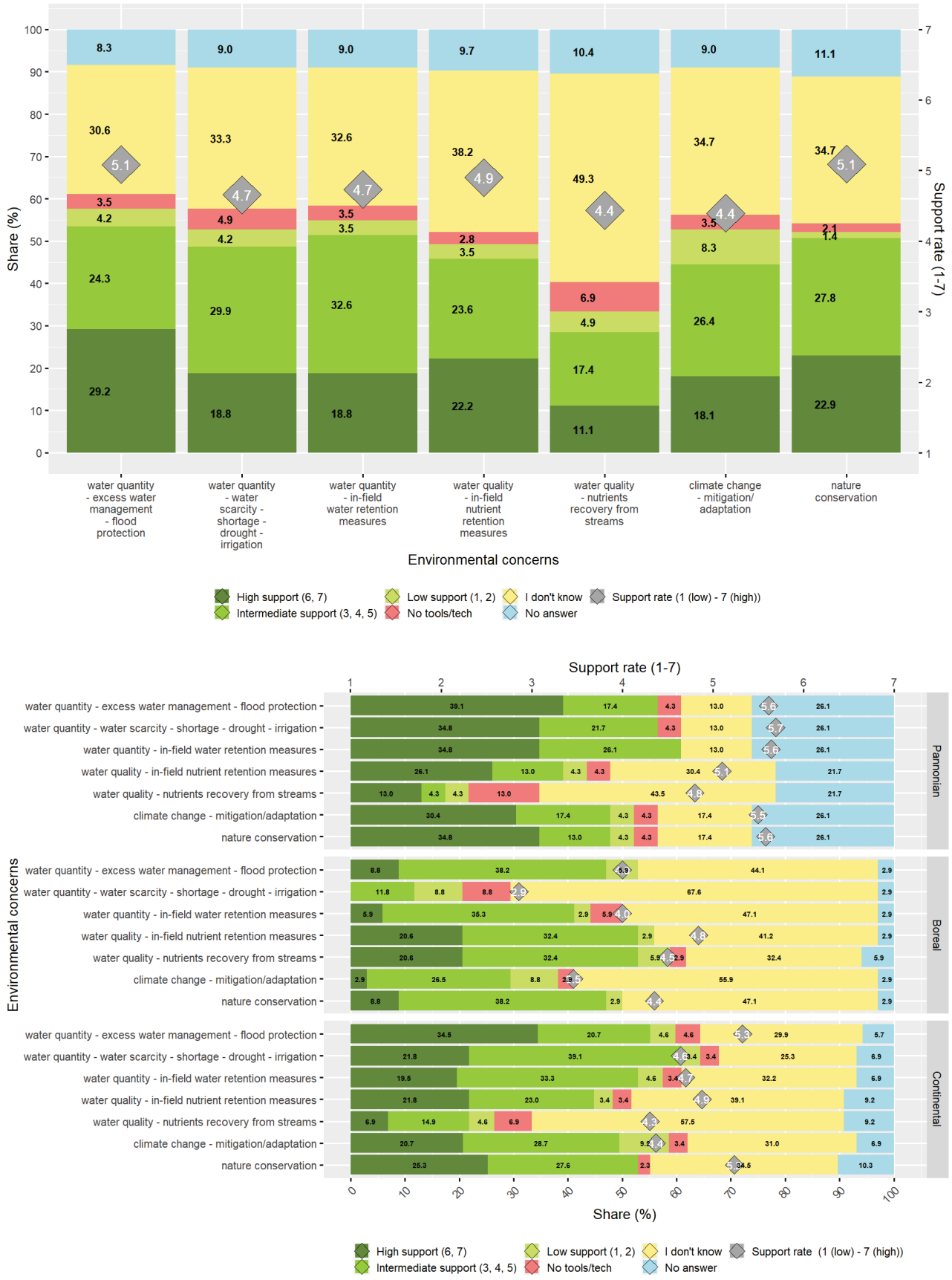


Figure 4.16: The level of support of existing tools and techniques in solving presented environmental concerns as rated by the informants (1-7).

For individual environmental concerns, the informants provided a considerable number of different examples of tools and techniques that could improve the situation and the success of implementation (Annex D).

For the area of flood protection, the information states the importance of land use and the interconnectedness of the hydrological system, "*give the waterbodies more space*", "*agriculture does already a lot, another approach would be to stop urban sprawl*", "*retention capacity is lost due to overbuilding and often is cropping area that is lost*", "*more concrete means as less water infiltration, more runoff/floods, less water storage in soils, resulting in less river base flow*", "*increasing the retention in forest, agricultural and urbanized areas are conducive to flood protection by reducing the outflow from the catchment area, thus translating into a reduction in flood - the action is also related to counteracting drought*". It is obvious that regular maintenance of ecosystems is often sufficient for successful protection, "*better maintenance of watercourses, cleaning, mud removal from retention reservoirs*", *"cleaning the banks of watercourses and deepening riverbeds as a measure to protect against floods*". The various drainage measures mentioned are often adapted to the individual field, "*drainage projects on field scale*", "*proper use of efficient drainage systems*" and also alternatives, "*water control instead of drainage, construction of bunds and reservoirs*", "*revitalization of damming and drainage systems for individual cases*". Among the repeatedly mentioned measures are renaturations and small water retention measures, "*revitalisation measures against flooding*", "*creating natural floodplains*", "*adaptation of intended use, providing space for floodplains, rivers, seasonal flows - not just with construction measures*", "*techniques rain garden, vegetated valley, water harvesting basin, pond, hedge and grassy strip on slopes, retention dike, rainwater*", "*dry reservoir*", "*structural measures to manage outflows (past projects) - the naturalization of riverbanks, streambed re-naturalisation*". However, cost-effective measures are pointed out such as, "*deep soil loosening*" and "*conservational tillage allows better survival of plants on soils saturated with water - such soils are more resistant to water erosion (for floods)", "permanent low-, no - and strip-tillage*". Informants highlight the importance of preventive action using tools like, "*hydrological monitoring*", "*runoff modeling*" and "*alert system*". Attention is also on the role of policies in the preparation of documents that promote the implementation of the measures, "*flood hazard maps and flood risk maps*", "*flood risk management plans*", and "*river basin management plans and flood protection plans as a tool*".

For the area of water shortage - drought, informants give high importance to the construction and upgrading of irrigation infrastructure, "*development of irrigation network/infrastructure*", the use of various sensors for detecting water in the soil, "*humidity sensor probes (potential for more support)*", and water balance "*monitoring of rainfall surplus and deficit*", "*drought monitoring system*", which enables drought warnings and, with the help of data, enables irrigation forecasting "*early warning system, data collection*", "*TDR soil moisture meters enable connection to the digital irrigation advice support system*". Furthermore, they mention changes in irrigation types, methods and techniques (drip, sprinkler, flood irrigation) and the importance of adapting systems to local conditions, "*type of irrigation and irrigation methods*", and the search for an optimal water balance in areas of drainage systems, "*decreasing outflow from the drained fields*", "*proper use of efficient drainage systems*". As an example of reducing the consequences of water shortages, they highlight the possibility of rainwater harvesting, "*rainwater harvesting containers*", the importance of renaturation

and the multi-purpose solutions, "*re-naturalization of rivers, floodplains, wetlands and re-meandering*", "*techniques of a temporary pond, rainwater harvesting basin, rainwater storage*", "*support in the construction of multi-purpose reservoirs*", "*naturalisation of artificial channels used for irrigation purposes*", changing agricultural practices "*adapted crop cultures*", "*drought-resistant*", "*increasing the organic component in the soil, preventing soil compaction",* and changing the attitude towards waste water, "*use of wastewater treatment plant for irrigation*". Examples are also highlighted where policy measures support implementation on the ground, "*plan for counteracting the effects of drought, Program for counteracting water scarcity*".

For the area of in-field water retention, the informants emphasize the high importance of agricultural policy measures that promote year-round plant cover and improve soil infiltration by specifying the following measures, "*all measures that improve soil infiltration*", "*improve soil structure*", "*conservation tillage, cover crops, greening in general*", "*Permanent soil cover of plants or plant waste*", "*use mulch and biomass to keep water from evaporating, green mulch*", and "*the direct payment program can give more value to these measures*". Furthermore, some informants highlighted the importance of an advice system as the best way to support the implementation of measures, "*more personalized advice for farmers on which measures are suitable for specific plots*", and "*end-user involvement in water retention measures should be supported by professional supervision system*". Furthermore, drainage systems are often mentioned, from the necessary modernization and maintenance of drainage ditches, "*modernization of drainage ditch systems for retention of winter rainwater in agricultural areas*", and "*green infrastructure development*" in areas with a lack of water (Poland, Hungary) to Boreal areas of Sweden, Latvia, Lithuania and Norway, where due to excessive amounts of water in the soil, the focus is on increasing their drainage properties, "*Drainage – believe it or not, but try to think of it as an in-field water retention measure as a drained field buffers rainfall*", and "*focus is on drains for water removal from fields, not water retention in fields*". Examples of support through policies and programs from agriculture, the environment, spatial planning and water management are also highlighted, "*implementation of measures in spatial planning, proposals for complex nature-friendly and technical measures in river basins*", "*RMP (Regional Environmental Program)",* and "*Programme "Water for Kuyavia region*".

In the area of in-field nutrient retention, the informants mention measures that encourage the preparation of fertilization plans to control the use of fertilizers, "*soil analyses and fertilization plans*", "*high-precision fertilization using software to calculate nutrient demands*", "*regulate nutrient input: timing, method (drop hoses), corrected fertilizer standard*". They also cite examples of measures in water protection areas, "*support especially regarding nitrate reduction in water sources for drinking at federal state, cantons and municipalities subsidize farmers in ground water recharge areas to manage fields extensively*", "*limited use of fertilizer near sensitive water bodies and change of the arable land use to grasslands along water courses, which helps the nutrient retention*", and "*reduction of easily soluble and use of less mobile nitrogen fertilisers*". Some informants note that policies address nutrient retention through many measures, "*well addressed by current policies*", "*there is support to farmers in purchasing better equipment*", and "*many measures (over 20 suggested in plans), most used are buffer strips, wetlands, reduction of fertilizers use, organic farming*". Among the informants, the buffer strips/zones measure and similar like are most often mentioned.

They are widespread and recognized as adequate by many informants, "*buffer zones, balanced N budget farms - minimization of nutrients in the soil, properly conducted agricultural practices*", and "*in agricultural and forestry areas grass strips, hedges, perpendicular to the slope buffer zone on the edge of watercourses, conservation of a permanent cover*". For even more excellent support and efficiency in the implementation of measures, they give examples such as "*greater emphasis on conservation agriculture*", "*additional treatment of livestock manure",* and "*fertigation, organic agriculture, integrated agriculture, slurry management on the field".* In addition to more funding, the informants also highlight the importance of setting performance standards for the implementation of measures and strict implementation control, "*additional financial support and standard requirements for implementation of CAP measures shall be more promoted and regulations on requirements regarding the protection of water, soil and air from pollution caused by agricultural activity shall be strictly controlled*". The informants also highlighted measures that exploit the potential of wetlands as a nature-based solution element for retaining nutrients, which are already linked to measures for nutrient recovery from streams, "*use of constructed wetlands to collect water from drainage lines and drainage ditch systems (absorption of nutrients)*", "*use of phytoremediation plants, planting willows, cleaning soil and water*" and "*some new initiative are known, implemented by the State Forest Service, ditches and sedimentation ponds near fields to collect runoff water and keep nutrients away from entering streams.*"

In the area of nutrient recovery from streams, the informants most often mention measures in the form of sand traps or the use of sediments from lakes, rivers or floodplains as fertilizer on agricultural land but point to the problem of sediment quality and legislative restrictions, "*sand traps on drainage ditch systems to collect bottom sediments rich in nitrogen and phosphorus and used as fertilizer*", "*use of river bed sediments on agricultural land*", "*sediment recycling, controlled overflows in valley floodplains, revitalization of valley floodplains*", "*smaller ponds, puddles to allow water to settle and hold, and reuse nutrients - quality problem*", and "*according to current legislation - application of excavated sediments from water reservoirs back to agricultural land".* Informants also mention measures that exploit the potential of wetlands and storage of nutrients in plant biomass, "*spatial nutrient retention - filter strips on fields along small watercourses, streams*", "*ecotone zones, sedimentation and biofiltration systems*", "*constructed wetlands, maintenance of buffer zones, erosion protection, can be funded*", "*environmental elements and farming practices promoted as wetlands, sedimentation basins, controlled drainage, two-step ditches*". They emphasize that most of these measures are implemented as "*revitalisation programmes, which are less agronomic but more (bio)engineering technologies - these measures receive subsidies as well*", but the funds are often insufficient, "*mainly project financed activities, this is insufficient*".

For the area of climate change mitigation and adaptation, informants highlight the need for system change, "*too big for a tool or technology - system change is needed*", "*a lot needs to be done here - including adapting all species/varieties - there are research projects on agroforestry and climate-adapted crops*", and strengthening the resilience of farms, "*enhance the resilience of farms look for diversity in agro-tourism, combine livestock and crop production, adapt crop/livestock to new conditions*". Among the measures that mitigate climate change, the informants mention several effective

measures such as "*increase organic matter in soils*", "*change of farming type, crop rotation, landscape management, NWRM measures*", "*sowing procedures, crop selection*", "*adapt crop varieties - drought resistant crops*", "*changes in agricultural practices, more sustainable farming, seasonal adjustment of production (e.g. when more water is available)*", "*irrigation*", and "*water reservoir installations*". Among the effective measures are the preservation of wetlands, shading, green belts and the management of transitional areas between ecosystems, "*preservation of wetlands, limitation of land use in wetlands - preservation of wet meadows*", "*water retention*", "*ensuring forest cover along water courses, which has good impact for microclimate, and reducing evaporation due to shading*", and "*promotion of buffer strips (trees) and hedges in between fields - the restoration of basins and ponds - preservation of ecotone zones and zones uncultivated areas*". They confirm the great importance of common agricultural policy measures and the importance of monitoring for determining financial support, "*agri-environmental-climate measures from regional RDP - extreme phenomena are becoming more common and are being covered by the AEC measures*", "*According to monitoring, evaluate for more support, especially related to shortages of water*". They highlight river management plans, "*measures in the 3rd National river basin management plan*", and various national programs and projects at all levels that address drought, water retention, and construction of ponds, but at the same time point out the importance of changing the mentality of the end-users of measures and consumers, "*Change of agricultural practices, change of mentality and responsible consumption*".

In the field of nature conservation, in connection with increasing the retention capacity of small agricultural catchments for water and nutrients, the informants highlight the importance of farmers, "*the farmer is the only one who cultivates the land and protects it and bears the responsibility for nature conservation*", and the fact that, "*a lot has been done already - there are direct-payment programs for biodiversity promotion areas*", however, they warn, "*as long as natural regeneration is hindered, nature conservation is not in place*". The information advises that "*consideration of site-specific vulnerabilities of habitats and species*" is considered when promoting measures. Among the more agricultural measures that promote nature conservation and improve the retention of water and nutrients, the informants give several effective measures such as, "*networking contributions, smaller structures spread across the landscape*", "*the importance of buffer strips"*, "*hedges and tree rows, flowering strips*", "*planting native trees and plants*", "*organic farming, bee pastures*", "*increasing biodiversity, small ponds, wetlands, ecotones, revitalization of agricultural land (bacteria, symbiotic fungi)*", "*grazing, maintenance of meadows and floodplains*", "*mowing in a nature reserve area with discouraging the animals production*", "*mixed cropping is big trend (e.g. maize with beans - very successful and works well), mixed cropping of cereals and legumes, harvesting must be possible (Fritz Glauser yellow peas - pulses), importance of legumes for binding nitrogen in the soil*". Among effective more hydro-morphological measures, they mentioned, "*River clean up campaigns, cutting of reeds, cleaning of fallen trees, meandering rivers, artificial rapids"*, "*restoration of river beds (e.g. restoration of meandering) and riverside trees*", "*subsidies for constructed wetlands*" and "*ecological connection of green and natural areas in a densely populated context - green infrastructures along rivers, conservation and restoration of traditional terracing against soil erosion and flood risk*". They emphasize that their inclusion in various programs, directives and legislation represents a great incentive for the implementation of

measures "*statutory requirements, agri-environment-climate measures*", "*actions under the greening scheme of the CAP"*, "*Nature Conservation Act*", "*Habitats Directive and the Birds Directive"*, "*application of sustainable measures in water management*", "*observations and monitoring of animal and plant species*", "*Natura 2000 territories are financially supported*". They highlight the importance of effective administrative procedures, "*administration takes time to develop projects*", well-intentioned readiness for green actions "*if there is the willingness to do something, the financial support is there*" and appropriate communication with the professional and general public "*digital information, media*".

4.2 Challenges and possible solutions in governance and policy instruments for mainstreaming NSWRM at the country/case study level

The following chapter presents the qualitative results of the survey for each case study country. The analysis of the survey results is presented by four different focal parts as illustrated in Figure 4.17.

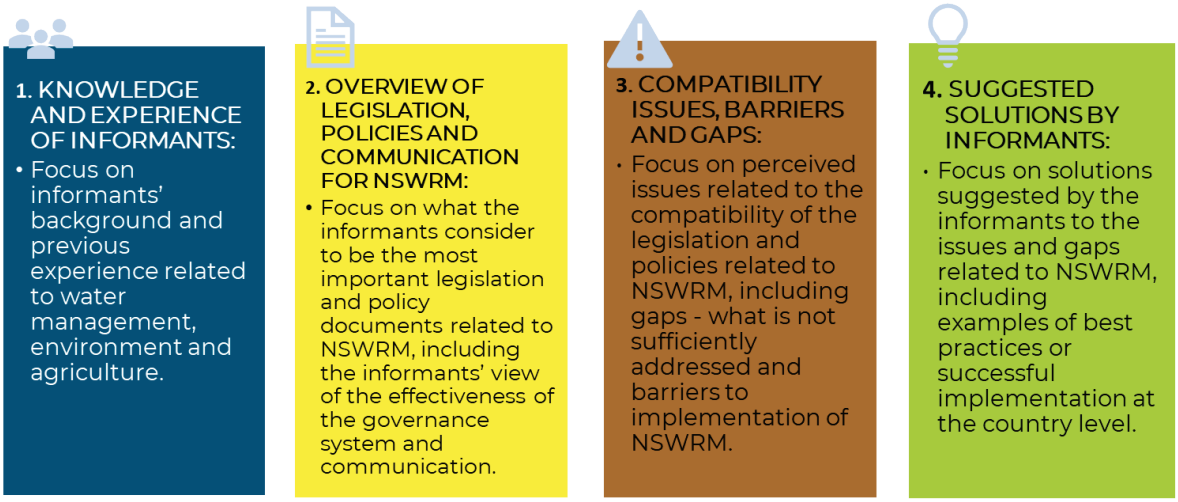


Figure 4.17: Structure of the case study narrative on challenges and possible solutions in legislation and governance arrangements at the country/case study level.

The first part summarises the informants' background, knowledge and previous experience. The second part highlights what informants perceive as important legislation and policy documents on different governance levels. It presents their views on efforts to address various specific environmental concerns, nutrient and water use efficiency and economic sustainability in agriculture. This part also describes how informants see the communication of policies to end-users. The third part focuses on what informants perceive as main barriers to implementation and gaps and compatibility issues in legislation. The informants ranked predefined challenges to implementing soil management measures and structural measures. The qualitative information is structured following different governance aspects and types of policy instruments, then after specific environmental concerns (as described in chapter 2.3). The fourth and final part presents the informants' views on suggested solutions for overcoming poor compatibility and improving implementation and uptake of measures. The qualitative information follow the same structure as in part 3. As explained in chapter 3.4 on data analysis, the number and types of informants varies between the different case studies. Hence, the information included will vary somewhat between the cases.

4.2.1 Case focus Germany

4.2.1.1 About the informants – background and experience

Seven informants were interviewed, three women and four men. Around half of the participants have master's degrees and the others have PhDs. All but one participant are employed in the public sector, on regional or national level. Environment/nature is the most common area of expertise among the participants, followed by water management and spatial planning. Two have expertise in agriculture, while none listed climate change as an expertise. All have to some degree addressed water quantity challenges in their work. Less than half have experience with water quality challenges related to nutrient recovery from streams. Most have experience with climate and nature conservation challenges from work.

The informants have extensive experience with several of the various agri-hydro-environmental measures listed in the questionnaire, but the majority have more experience with the agricultural than hydro-morphological measures. While the participants' main competence and work experience varied, almost all had intermediate to high knowledge of policies within agriculture, water management and environmental management. Most also had knowledge of legislation and policies related to spatial planning and climate change, but mainly on low-intermediate level.

4.2.1.2 Overview of legislation, policies and communication for NSWRM

This section describes the case study situation regarding legislation and policies within the agri-hydro-environmental governance domain according to the informants' perspectives.

Legislation at different governance levels: Most informants said that legislation for water quality, quantity and climate change involves a combination of local, regional and national documents (national level mean federal level). The federal level defines focus areas for funding from CAP 1st and 2nd pillars, while the regional states specifies this by considering regional characteristics. All legislation and policy documents mentioned are within the agriculture sector, on national or regional level.

Important legislation, policy documents

National level: Documents mentioned on national level address funding schemes such as direct payments to farmers and the cross-compliance mechanism. *The national law on implementing direct payments for farmers* sanctions a reduction of greening payments if standards are not met, and requires controls of 5 % of farms to ensure compliance. A new regulation was recently introduced on CAP direct payments *(GAPDZV)* and cross-compliance standards *(GAPKondV)*. The national regulations mentioned were all considered to have high impact on end-users.

Regional level: The majority of the informants highlighted *Funding guidelines for agri-environment climate measures* as most important. This regional level document specifies measures on cropland and grassland for funding from CAP 2nd pillar for agri-environment climate. The measures are implemented on a voluntary basis combined with economic incentives. *The regulation on cross-compliance standards for payments to farmers* is a legal obligation combined with economic incentives. It defines standards for good agricultural practice according to *EU Regulation (1306/2013)* on the financing,

management and monitoring of the common agricultural policy. Farmers have to meet these standards in order to get direct payments.

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Most of the informants said the legislation addresses flood protection to a high-intermediate degree. The same was the case for in-field water retention measures, while some informants were uncertain. Water shortage was considered to be included, but only to a low-intermediate degree.

Water quality: In-field nutrient retention measures were seen as addressed to an intermediate-high degree by around half of the informants, while many did not know. None of the informants considered nutrients recovery from streams to be addressed by legislation.

Sustainable agriculture production was considered to be addressed by legislation to a high or intermediate degree by most informants. **Nature conservation** is mainly seen as addressed to an intermediate degree, while **climate change mitigation** is seen only indirectly addressed.

Water use efficiency: The majority of the informants said water use efficiency have high support in the legislation/policy. It was highlighted by two informants that water abstraction is strongly regulated and prohibited in case of severe droughts.

Nutrient use efficiency: The majority of the informants said that nutrient use efficiency have intermediate or high support in the legislation/policy. Federal legislation on fertilizer use was highlighted, but one informant said that "material flow balancing approaches exist, but still not (enough) accounting for site-specific vulnerability".

Support for economic sustainability: Most of the informants said that financial support/subsidies is the most important type of promotion of economic sustainability of technologies on farm and small catchment level. A few also said that penalties and legal framework promotes this, while none included voluntary action as an important promotion type.

Monitoring of economic and environmental sustainability: Some informants said that economic sustainability is recorded on farm and catchment level. The data quality was rated as higher on farm level than catchment level. Examples mentioned: A benchmark system on farm-level economics is available for the Federal State of Saxony, where each farm can participate to study economic efficiency of their practice by comparing with others. Informants said that environmental sustainability is recorded both on farm and catchment level. Data quality was rated as intermediate on farm level, slightly higher on catchment level.

Effectiveness of communicating policies to end-users at local level: The communication of agriculture policies was generally seen as active from authorities, with intermediate effectiveness. The same was the case for communication of policies on water management and nature management. Policies on spatial planning were seen by some informants as more individually communicated with intermediate effectiveness, while

climate change policies were seen as actively communicated, but somewhat less effective.

Communication to promote water/nutrient efficiency: Many informants did not know whether water use efficiency is promoted among end-users, but the ones who answered rated it as intermediate or high. Similarly, around half of the informants said nutrient use efficiency is promoted among end-users to an intermediate or high degree.

4.2.1.3 Gaps and compatibility issues challenging implementation of measures

This section provides an overview of barriers, gaps and compatibility issues identified by the informants. In summary, the informants perceived the policy support as inadequate in addressing environmental concerns. The informants' perceptions on compatibility varied. More informants considered policies on management of excess water to be compatible, while in contrast few considered water quantity in-field retention measures and nutrient recovery from streams to be compatible. Several informants did not respond to the questions on adequate and compatible policies.

The informants ranked challenges to implementing soil management measures and structural measures, and had the option to fill in other explanations (Figure 4.18, , Figure 4.19).

Low cost-benefit was identified as the most important challenge for implementing soil management measures, followed by administrative barriers. Regarding perceived challenges for implementing structural measures, the informants' perspectives differed. However, administrative barriers were identified as the main reason for weak implementation, followed by land-ownership and low cost-benefit. Control/inspection was seen as an insignificant variable.

Figure 4.18. Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

Figure 4.19. Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: (i) The legislation on agricultural land use is weak - the Federal Act on Regional Planning is binding for authorities, but not for agricultural land-users. An informant said that measures are not specified in enough detail, "especially for agricultural land". Regulations on regional planning miss the mark because agricultural land use needs no legal authorization. (ii) Almost no projects/measures are implemented without being triggered by EU policies such as the CAP. (iii) Voluntary principle is a barrier for implementation of WFD management plans (especially measures along water courses), because municipalities can choose which measures to implement- they are often constrained by compliance with national legislation. (iv) The law on state aids hampers efficient consultation of farmers. (v) Very high standards defined in water and nature conservation, but water policies can be jeopardized by agriculture. It was argued spatial planning is not applicable to agricultural and forestry land use by law (no authorisation requirements).

Insufficient integration, incoherent sectors, authorities: There are internal conflicts in Water Boards (WFD targets vs. interests of water users). Also problems with policy transfer between national and regional level - "länder" (regional) do not sufficiently fill the gaps left by "bund" (national).

Insufficient administrative capacity, competence and knowledge: Implementation of WFD suffers from insufficient human resources and structures - environmental agencies responsible for policy implementation (incl. the WFD) and control are heavily understaffed.

Policy instruments

Insufficient or inappropriate funding schemes: (i) Limited compatibility of funding schemes between water, nature protection and agricultural funding schemes of certain sectoral laws, for example water vs. nature conservation vs. funding policies for agriculture. (ii) The funding programmes/requirements for farmers lack flexibility, and conditions for funding/policies change too fast.

Insufficient technical infrastructure and support: Perceived as insufficient ("consultancy should be broad, free and independent").

Insufficient awareness and communication efforts: Agricultural management measures with a potential benefit for water issues (e.g. conservation tillage) cannot be directly addressed because the positive impact often occurs only in the long-term (soil properties need some time to change) - this can be a strong barrier for redesigning landscapes (e.g. hedges and tree rows as new field divisions; restoration of floodplains).

Further gaps and incompatibility issues are presented by type of challenge below.

Water quality challenges: (i) Buffer zones: High standards defined for farming along water courses (e.g. riparian buffers) in national legislation on water and fertilization, but regional level states (länder) can define exemptions for small channels (<500 m from the source), drainage ditches and tile drains. The state make excessive use of these

exemptions; National level policies for riparian buffers are not concrete enough (only stating "greening", not explicitly requesting trees/forest). (ii) Greening policies: After five years of greening, the land gets status as permanent grassland, which cannot be converted back to arable land (5-year permanent grassland rule). This hinders many farmers from implementing greening measures. (iii) Regulations on fertilising and pesticides: Codes of "good agricultural practice" are not binding. Impact Mitigation Regulation (IMR) does not apply to fertilization and pesticide application - if farmers follow "good practice" codes, they do not have to follow the codes of IMR, FFH compatibility or the Protection of Special Species. (iv) Regulatory law: Applications are not accounting (enough) for site-specific vulnerability (e.g., allowed fertilizer application can be too high according to SSBV calculations). Strong deficits in addressing nitrate, particularly in translating EU legislation into national and regional legislation.

Water quantity challenges: (i) Urban development planning and agriculture: The process of sealing / (agricultural) land loss through urbanization is a very big problem for the water and agriculture sectors. Nature protection is somehow considered in this process, but often at the expense of agriculture (e.g. by compensation measures on agricultural land). Exemption clauses in spatial planning are partly contrary to flood protection policies (e.g. building development in flood risk areas). (ii) Heavy rainfall events are not sufficiently considered in agricultural policies. (iii) Groundwater recharge zones are not sufficiently considered in spatial planning (in context of climate change).

Nature conservation challenges: (i) Natura 2000 implementation is insufficient at regional state level (not concrete enough, not sufficiently addressing land-users). For example, on Natura 2000 protected grassland it is not allowed to implement afforestation measures (e.g. riparian forest) as postulated in the local WFD management plan. (ii) Flood risk measures vs. nature conservation: Flood risk measures are often contrary to nature conservation policies (therefore long durations/procedures for implementing flood protection measures). (iii) Gaps in promoting sustainable management/use of rewetted/restored peatlands. Site-specific/ spatially targeted funding (depending on the site conditions, such as height of groundwater table) should be improved.

Climate mitigation and adaptation challenges: (i) Regulatory law is not (enough) addressing water quantity and climate change issues. State aid law has a broader coverage (e.g. agri-environment climate measures). Until now there are no binding climate protection regulations on agricultural land, only commitments of ministries. (ii) Funding for renewable energy (e.g. biogas, biofuels) fosters production of a few crops (e.g. corn, rapeseed) which (at large scale) can conflict with policies on biodiversity and soil protection; Policies are only marginally addressing land-use related climate protection measures.

4.2.1.4 Suggested solutions to improve compatibility and implementation of NSWRM

This section presents the informants' suggested solutions for overcoming poor compatibility and improving implementation and uptake of measures. The informants ranked various suggested ways to upgrade related policy / legislation (

Figure 4.20). Informal education (practical demonstration) and de-bureaucratization of administration were ranked highly by several informants, with some importance given to the other options for improved policies, except product quality brands.

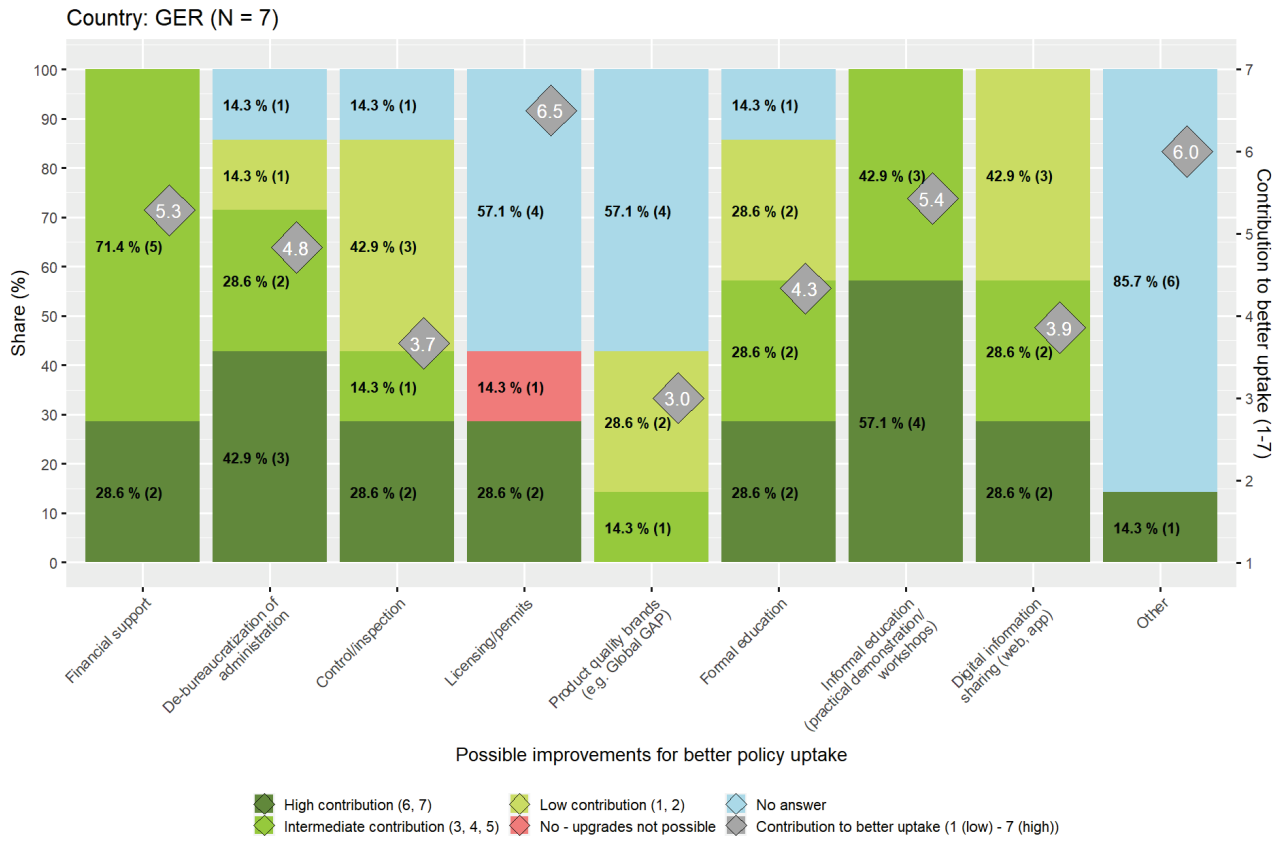


Figure 4.20. Illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Additional qualitative suggestions by the informants for improved implementation are presented below.

Governance

Upgrade legislation: (i) Legal requirement of environmental consultancy for farmers. (ii) Nature protection legislation should focus on protecting natural processes instead of simply protecting the status quo. (ii) More concrete recommendations from Natura 2000 and FFH directives with explicit consideration of other environmental concerns/targets (e.g. low-flow requirements, flooding frequencies). (iii) Projected climate change impacts needs stronger consideration in agricultural and water policies. (iv) Land-use plans for municipalities should also include agricultural regulations.

Efforts for improved engagement: Recipients/end-users should be better connected (also among different municipalities); more citizen forums.

Policy instruments

Improved financial mechanisms, increased financial support: (i) Stronger financial support for farmers. (ii) Payments for farmers should be based on an "integrative" agri-environmental law which combines different policies. Integration of different policies through joint funding models, only providing funding when several different "sector-

specific" standards are met. (iii) A stronger appreciation of positive long-term impacts of agricultural management measures should be reflected in the policy mechanisms and support levels. (iv) The agri-environmental climate measure "extensive management of hay-meadows" (funded by 2nd CAP pillar) must be applied on the whole field – targeted implementation only at field margins/ close to the streams (where it would make sense from a water perspective) is not funded.

Efforts for awareness, education and communication: Free of charge consultation addressing environmental concerns at farm level by independent consultants (public funding) was suggested, in addition to more local and regional workshops (incl. local decision-makers and implementers) about available policy instruments, addressing topics of water- agriculture-nature environment in formal education (school, training, studies).

Other suggested solutions are presented according to type of challenge.

Addressing water quality challenges: (i) Stronger financial support for agri-forest, cover crops and conservation till; low-, no- and strip-tillage. Tools for ground-level application, injection, or direct application of liquid manure. (ii) There is a benchmark system on farm-level economics available for the Federal State of Saxony, where each farm can participate to study economic efficiency of their practice by comparing with others. This represent a best practice experience that could be useful to study the efficiency of water/nutrient retention measures. (iii) Managing water quality, nutrient retention: The Federal Regulation (+Act) on Fertilising was highlighted - for nutrient use there exists material flow balancing approaches (but still not (enough) accounting for site-specific vulnerability); Conservation till (reduced or even no-till) and cover crops have been established over the last century, including tools for ground-level application, injection, or direct application of liquid manure. Sensor technologies for high-precision application of fertilizer, manure, pesticides (with section switching) and mechanical weed control. (iv) Impact of afforestation was/is monitored in several projects: Long-term monitoring plots of the Saxon State Agency of Environment, Agriculture and Geology. (v) Comprehensive information about fertilizer regulations to farmers and specialist advice on implementing measures according to the WFD.

Addressing water quantity challenges: (i) Managing shortages: Stronger financial support for agri-forest, biochar/Terra Preta approaches and conservation till. For water use efficiency, it was commented that there are rights for a pre-defined maximum amount to withdraw, abstraction fees and prohibitions in case of severe droughts. (ii) Managing excess water: "Disclosure obligations" and approval requirements for drainage systems were highlighted (also for water shortages and water quality).

Addressing nature conservation objectives: (i) Natura 2000 - More concrete recommendations from Natura2000 and FFH directives with explicit consideration of other environmental concerns/targets (e.g. low-flow requirements, flooding frequencies). Nature protection legislation should focus on protecting natural processes instead of simply protecting the status quo, e.g. oxbow lakes are special protection areas for the Great Nested Newt and therefore it is not allowed to reconnect the oxbow lake with the river network (what would be overall more beneficial for the environment). (ii) Spatially targeted funding for measures that allow some kind of production (wetland restoration, but allow sustainable use). Promotion of wetland/peatland restoration could

be improved. (iii) Projected climate change impacts should be (stronger) taken into account for agricultural and water policies - need for more nature-based climate protection measures.

4.2.2 Case focus Switzerland

4.2.2.1 About the informants – background and experience

Eleven informants were interviewed, six men and five women. The majority have master's degrees; some have bachelor or PhD degrees. Most of the informants work in the public sector, three in private sector and one in an NGO. More than half work on regional level and the rest on national level (no one from local level). The main expertise is agriculture, with some having expertise on water management, environment, spatial planning and climate change. Several informants listed more than one area of expertise.

Most informants have addressed challenges related to water quantity, especially drought, then flood protection on a high-intermediate degree and water retention to a slightly lower degree. Almost all had also addressed climate challenges to a high degree, and nature conservation to an intermediate-high degree. However, water quality challenges was addressed to a lesser degree among informants, especially nutrients recovery from streams, which very few had addressed. Most informants also had experience with several of the agri-hydro-environmental measures listed. Considering their knowledge on policies, almost all the informants had some expertise within all topics mentioned, with the highest competence rated in agriculture and environmental management.

4.2.2.2 Overview of legislation, policies and communication for NSWRM

This section describes the case study situation regarding legislation and policies within the agri-hydro-environmental governance domain according to the informants' perspectives.

Legislation at different governance levels: Relevant legislation is described on national (federal), regional and local level. Informants explained that frameworks in terms of strategies and legislations are made on national level (federal law) which is the same for all parts of the country, while cantons are the responsible for implementation and data collection. The cantons may also delegate responsibilities to the municipalities, which "are primarily active in enforcement". Several highlighted that the cantons and municipalities have the opportunity to implement extra measures or interpret the legislation differently to add measures beyond the "minimum level" defined nationally. It was mentioned that this differs somewhat for climate change, as there is a federal CO2-law, but canton responsibilities are less clear and different legislation between cantons.

Important legislation, policy documents: Important documents for NSWRM identified by informants were mostly on national level (two on regional level, no local). The documents were divided between the agriculture sector, water management and cross-sectoral documents.

National level: *The Ordinance on Direct Payments* is described by several informants as the most important document, as it defines the frames for agricultural production and policy in Switzerland, i.e. farmers receive direct payments if they comply with the rules laid down in the ordinance. This includes agri-hydro-environmental measures and contributes to meeting *Environmental Goals for Agriculture* related to nitrate, biodiversity, climate, aquatic environment.

The ordinance mentioned above is under *The Agriculture Act*, and specifically articles 77a and b on sustainable use of natural resources were mentioned. It was described as "very result-oriented" as it enables testing new practices and techniques. *The Structural Improvement Ordinance* was referred to, as it sets the framework for rational and sustainable development of production structures in rural areas and encompasses, among others, regulations for cultural engineering such as agricultural land improvement, preservation and improvement of traditional irrigation channels, and restoration/ revitalization of waterbodies.

The Spatial Planning Act and the *Nature and Cultural Heritage Protection Act.* The latter protects landscape structures such as biotopes, riparian vegetation, hedges and peatlands.

Regional level:

The Water Protection Act defines financial support, legal obligations and "priority areas of revitalisation". It was described as important for agriculture as it defines the minimum residual flow for watercourses. If the discharge is below this value, no authorization is granted for water abstraction - not even for agricultural irrigation. This is already often the case in the canton of Vaud. The cantons grant subsidies based on the regulations for the development of lakes and watercourses. One informant said that while agriculture is mostly regulated at federal level, "the cantons have more leeway in water protection". The Water Protection Ordinance was also mentioned. Based on the Water Protection Act it concretises the regulations for "water spaces", which cantonal spatial planning has to spare for waterbodies.

The Cantonal Water Management Sector Plan integrated into the cantonal spatial planning plan and names priority measures to be implemented in the various regions of the canton. It aims to implement measures to protect drinking water resources, improve the quality of watercourses and lakes, and prevent flood risks. It is binding for the authorities.

Cantonal Climate Plans elaborated in the last few years are highlighted as important. *The Climate Plan of the canton Fribourg* lists several measures for climate change mitigation and adaptation, including such for making water resources available for different uses and needs.

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: The majority of the informants considered water quantity concerns to be covered by the legislation, but to a very varying degree. Flood protection and drought -irrigation was seen as included to a relatively large extent, while water retention measures in agri-production was considered to be addressed to a low degree.

Water quality: Water quality concerns, especially nutrient recovery from streams, were considered by a number of informants not to be included in legislation, or to a low degree. In-field nutrient retention measures were also considered to be supported to a lower degree.

Sustainable agriculture production was considered to be addressed to a large degree. Nature conservation was also considered by most informants as addressed to a large degree. The informants differed in considering whether climate change concerns are addressed in the legislation or not.

Water use efficiency: The majority of the informants said that water use efficiency is supported to an intermediate degree in national policy/legislation. The same was the case when considering the promotion of water use efficiency among end-users. Informants said that there is public financial support for irrigation - proving water use efficiency is a criterion to receive subsidies for irrigation projects or land amelioration. One informant said that water is "too cheap", creating no economic incentive to use it efficiently. It was also mentioned that the focus is on threshold values, not on overall efficiency (legislation can prohibit water use when water flow is too low).

Nutrient use efficiency: This was considered supported in national policies by most of the informants to an intermediate to high degree. Legislation was described as "work in progress" as there is an initiative on nitrogen currently being discussed in the parliament. The majority of the informants said nutrient efficiency is promoted among end-users, but to a lower degree than water use efficiency.

Support for economic sustainability: Almost all the informants considered financial support the most important way of promoting economic sustainability of technologies on farms and small agricultural catchment level in the policy/legislation. Around half considered economic sustainability to also be promoted by penalties, legal framework or voluntary action. It was highlighted that there are no penalties for failing to implement voluntary measures, but it will affect the eligibility for subsidies.

Monitoring of environmental and economic sustainability: Few informants considered economic sustainability to be systematically recorded neither on farm nor catchment level. It was commented that economic sustainability is monitored on cantonal level. Around half considered environmental sustainability to be recorded - most rated data quality slightly higher for catchment level than farm level.

Effectiveness of communicating policies to end-users at local level: Informants mainly considered communication of policies to end-users at local level as active from the authorities. Agriculture, water management, nature management and spatial planning policies were all seen as actively communicated by more than half the informants, while some informants said climate change is not communicated. There was a broad range of approaches to dissemination, such as field visits, technical sheets, website, podcasts, videos etc.). A newsletter of the federal office of agriculture exists, but with a limited reach. Cantons and advocacy groups receive important information quarterly in a special newsletter and forward information to end-users.

Communication to promote practical acceptance and implementation of measures: More than half of the informants said that policies/legislation contributes to practical acceptance and implementation of measures for water retention to an intermediate or high degree. The same was the case for nutrient retention measures, but acceptance was rated slightly lower.

4.2.2.3 Gaps and compatibility issues challenging implementation of measures

This section provides an overview of gaps and compatibility issues perceived by the informants. In summary, about half of the informants think that policies to address environmental concerns are adequate, while the rest did not think policies are adequate. Regarding compatibility, low compatibility was noted for water quantity excess, (and water quantity in-field) water management and water quantity scarcity shortage.

The informants ranked challenges to implementing soil management measures and structural measures, including the option to fill in other explanations (Figure 4.21, Figure 4.22). Low cost-benefit was rated as the biggest challenge for implementing soil management measures, followed by complicated implementation (land ownerships received low score). For implementing structural measures, complicated implementation and low cost-benefit were identified as the biggest challenges, followed by land ownership and administrative barriers.

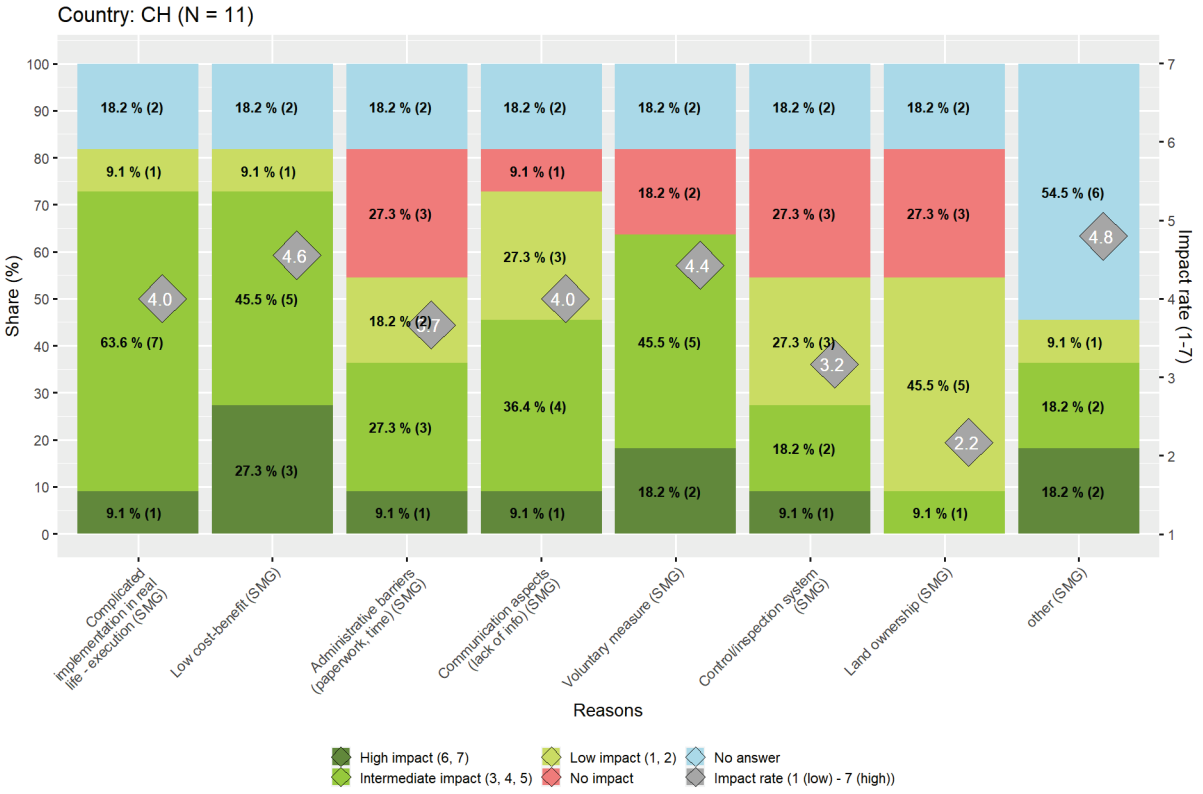


Figure 4.21: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

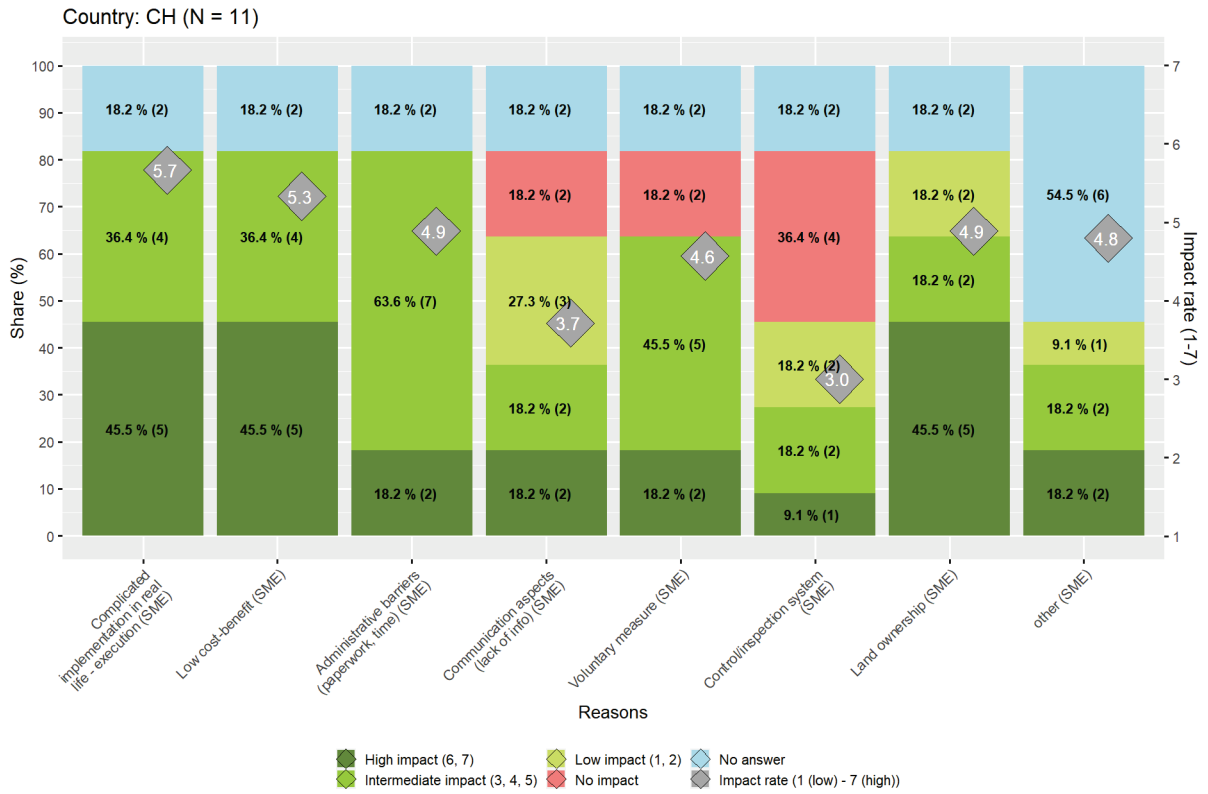


Figure 4.22: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: The regulations are good, but there is not sufficient implementation of the measures and actions, and insufficient control (while there are penalties).

Insufficient integration, incoherent sectors, authorities: (i) Lack of coherence between agriculture, water management, nature, spatial planning and climate change, and lack of communication on the horizontal axis, i.e. between governmental offices, sectors, different actors. The SAR (regional agriculture strategy) aims to solve this incoherence (where infrastructure and market were added as concerns). (ii) Different interpretations and several legislations involved. General policies to different environmental situations - environmental issues differ from region to region, e.g. drought does not affect all regions the same way.

Insufficient administrative capacity, competence and knowledge: A weakness is the administrative apparatus. Not every country can afford the necessary administration.

Policy instruments

Insufficient or inappropriate funding schemes: Lack of financial means and will on canton level. Also lack of support for the national fertilizer standard (GRUD), and for larger crop failures.

Further gaps and incompatibility issues are presented by type of challenge.

Water quality challenges: (i) Responsibility and agricultural practices: Too high nutrient concentrations in rivers and lakes, therefore not adequate. This is due to the control and consequence, i.e. once the waterbody shows high values it is almost impossible to find the responsible person. Pollution, unauthorised practices (e.g. manure spreading over frozen soil). (ii) No-till farming and pesticide use: For water retention on site/ field-scale farmers are encouraged to do no-till. No-till however implies the use of pesticides. Hence, there is incompatibility between water retention on-site with no-till and agriculture without pesticides.

Water quantity challenges: (i) Spatial planning: Lack of space for nature/environment in agriculture and in construction plans. There are new industrial land, but sealed areas, even if the land-use planning law must protect soil. Land-use planning does not take water retention sufficiently into account. (ii) Urban development: High population density - the high pressure on water resources takes priority over the water resources needed for agriculture. Agricultural areas near urban areas have complex challenges - it is complex to consider the whole range of problems to develop a good strategy. (iii) Feasibility of measures: Some land-users fill the depression areas in their fields so water cannot accumulate there. They want to control the soil humidity (with drainage and irrigation at the right time). Sometimes there are measures that would actually be good, but there are financial or permission issues, e.g. water retention basins cannot be implemented everywhere. (iv) Water shortage: Incompatibilities due to different aims, e.g. between irrigation for agriculture (increase production) and secure base flow (ecological function of stream). Promotion of organic farming is good, but problems with driving on fields; Water quantity vs. water quality.

Nature protection challenges: (i) Projects to revitalise watercourses are not very compatible with agriculture and spatial planning, when restoring a stream more space is needed, hence agricultural areas near the stream gets smaller. Sometimes the watercourse is no longer channelized, this makes the agricultural work less easy. (ii) Water management: Floodplains should not be cultivated intensively. Wetlands and nature conservation objectives are not compatible with drainage. (iii) Ecological interests are subordinated to short-term economic goals. Challenge to find the balance between agricultural production and environmental protection. The WSL (Swiss Federal Institute for Forest, Snow and Landscape Research) identified several subsidies harmful to biodiversity. According to the authors, the subsidies identified are ecologically problematic and economically inefficient, as they can cause initial damage which then often requires further public funding to remedy.

Climate mitigation and adaptation challenges: (i) Conflicting goals: Climate Change CO2 legislation and Energy Strategy 2050 indirectly contradict other sectors - what is good for global climate may not be good for local resources. Weak legislation and enforcement – a need for regulations, laws, “bons-malus-system”, penalties. (ii) The transformation of agriculture to cope with or adapt to climate change (on a local level) is insufficient. The Climate law is too weak. (iii) Objectives related to water management of climate are not well integrated into spatial planning.

4.2.2.4 Suggested solutions to improve compatibility and implementation of NSWRM

This section presents the informants' suggested solutions for overcoming poor compatibility and improving implementation and uptake of measures. The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.23). Financial support, formal education and informal education were ranked as most important.

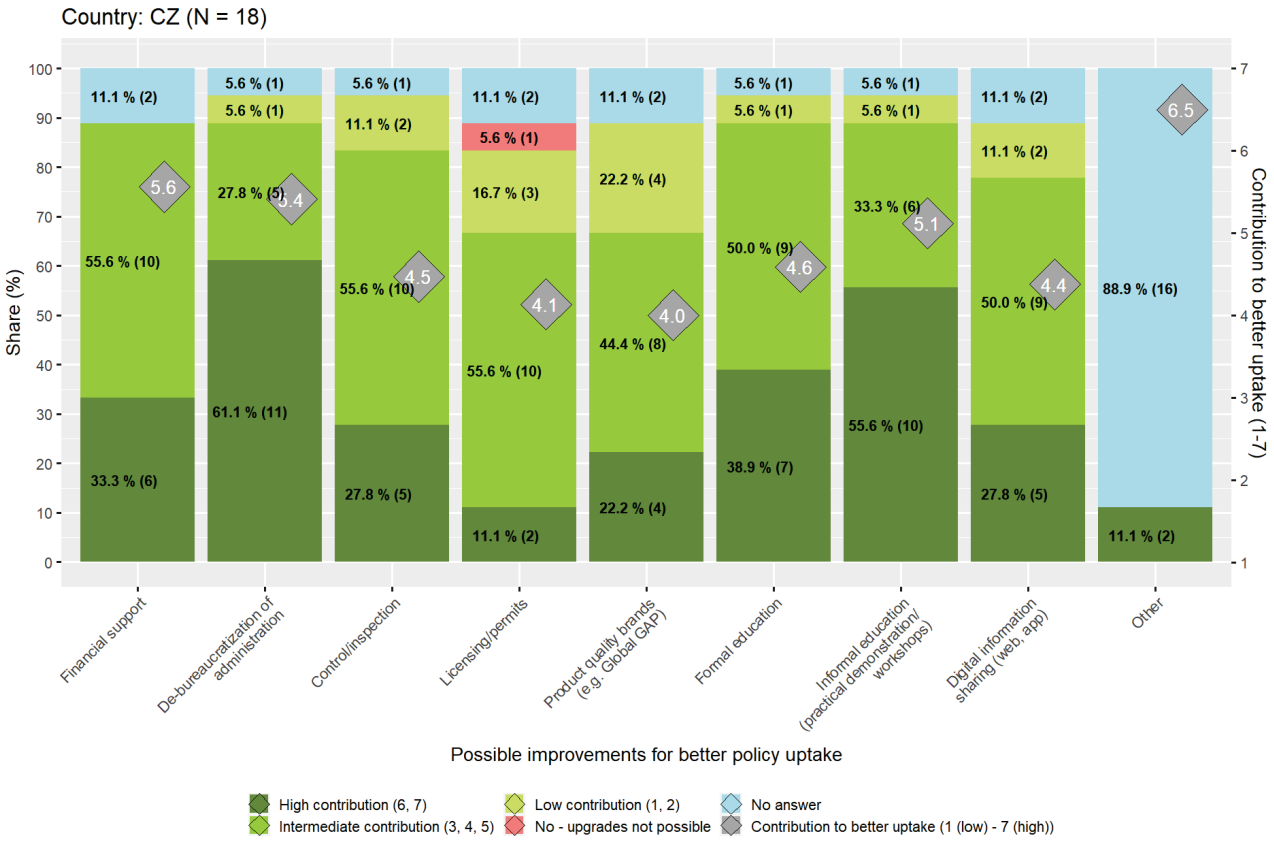


Figure 4.23: The figure illustrates the information provided by the informants in response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Additional qualitative suggestions by the informants for improved implementation are presented below.

Governance

Upgrade legislation: Make national and regional adaptation strategies legally binding, and stronger law enforcement.

Efforts for better coordination and coherence between sectors: (i) The strategy should be to work more horizontally. All the offices (water, agriculture, nature, spatial planning, etc.) should work more together to focus on food policy in general. Spell out priorities between food policy and protection of the environment. A national water management strategy is needed, broken down to canton and community level. It was suggested to coordinate and cooperate spatially rather than by state entities, to coordinate vertically and horizontally on state level across sectors, and to coordinate topics that have

interrelationships and interactions. Using a hierarchy of common goals - conformity with these goals should be checked before approving the legislation. (ii) Identify the interests and needs of all stakeholders and try to find a suitable compromise, synergies. One informant said that "it is crucial not to undertake any measures before it has been discussed with the land-users".

Efforts for improved administration, competence and knowledge: Cost-benefit analyses - if a land user thinks that a measure is not sustainable (especially economically) he won't implement it. On a watershed level, the costs of pollution/degradation should be calculated ("how much does pesticide in the river cost?") and if certain measures are able to reduce these costs, these measures have a value.

Policy instruments

Improved financial mechanisms, increased financial support: (i) Support for (agricultural) cooperatives, e.g. irrigation cooperatives. More research is needed, but there are already examples of good practices in different cantons. (ii) Implementation of control measures - agricultural and industrial. One said that "voluntary actions without legal or financial support is useless", when distributing direct payments, economic sustainability is a decisive criterion. Subsidies, e.g. direct payments for direct seeding was also suggested.

Efforts for awareness, education and communication: (i) Education of policy-makers, students, farmers and general population, training of decision-makers on agricultural reality (real agricultural issues). Trainings – "environmental NGOs could visit land-users and discuss field-scale measures with them". (ii) Communication and dialogue between sectors and actors, particularly in the rural areas, is needed. Pilot projects are a good opportunity for exchange between farmers and authorities. Even better – communicate to municipalities best practice examples referring to successful projects. (iii) Farmers could also form an interest group to respond to requests of single farms. Move from providing information on request toward active communication by authorities - using social media, active and tailored communication - agriculture as part of the solution instead of generating "climate sinners", and more dissemination of planned measures.

Other suggested solutions are presented according to type of challenge.

Addressing water quality challenges: (i) Nutrient retention measures - need for better techniques and tools for «regarding larger nutrients retention measures (e.g. revitalisation of streams) the cantons are encouraged but not necessarily the owners of the land» and that the problem should be addressed at field scale. (ii) The cantons define the area belonging to the "watercourse space" and the farmers are obliged to use this area extensively (no-tillage, no inputs), in return they receive direct payments (part of the Agriculture Act); this represents a best practice experience. The canton of Fribourg is a bit of a pioneer by doing a global management by watershed (assessing current state and then defining measures for each watershed). Subventions are very important for environmental measures on watershed level (e.g. for the development project of Petite-Glâne).

Addressing water quantity challenges: (i) Water use efficiency is influenced by the water protection act (ensuring minimal residual flow). As drought is new, need for education of policy makers-students-farmers-general population. (ii) Spatial planning has potential for more to reduce nutrient input on field (e.g. only allow barns where there is enough

feeding base); non-conforming buildings. (iii) Irrigation tools – ongoing adjustments it will be defined where one can take water for irrigation (essentially from lakes so that streams will be more protected) - compatibility will be enhanced. (iv) Relevant programs addressing water retention, incl. direct payment for measures includes: Resource Programme, Projects for Regional Development, production system contributions, resource efficiency contributions. Project of the Bernese University of Applied Sciences: probes for measuring soil moisture in order to evaluate the water needs of crops, e.g. to determine when to irrigate. (v) Ensuring appropriate residual flow in streams (flow rate Q347*) is the most important reference for withdrawal of water from a watercourse with permanent flow or from lakes or groundwater resources in such a way as to affect substantially the discharge rate of a watercourse with permanent flow; this represents a best practice experience.

Addressing nature conservation challenges: (i) Organic farming: no synthetic products - better water quality; soil rich in humus - better water quality; Build up humus advantage of carbon storage. (ii)Regenerative agriculture (partly contradiction with glyphosate) away from glyphosate. FENACO (agricultural cooperative federation supporting agricultural economic development) and FiBL (research institute of organic agriculture) have started a collaboration in research and implementation of innovative solutions for sustainable pest control.

Addressing Climate change challenges: (i) Cow pasture can have positive climate impact; great value of permanent grassland (not in rotation). (ii) Climate action plans and good practices on climate issues coming, farmers will start to use models for the impact of their work on the climate (e.g. a CO_2 footprint).

4.2.3 Case focus Hungary

4.2.3.1 About the informants – background and experience

In total, 23 informants were interviewed in the Hungarian case studies, 17 men and 6 women. The Hungarian case study areas include Csorza (case 3a) with four informants; Felső-Válicka (case 3b) four informants, Kobiljski/Kebele (case 6a) ten informants; and Tetves (case 11) five informants. For the rest of this section, all informants will be referred to as one group.

Among the informants, the majority have education on master's degree level. Around two thirds of the informants work in public sector, some work in private sector or NGOs, relatively evenly divided between local, regional and national level. More than half of the informants have agriculture as their main area of expertise, several also say that water management and nature protection are important expertise. Most of the participants have addressed water quantity challenges in their work, but more often drought than excess water such as flood challenges. The majority also had experience with water quality in terms of in-field nutrient retention, but to a less degree nutrient recovery from streams. Most have worked with climate and nature conservation challenges to a high degree.

Many of the informants have experience with the various agricultural and hydro-morphological measures listed. A majority of the informants had intermediate to high knowledge of policies within agriculture, water management and environmental management. Around half also had knowledge of legislation and policies related to spatial planning and climate change, but mostly on an intermediate level.

4.2.3.2 Overview of legislation, policies and communication for NSWRM

This section describes the case study situation regarding legislation and policies within the agri-hydro-environmental governance domain according to the informants' perspectives.

Legislation at different governance levels: Legislation in general is developed at the national level (parliament), but the specific strategies and the implementation may differ on regional and local level. Regarding water quantity related legislation most said this refers to national level, while a few also referred to local and regional level. One informant added that municipalities also make legislation locally, and that drafts are sent out for consultation, but not to a specific committee. Considering water quality related legislation, respondents said such is also developed on regional and local level. Municipalities can set local rules by legal mandate. This includes such as, setting of a soil charge for the disposal of wastewater under the jurisdiction of the local water authority, the setting of various enforcement rules for the payment of the charge, including discounts and exemptions from the payment of the charge. Climate change related legislation was also mainly considered to be on national level.

Important legislation, policy documents

European level: *The EU Water Framework Directive (WFD)*, together with EU tenders to support the implementation of water retention measures were rated as important. *The Regulation on EAFRD* (European agricultural fund for rural development) was also mentioned as important related to investments and funding.

National level: *The Water Management Act* was highlighted for water retention objectives as it regulates water utilisation, together with the *National Water Strategy*, which identifies short and medium-term objectives and related actions. *A national river basin management plan* was also highlighted as it sets out measures/actions and long-term objectives without direct financial resources.

Act CXXIX of 2007 on the Protection of Soil was mentioned by several informants. It lays down provisions on the use of agricultural land, land protection, land certification and soil protection. *The FVM Decree 90/2008 on detailed rules for the preparation of soil protection plans* - this legislation contains the professional basis for irrigation, the basis of which authorities approve irrigation.

The Water Damage Mitigation Plan was also mentioned: *Government Decision 1979/2013 (XII.23.) on measures to ensure the efficiency of water damage mitigation and irrigation*.

The FVM Decree 59/2008 on the detailed rules of the action programme for the protection of waters against nitrate pollution from agricultural sources and on the procedure for data reporting and recording. This is Hungary's legal document for implementing the *EU Nitrates Directive*. *Government Decree 27/2006 on the protection of waters against pollution caused by nitrates from agricultural sources* was also mentioned as important for habitats and especially water quality concerns.

The NATURA 2000 management plan is a reference for e.g. permit procedures and prepare sectoral plan, with some impact on agriculture, water management and forestry. *Act XXXVII of 2009 on forests, forest protection and forest management* was also mentioned. *The Biodiversity Strategy*'s impact "covers the food chain".

Act XXI of 1996 on Spatial Development and Planning. Designation of areas suitable for water retention would be necessary to avoid conflicts between land users.

Regional level: *River basin management plans* were highlighted by several informants as important. Comments: "The Plan can be the basis for balanced, predictable economic development. It makes water resources available for the long term. Flood protection is a higher priority". Water boards' regulations (inland water management, canal management) were also mentioned.

Local level: *Local water regulations of municipalities* were also mentioned as important for water retention.

The following section considers whether and to what extent informants perceive legislation to include various environmental concerns.

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Most informants said the legislation addresses flood protection to a high or intermediate degree. Water shortage concerns were perceived to be considered to a high or intermediate degree. In-field water retention measures was perceived to not be addressed, or to a low degree.

Water quality: More than half of the informants did not know, or said that measures to address in-field nutrient retention and nutrient recovery from field are not included in legislation. Some said it is included indirectly to an intermediate degree.

Sustainable agriculture production was mainly seen as indirectly addressed to a low or intermediate degree.

Nature conservation was considered by most informants to be addressed to a high or intermediate degree, while there was little consensus on whether or how **climate change** mitigation is addressed and to what degree.

Water use efficiency: Most of the informants said water use efficiency have little or no support in the legislation/policy, while some said it was intermediate.

Nutrient use efficiency: Most of the informants said nutrient use efficiency have little or no support in the legislation/policy, while some said it was intermediate.

Support for economic sustainability: More than half did not know whether the economic sustainability of technologies on farms and small agricultural catchment level supported by promotion in the policy/legislation. Of those who answered, financial support/subsidies was considered the most important type of promotion.

Monitoring of economic and environmental sustainability: Most did not know whether economic sustainability is recorded on farm or catchment level, while the rest were divided between yes or no. A network of farmers' advisors were mentioned for farm level, while the nature conservation guard service was mentioned for economic monitoring on catchment level. A large majority said that they did not know whether environmental sustainability is recorded on farm or catchment level. Some said it is recorded on catchment level. Institutions responsible for monitoring, Regional Water Directorates, Water Society, The Water Agency measures hydro-meteorological data.

Effectiveness of communicating policies to end-users at local level: A large number of the informants did not know about the communication of various policies, and there was little consensus on the type, and effectiveness of the communication. An informant commented, "There is communication in regional and local level, but lack on national level".

Communication to promote water/nutrient efficiency: Most of the informants said that water and nutrient use efficiency is promoted among end-users with intermediate or high effectiveness. Comments provided however include such as, "Communication and Information Service of the Hungarian Chamber of Agriculture Lack of proper communication"; "There are newsletters, but just few practical information". "NAK lap" – official journal published by National Chamber of Agriculture.

4.2.3.3 Gaps and compatibility issues challenging implementation of measures

Some informants perceived that the policy mechanisms were adequate, others did not think that these were adequate, no clear pattern appeared. It can be noted that several informants did not provide and answer or were unsure of whether policies are adequate or not.

The informants ranked challenges to implementing soil management measures and structural measures, including the option to fill in other explanations (Figure 4.24, Figure

4.25). Regarding perceived challenges for implementing soil management measures, there were not very strong differences, but low cost-benefits received a marginally higher rating. Regarding perceived challenges for implementing structural measures there were also quite divided opinions.

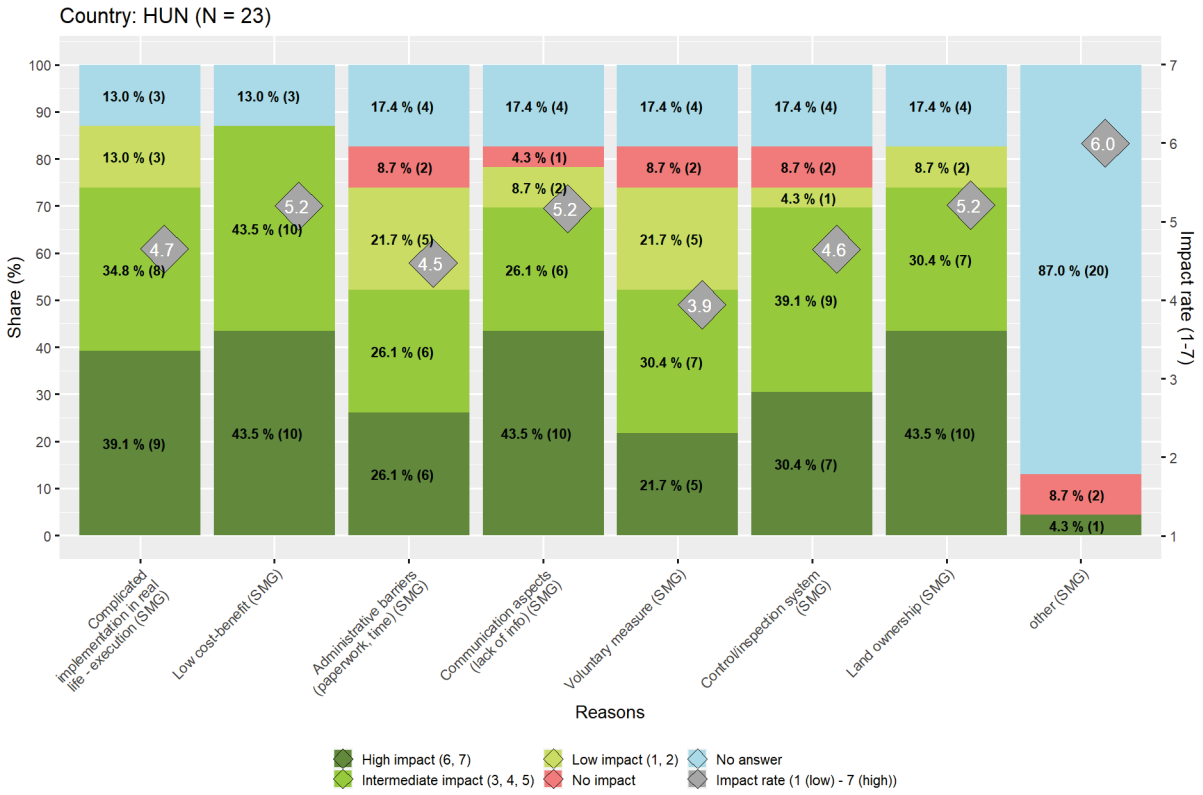


Figure 4.24: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

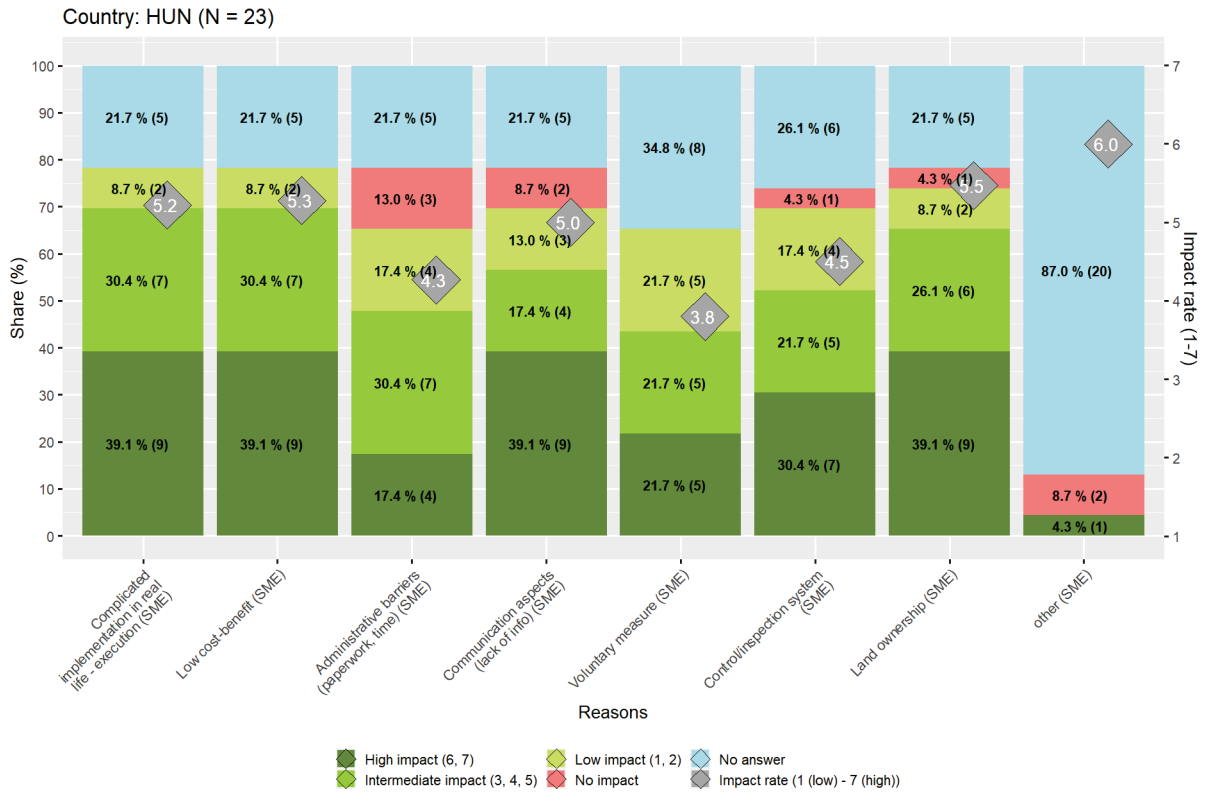


Figure 4.25: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: (i) Legislation on national level do not target local conditions. (ii) Legislation is not harmonised, it is fragmented and does not necessarily use the same terminology. (iii) The legislation missing complexity; also over-complicated legislation, e.g. Agri-environmental schemes (AES) and lack of flexibility in the legislation rules and administration. (iv) Water legislation, the WFD - "the directive tries to address a real problem, but there is no accountability or sanction behind it". (v) EU legislation reflect conflicts between EU policies and land-use without solving them. (v) The communication of river basin management plans is regulated in detail, events are held regularly with mixed attendance and interest.

Incoherent sectors, authorities: (i) Lack of coherence among policy objectives - "different guiding principles and perspectives for different sectors and different terminology is being used; general priorities are missing, guided by individual interest, lack of harmonisation of concepts, rights, obligations and responsibilities. (ii) Coordination at higher strategic level is lacking, sectors are not coordinated. The areas of water management fall within the remit of several different ministries, e.g. irrigation, water utilities, water management, etc. (iii) Insufficient level of cooperation between experts from different disciplines - few opportunities for joint projects; lack of dialogue between professions and interests. (iv) Institutional memory is insufficient - the administration

and research semi-institutions of the water sector are constantly being reorganised, and the institutional memory is gradually crumbling and disappearing as a result of the ongoing reorganisation. (v) “Integrated planning exists only in theory”.

Insufficient administrative capacity and competence: (i) Impact analysis is only formally implemented in development projects, with a predefined technical solution and budget, it is hard to move for a better solution for other sectors. (ii) Water professionals, growing shortage of professionals due to ageing, often lack of green vision, many lack a positive appreciation of ecosystems and their services. (iii) The authorities are not prepared for new approaches, if the conditions and the corresponding behaviour are not in place, it is sometimes not reflected in the application of the law by the authorities.

Policy instruments

Insufficient or inappropriate funding schemes: (i) Difficulties in obtaining funds for the implementation of measures; local legislation/plans/programmes are dependent on central funding and approval. (ii) Insufficient / lack of subsidies, farmers will not adopt solutions that require minimum cost inputs. Under the farmer's current support system, and given the farmer's traditions and income situation, the above policies cannot be implemented on a voluntary basis.

Insufficient technical infrastructure and support: Past improvements, such as the construction of a culvert system under land, are not registered in the land register.

Insufficient awareness and communication efforts: (i) Lack of awareness raising and proper communication about NWRM measures; farmers' knowledge of the importance and economic benefits of field forest strips is lacking. (ii) Insufficient communication, there are newsletters, but little practical information. Communication of policies varies greatly according to the policy, where it is of interest, and who is interested in the ideas. (iii) Contact with landowners is difficult - often lack a sense of responsibility for their environment and the impact of their own activities; reluctant to implement measures. (iv) After privatisation, the unified system was dismantled, which also dismantled its functioning; landowners are lack knowledge of rules.

Further, gaps and incompatibility issues are presented by type of challenge below.

Water quality challenges: (i) Implementation and enforcement: Water protection measures are not sufficiently supported, there is insufficient implementation of measures in water protection areas. (ii) Mandatory nutrient retention, the possibility and alternatives for reusing nutrients is not specified. (iii) Buffer strips and greening: Water protection strips are not assigned, marker stones are ploughed in; hence, there is agricultural land next to water bodies land. Riparian buffer strips are ploughed, then banks are filled with silt, which the municipality then has to clean up. Legislation does not take into account the different local conditions, on small agricultural fields, where there is no place for buffer strips. Farmers' knowledge of the importance and economic benefits of field forest strips is lacking. (iv) The current support system (SAPS, greening, etc.) provides a better return on the extent of the damage rather than on prevention and the resulting increase in yields. (v) Use of herbicides: Informants argued that while the EU is narrowing the range of PPP active substances, there are not yet alternative methods of controlling many weeds available. (vi) With regard to agriculture, territorial water retention measures are not addressed. “We drain rather than retain”.

Water quantity challenges: (i) Land use planning and administration for irrigation water - few reservoirs are built, there are problems in gaining water resources for irrigation and, on the other hand, restricting access to water resources. The authorisation process for irrigation is difficult, obtaining approvals for the introduction of a local irrigation system is difficult, high costs of implementing an irrigation system. Tenders are focused on a single objective, resulting in a forced path in the future; if an application addressees drainage, it does not consider water retention hence sometimes the measure exacerbates a problem. (ii) Water saving technologies are not widespread; Water quantity issues should be more prominent, better subsidies. (iii) Urban development and water quantity concerns - Development of a former floodplain will change the soil water regime in the area, this is beneficial from the point of view of urban development but deepening the groundwater level is unfavourable for the agricultural sector. (iv) The Water Act specifies the aim of good water quality and environment flow, while the law on nature conservation says that habitats must be preserved. It would be necessary to specify more specifically in order to avoid different interpretations.

Nature protection challenges: (i) Nature 2000 area: Spatial planning does not follow the goals of nature conservation, no obligation to take nature conservation suggestions into account in spatial plans. (ii) Drainage for agriculture vs. nature conservation: If a reservoir area is declared protected, it cannot be maintained for agriculture. When implementing measures, land is taken out of cultivation. When a reservoir is created, the water administration has an interest in maintaining it, while the environmental authorities see the reservoir as an element of an ecosystem, and therefore have an interest in protecting it (example, Lake Kis-Balaton, where nature conservation and water management interests are in conflict). Drainage is a national level target - in line with this, farmers ignore the need for long-term water retention for short-term profit. The aim is to drain away the excess water quickly, for nature conservation the aim is retain the excess water, and through this the water supplementation of wetlands. Agricultural subsidies as incentive for drainage, this conflicts with nature conservation aspects as water retention is important for inland wetlands. (iii) Area-based agricultural support versus nature - has resulted in maximising the area under cultivation, resulting in the ploughing up of grass/shrub and forest strips to protect fields.

Climate mitigation and adaptation challenges: (i) Areas under cultivation but regularly flooded by inland water, there is no possibility to change the crop structure. Farmers' compensation counter- interest. (ii) Lack of knowledge about the negative impact of pavements, e.g. their role in the formation of heat islands, the microclimate enhancing role of trees, the need for tree habitat, ignorance of the effects of climate change. (iii) Climate change policy is not reflected in practice, lack of concrete action for real change to mitigate climate change, deficient implementation.

4.2.3.4 Suggested solutions for improved compatibility and implementation of NSWRM

This section presents the informants' suggested solutions for overcoming poor compatibility and improving implementation and uptake of measures. The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.26). Financial

support was ranked highest, followed by informal education, de-bureaucratization of administration and digital information.

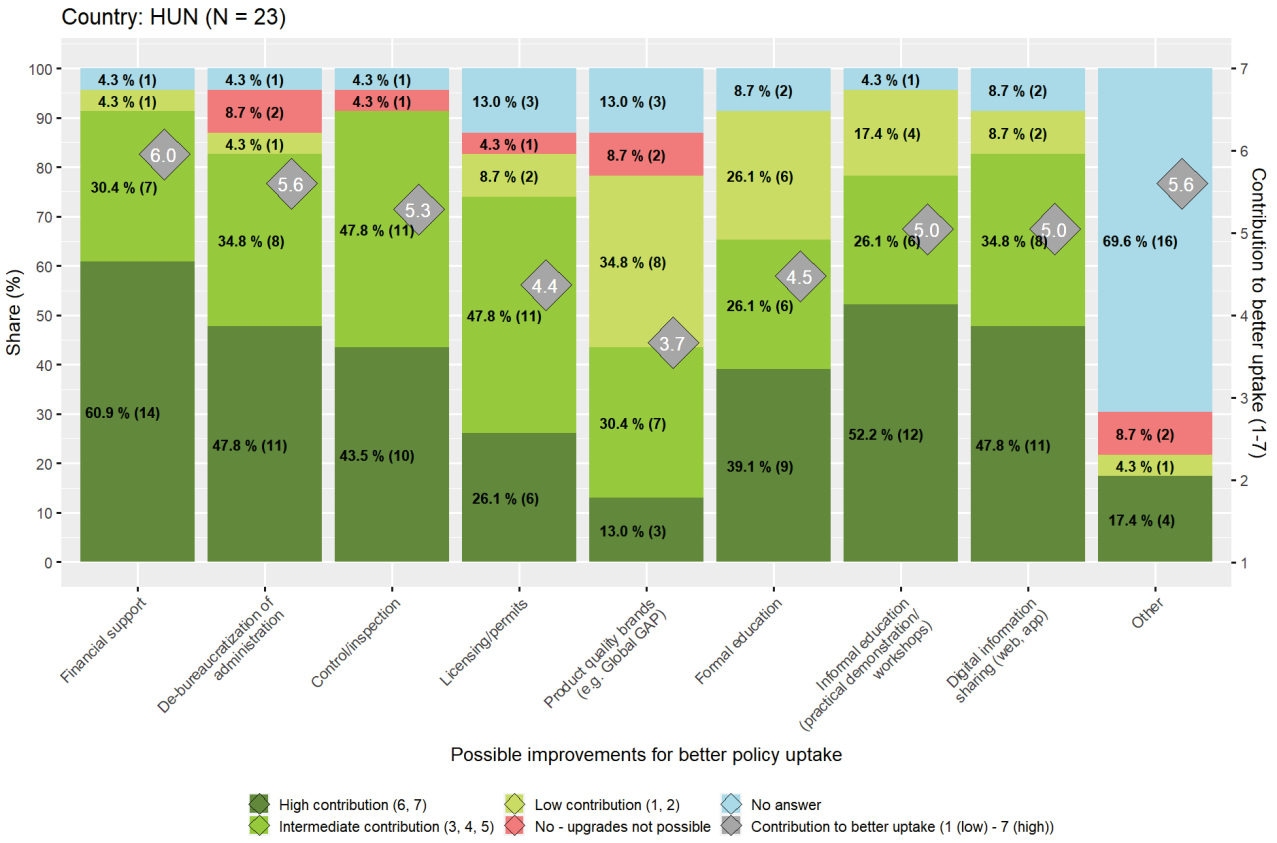


Figure 4.26: The information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Additional qualitative suggestions by the informants for improved implementation are presented below.

Governance

Upgrade legislation: (i) There should be an obligation to take account of the specific nature of natural factors in all legislation and law making. To be incorporated into related legislation (Land Act, Land Protection Act, Forest Act, Hunting Act). (ii) Need for improved enforcement of legislation and policy, more enforcement of practice and control, more effective environmental inspection.

Efforts for better coordination and coherence between sectors: (i) Inter-ministerial committees for better coordination between sectors sectoral consultation and dialogue at higher levels needed. (ii) Consultation before the adoption of legislation, impact assessment, consistent legislation, transposition of directives, deregulation, involve the economic and social sectors. (iii) National and regional strategies need to involve experts from different institutions. (iv) Water conservation should be placed under ministerial control and the construction, water and nature protection sectors should be addressed by agricultural administrations.

Efforts for improved engagement: Establishing a village farmers' network for discussing how different solutions can reduce costs, and a network of advisors.

Efforts for improved administration, competence and knowledge: (i) Cutting bureaucracy, training properly qualified professionals to achieve simple, professional objectivity and interoperability between institutions. (ii) New measures need to be tested and worked before they are repealed - in the context that the EU is narrowing the range of PPP active substances. Practical implementation would require a long process of consultation to find the best common solutions.

Policy instruments

Improved financial mechanisms, increased financial support: Subsidies need to be enhanced, part of the activity costs must be earmarked for some form of subsidy. Allocation of subsidies should be linked to compliance with soil and water protection standards, e.g. linking the steepness of a slope to the crops that can be grown. Preference should be given to mixed farming and monoculture should be discouraged.

Improved technical support and infrastructure: (i) Climate adaptation activities should be harmonized, making priorities based on cost-effectiveness. Also establish a KtioKl strategy for climate change mitigation. (ii) Film screenings/discussions on local conditions, how the microclimate of the municipality is changing as a result of different land uses/conversations, which ecosystem services can prevent or improve local conditions and what concrete benefits they can bring. (iii) Establish an adequate and effective support system, with a partial increase in the legal requirements. Provide an advantage to the farmer for access to certain programmes. (iv) Avoid political interference in technical matters, "lobbying interests prevail through political connections instead of a united front that takes all interests into account".

Efforts for awareness, education and communication efforts: (i) Avoid one-way communication, receive feedback on the reviews, communication need to be ahead of actual solutions. (ii) Discussions on local level based on local data and observations, giving local stakeholders the opportunity to express their views. (iii) Establish and organise structured professional forums, local forums, network of farmers' advisors. More local forums needed among young people. (iv) Meetings in the field, demonstration of good practices, joint site visits with experts. Practical campaigns demonstration of pilot farms. (v) Joint training of experts, property owners / users about measures and approaches (ecosystem, circular economy, permaculture), in the area of land use planning explain how changes may affect their interests, and discuss how to avoid negative impacts as part of a genuine dialogue in the forum. (vi) Provision of information and news in the form of specialised magazines, agricultural news internet site, brochures printed and electronic form - accessible and understandable content on the internet, increase media involvement, develop strategies. Holding national roadshows on water management investments.

Other suggested solutions are presented according to type of challenge.

Addressing water quality challenges: (i) Nutrient use efficiency, the LIFE MICACC project (LIFE16 CCA/HU/000115 represent a best practice example. (ii) The Nitrate Decree prohibits the application of manure between the end of October and 15 February. (iii) Crop rotation: all farmers must apply crop rotation in their own interest + greening aid

condition. (iv) Decree 10/2015 fm incentive under direct payments represents a best practice experience. The NAK (National Chamber of Agriculture) puts farmers' interests first and helps them to get subsidies and solve their problems. Greening above 15 ha max. 5%. Nitrogen-fixing crops/reseeding (white mustard and oil radish -" must be on the field for at least 60 days) - soil structure and nitrogen source, around July, main crop comes off in August. Agri-environmental scheme (AES) tenders.

Addressing water quantity challenges: (i) Soil loosening and deep loosening at appropriate time and depth to promote water retention. (ii) Preventing erosion through proper cultivation. Reduction in the number of rotations - specifically for water retention purposes. (iii) Creation of reservoirs in forest areas. (iv) Facilitate irrigation with water reclaimed from reservoirs or from wastewater treatment, this would help to solve the drought problem to some extent. (iv) Agricultural aids for maintaining ditches. Government grants for regional improvements for water management and retention.

Addressing nature protection challenges and climate mitigation and adaptation challenges: (i) Stronger integration of nature conservation interests into policy; screening of projects for these indicators. (ii) The rehabilitation of the Old Lake of Tata. Tata was awarded the title of Ramsar City in 2018; the LIFE-MICACC projects; prohibited drainage of inland water from Natura 2000 grasslands; construction of water retention structures to protect wetlands, all represent best practice examples.

4.2.4 Case focus Poland

4.2.4.1 About the informants – background and experience

Twenty-three informants were interviewed, five women and 18 men. Around two thirds have master's degrees and one third have PhDs. A large majority work in the public sector, a few in the private sector and one in a NGO. The group works with policy making, implementation, as experts or in research (even distribution). More than half work on national level, five on regional level and four on local level. Water management is the most common competence among the participants followed by environment and agriculture. None listed spatial planning as a competence.

Most of the informants said that they have worked with concerns related to water quantity (flood, drought and water retention), nutrient retention, climate change mitigation and nature conservation. The exception was nutrient recovery from streams, which only about half of the informants had experience with. Considering their knowledge on policies, most of the informants had some expertise within all topics mentioned, with the highest competence rated in water management policies, followed by environment and climate change. The lowest rated knowledge was in spatial planning policies.

4.2.4.2 Overview of legislation, policies and communication for NSWRM

Legislation at different governance levels: Policy documents highlighted were mainly on national level. Some informants considered relevant legislation to be found on local, regional, and national levels. It was mentioned that legal acts and strategies are on national level, often implemented regionally, while the local level "has smaller impact and utilizes the decisions and records of the higher-level documents". Some documents are explicitly formulated for regional or local level. Water quantity is managed on national level by the State Water Holding Polish Waters. On regional level it is the water management boards, while on local level it is the catchment boards. An informant said that the distribution of financial support to water infrastructure and irrigation is currently administered by regional and local administrations with separate grants and subsidies. Water quality is regulated on national level; for "protected areas" and in nitrate vulnerable zones requirements for water protection are more strict. It was pointed out that regional legislation directs the water management plans in the river basin districts "when the terms of water use apply to smaller areas - water regions. Climate change is regulated by a Strategic Adaptation Plan "for sectors and areas sensitive to climate change by 2020 with a perspective by 2030" (SPA2020).

Important legislation, policy documents

EU level: *The Common Agriculture Policy (CAP)* and particularly the specified agri-environment-climate measures (AECM) are highlighted as important as the associated cross-compliance mechanism including water retention measures such as buffer strips and greening. *The EU Nitrate Directive* on the protection of waters against pollution from agricultural sources. *The Water Framework Directive (WFD*) as it directs water management and protection of water resources. It was described as a "framework for actions to achieve environmental goals, including promotion of NSWRM".

National level: *The Water Act* was identified as having most significant impact on NSWRM by a number of informants. It implements the WFD in Poland, and it is the legal

base for a range of planning documents, including river basin water management plans and the related programmes of measures, drought prevention plans and flood risk management plans. *The Integrated Drought Management Program* in Central and Eastern Europe is described as a combination of voluntary actions and economic incentives that has resulted in "increased interest in co-financing the construction of home ponds and rainwater intercepting installations". *A Drought Management Plan (PPSS) and Program for Counteracting the Effects of Drought* were highlighted as the PPSS "provides a wide list of retention enhancement measures and identifies areas with varying degrees of exposure to agricultural and hydrological drought". *The Program for Counteracting Water Shortage* aims to increase the volume of retained water and increase the capacity of NSWRM facilities. A number of investments included in the program are also aimed at improving the conditions of agricultural water use". Local implementation, the *Program on Adaptation to Climate Change and Mitigation of Threats to the Environment* is described as "financing retention in rural areas" and "measures/actions to prevent floods and droughts, including increase of retention in ecosystems". It includes "risk analysis for the most vulnerable areas" with increasing protection with a time perspective from 2020 toward 2030.

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Almost all the informants considered various water quantity concerns to be covered by the legislation, but to varying degree. Flood protection and drought irrigation was seen as included to a relatively large extent, while water retention measures in agri-production was considered as included to a low degree.

Water quality: Water quality concerns, especially nutrient recovery from streams is considered not to be included in legislation, or to a low degree. In-field nutrient retention measures and sustainable agriculture production are seen to be supported to a lower degree. Climate change mitigation is seen as somewhat included; nature conservation is seen to be addressed by in legislation to a large degree.

Water use efficiency: Just under half of the informants said that water use efficiency is supported in national policy/legislation rating this support as low-medium, the rest were unaware of support.

Nutrient use efficiency: Around one third said that nutrient use efficiency is supported in the policy/legislation, with low-medium support, an example mentioned are programmes implemented by National Fund for Environmental Protection and Water Management related to water retention/construction of ponds and the agri-environment-climate actions (AECM) under the CAP.

Support for economic sustainability: Around half of the informants considered economic sustainability of technologies on farms and small agricultural catchment to be promoted by financial support. Penalties are to some extent seen to promote this; the same was the case for voluntary action.

Monitoring of economic and environmental sustainability: Most of the informants said they did not know whether the economic or environmental sustainability of technologies is recorded/monitored, or they said that this is not recorded.

The situation and perceptions on communication aspects: Considering the effectiveness of communicating the policies to end-user at local level, the communication of agriculture policies were generally seen by the informants as active form authorities, and it was rated by most informants as being intermediate in effectiveness. Nature management communication was also seen as active with intermediate efficiency. Water management communication was seen as active by several informants, while many said they did not know. For communication related to spatial planning and climate change it was seen as intermediate effective, but there were more mixed opinions whether it is active from authorities or individual on request. Around half of the informants said they did not know or did not answer.

4.2.4.3 Gaps and compatibility issues challenging implementation of measures

On perspectives on adequate and compatible policy mechanisms all informants agreed that the policy mechanisms are not adequate. Regarding compatibility, rather low compatibility were noted for water quantity excess water management and water quantity scarcity shortage. Below more detailed perspectives on challenges, gaps and incompatibility issues are presented.

Regarding perceived challenges for implementing soil management measures, there were divided views among the informants, with several factors ranked almost equally important, with administrative barriers, communication and voluntary measures marginally higher (Figure 4.27). Regarding perceived challenges for implementing structural measures, the results were similar, with several barriers ranking as almost equally important (Figure 4.28).

Figure 4.27: Ranking of challenges / reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

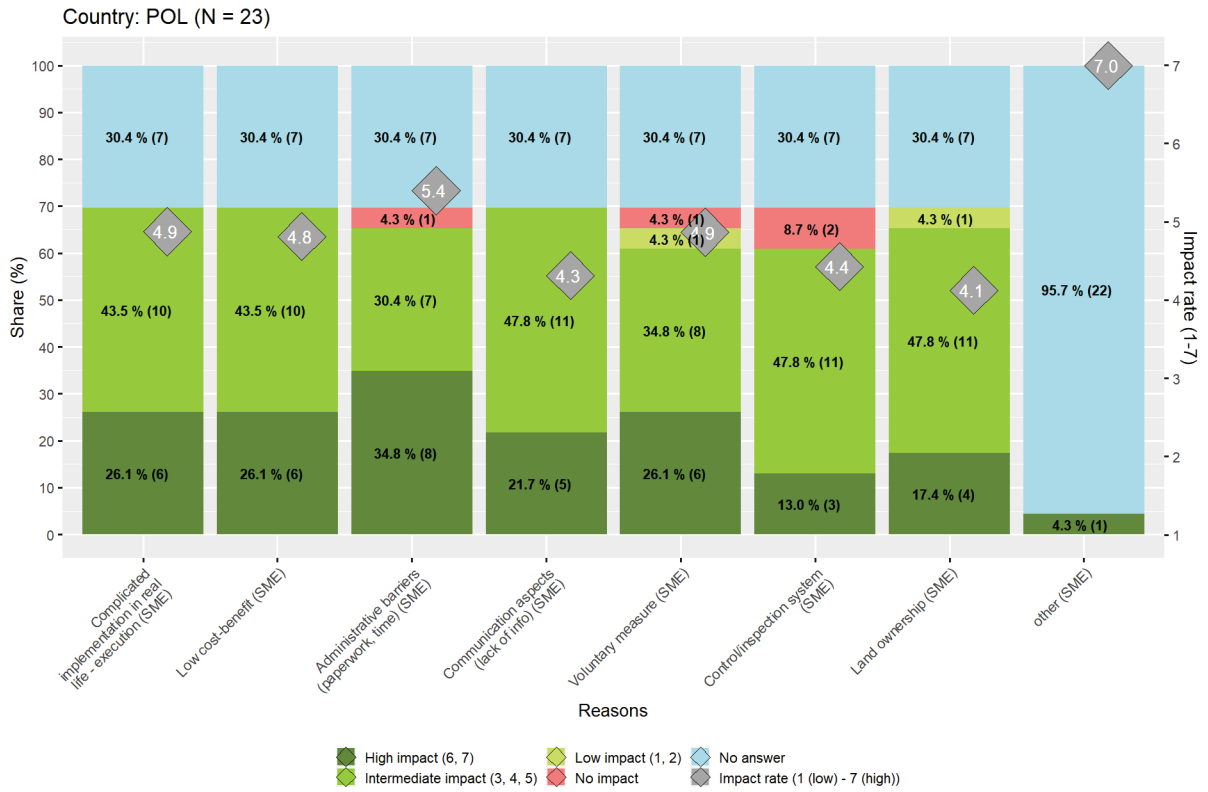


Figure 4.28: Ranking of challenges / reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following section provides qualitative overview of barriers, gaps and compatibility issues identified.

Governance

Insufficient, incoherent legislation: (i) Lack of an EU Soil Strategy. (ii) Imposing European legislation without taking into account local conditions, no local variation related to water. (iii) The Water Law - limitations and penalties exist only on paper, there is no clear reference in the act for small and natural retention purposes, (iv) Lack of coherence especially in spatial planning, but also in agriculture and water management (CAP vs. WFD), (v) Only rudimentary consideration of climate change. (vi) Regional Operational Programs not coherent with the national policy; there are no legal acts on this level, it deals only with spatial planning.

Insufficient integration, incoherent sectors, authorities: (i) Conflict of interest between private owners using land, especially agricultural land. (ii) Lack of catchment solutions for mutual benefits and farmers' responsibility within one catchment area. (iii) Very limited involvement of regional and local self-government units in national water policy – "more organizational issue than bad will".

Insufficient administrative capacity, competence and knowledge: (i) Too rigid legislation increase implementation costs of small measures (i.e. small ponds, water level rise in ditches) from the NSWRM pool. (ii) Low comprehension of legislation and rules, complex legislation (e.g. the Water Law) discourages recipients from becoming familiar with the legislation and inaccessible for "ordinary users" hence farmers are not aware of potential

support for NSWRM from PGW Polish Waters. (iii) Ambiguous and incomplete interpretation of EU directives as misinterpretation of the requirements of the Water Framework Directive.

Policy instruments

Insufficient or inappropriate funding schemes: (i) Insufficient financing in agriculture, lack of subsidies for the preservation or restoration of wetlands and reservoirs, or for vegetated buffer strips, hedges and forest cover, and for NSWRM; "Subsidies e.g. from AECM does not work - intensive use is much more profitable". (ii) Lack of clear, tangible end users incentives for implementation of NSWRM. (iii) Lack of financial motivating (damage compensation) for farmers, that incur costs (understand as loss) due to investments in NSWRM i.e. individual end user needs are not taken into account.

Insufficient technical infrastructure and support: Lack of knowledge based on analysis of cumulative effects of measures/actions in administrative plans.

Insufficient awareness, and communication efforts: One informant said that "local authorities have no influence" on protection of water quality against pollution, for example in agricultural wells".

Further gaps and incompatibility issues are presented below by type of challenge.

Water quality challenges: (i) Reduction of runoff of nutrients – there is lack of incentives (quality improvement, but also hydro-morphology) to reaching WFD goals; incoherence of CAP and WFD. (ii) The CAP lack measures supporting the integration of farmers to improve environmental conditions - e.g. joint responsibility for exceeding the nutrient concentration, no penalties for failure to comply with the basic legal provisions in the field of protected soils and land use (e.g. not ploughing to the road or watercourse, protection and anti-erosion treatments on steeply sloping fields). (iii) Spatial planning policies do not translate into real activities for achievement of environmental objectives, as improving the quality of water in the catchment area.

Water quantity challenges: (i) Drought and floods are treated as seasonal obstructions and not as a systematic problem – due to flooded fields/drought damage compensation system; the shortage of water and its excess are analysed separately, which results in a lack of consistency and poor planning. (ii) Poorly synchronized programmes – the drought Effects Counteracting Program is poorly synchronized with environmental protection. (iii) Lack of enforcing flood prone zones in spatial management plans, there is focus on flood and drought protection instead of promoting NSWRM and actions in catchments. (iv) The WFD doesn't address hydro-morphological measures, there are no guidelines/recommendations. (v) Non-compliance between actions to counteract the effects of drought (e.g. Drought Effects Counteracting Plan) and the problem of 320,000 km of running drainage ditches devoid of valves and weirs; Incompatible effect of drainage systems; the problem of melioration systems serving only drainage functions - in view of the increasing threats of agricultural drought (320,000 km of running ditches, usually without valves) is not addressed; Mass-scale maintenance works on rivers, permanently accelerating the outflow of water from agricultural catchments (dredging watercourses, riverbed regulation) with no legal obligation to monitor maintenance works. (vi) National financing building of drilled wells without taking into local hydrogeological conditions, there is no obligation to consider an existing (ex. irrigation

network) or planned irrigation investments. (vii) Uncontrolled abstraction of groundwater; lack of effective limitation on ground water abstraction for agricultural purposes, Private drilled wells don't have to be equipped with water meters, and therefore, they are over exploited, especially during droughts. (viii) Insufficient national and regional policies about water retention, besides of retention reservoirs; only CAP payments to support retention in agriculture, CAP - lack of incentives for soil retention; Agricultural land use is underestimated as a water retention area, especially in areas surrounding large cities; Irrigation and spatial planning does not address NWSRM - Lack in legislation and guidelines of spatial planning for preservation of existing irrigation infrastructure, and regarding possibilities for NSWRM development and funding.

Nature protection, biodiversity objectives: (i) There is lack of legal mechanisms ensuring protection of river ecosystems against development, and degradation from unjustified maintenance works on rivers, river regulation and construction of dam reservoirs on rivers. Inland navigation development plans threatening the best-preserved large rivers in Poland, protected under the Natura 2000 system, "over 30 Natura 2000 areas in valleys at risk of degradation". (ii) There is lack of effective regulations/mechanisms for acquiring properties for actions related to river renaturalization. (iii) Spatial planning regulations are incompatible with nature projection objectives. (iv) Poor compliance with the INSPIRE Directive - forcing by PGW Polish Waters the construction of retention reservoirs on rivers interrupting the ecological continuity of the river and at the same time practically useless for managing the risk of drought and flood risk.

Climate mitigation and adaptation policies: (i) Lack of clearly defined potential effects of climate change on water quality for regions is a reason that policy of adaptation and mitigation (to climate change) is too vague. (ii) Lack of effective measures to reduce CO_2 emissions from drained peatlands, aggravating the problem of drought by carrying out substantively unjustified and without social control maintenance works on rivers, aimed at accelerating the outflow of water.

4.2.4.4 Suggested solutions to improve compatibility and implementation of NSWRM

The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.29). Informal education were given high rank by several informants, followed by digital information, financial support and formal education.

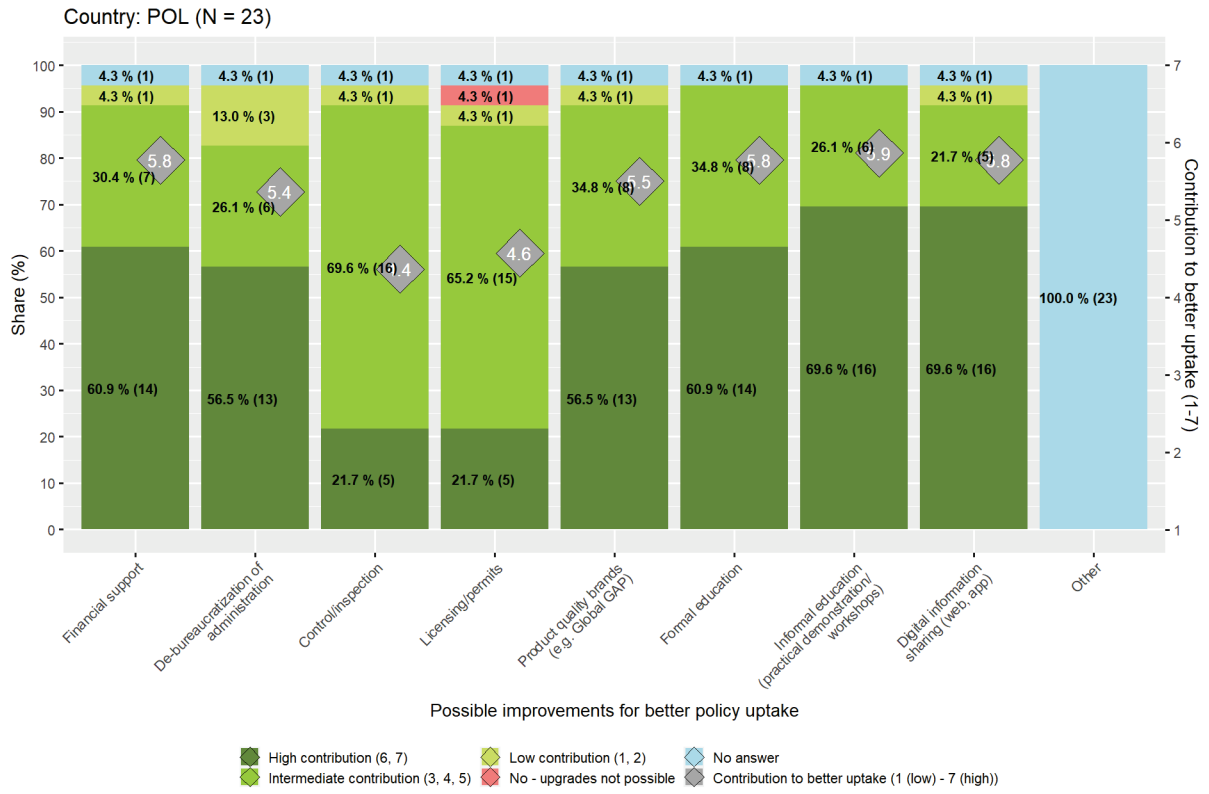


Figure 4.29: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Several qualitative suggestions for improved implementation of NSWRM were identified and are presented below.

Governance

Upgrade legislation: (i) Institutions dealing with issues of water and climate protection shall undertake decisive actions to regulate coal and lignite mining, which has a significant impact on water resources, and speed up changes in energy sector to create more convenient conditions for building wind farms and plants based on biomass. (ii) Common rules/regulations would make work/collaboration easier and would give opportunity to increase knowledge on the given subject.

Efforts for better coordination and coherence between sectors: Systemic implementation of agricultural measures being consistent with other policies, while not leading to the loss of continuity of food supplies to the domestic market. Programmes shall link together all aspects both environmental as well as socio-economical to find the common good.

Efforts for better / improved engagement: (i) Support for catchment area programs – addressing joint responsibility of farmers in the agricultural catchment area for the quality and quantity of surface waters. (ii) Involvement of regional and local self-governments in process of information exchange - scientists and experts - from different disciplines (nature protection, hydrology, hydrogeology, spatial management, business), the local community to achieve agreement on interactions in sustainable management between farmers and water management institutions.

Policy instruments

Improved financial mechanisms, increased financial support: Setting up simple financial program for regional and local self-governments to improve application of land purchase mechanism along watercourses to create effective buffer zones.

Efforts for awareness, education and communication efforts: (i) Local administration to publish information on the communities' web pages to reach individual users, and place announcement of the community/town hall. (ii) Workshops with residents about measurable financial benefits from the involvement of activities for the protection of the environment. (iii) Social campaigns and programmes run by NGOs that are promoting sustainable agriculture for environmental protection. Demonstrating the long-term economic effects of applying specific practices. (iv) Best practice: Local Water Partnerships establishment on district level is ongoing, communication of information to end users has significantly improved; it is suggested to organize study tours to places where measures have been implemented. Successful implementations mainly come from the national park areas, e.g. retention of winter rainwater in the North Polder in the Ujście Warty National Park, activities for water retention in peat soils in the Biebrza National Park.

Further suggested solutions are presented by type of challenge addressed below.

Addressing water quality challenges: (ii) Unification and improvement of the economic incentives – financial support and introduce and enforce penalties for non-compliance regarding water and soil protection, especially in areas vulnerable to pollution from agriculture, areas with slopes and areas. (ii) Promotion meadows and pastures (green areas) development in river valleys to improve water quality and decrease flood risk. Vegetation barriers limiting the runoff to drainage ditches and watercourses CAP-WFD-flood protection. Efficiency in nutrient use is supported by the CAP AECM commitments.

Suggestions addressing water quantity challenges: (i) Ground water extraction; Coordinate policies in area of limiting possibilities of ground water extraction with local agricultural situation/conditions. Users who pay for water ensure its proper and effective use. (iii) Drainage systems and water retention: Drainage policy better combined with environmental protection; include in legislation on spatial planning conditions regarding a preservation of existing irrigation infrastructure (conflicting housing and line investments) and necessity to preserve areal possibilities to develop NSWRM (i.e. fences along irrigation ditches, access roads; modernization of drainage systems towards retention of autumn and winter rainwater (preventing drought and activating a mechanism for renewing groundwater resources). Transparent small retention subsidy programs. (iv) Irrigation infrastructure: Including in legislation on spatial planning conditions regarding a preservation of existing irrigation infrastructure (conflicting housing and line investments). CAP - floods - Use of land reclamation (irrigation) systems for flood protection.

Suggestions addressing nature conservation challenges: (i) Buffer zones for flood protection; Natura 2000 areas as buffer zones for flood protection. (ii) Protect hydrogenic habitats and as , especially peat bogs against development of drainage structures; Consider extending the spatial extent of protected soils and designating areas where agricultural land use should not be carried out outside the permanent grassland. (iii) Restoration efforts - effective legal and financial mechanisms enabling restoration of

currently unused and previously drained wetlands. Strengthening renaturalization of watercourses.

Suggestions addressing climate mitigation and adaptation challenges: Information on climate change is reached by end user on internet or throughout mass media, an improvement would be direct contacts between climate change experts and limited groups of interested people.

4.2.5 Case focus Slovenia

4.2.5.1 About the informants – background and experience

Nine informants were interviewed, four women and five men. Around half of the participants have education on high school/bachelor level and the other half have master's degrees/PhDs. All but one participant who works in private sector, are employed in the public sector on national, regional or local level. Water management is the most common area of expertise among the participants followed by agriculture and environment. None of the informants identified spatial planning or climate change as their main area of expertise.

All of the participants had already addressed water quantity challenges in their work, mostly to a high or intermediate degree. The informants had somewhat less experience with water quality challenges, especially related to nutrient recovery from streams. Most also had intermediate or high experience with climate and nature conservation challenges from their work. Many of the informants have extensive experience with the various measures listed, but in general, most had more experience with hydro-morphological measures than agricultural. Almost all the informants had knowledge on policies within several different fields, with the highest overall knowledge on water management policies, mainly intermediate within environmental management, spatial planning and climate change, and slightly less knowledge on agriculture policies.

4.2.5.2 Overview on legislation, policies and communication for NSWRM

Legislation at different governance levels: Most of the informants stated that legislation for water quality, quantity and climate change is defined on a national level, while some considered it to be a combination of regional, local and national level. Several informants said that most legislation concerning water quantity is on national level, but the municipalities have responsibilities, including wastewater treatment including management of waste from wastewater treatment, and water supply. It was also mentioned, "municipalities manage floodplains according to their own rules and there are differences according to the municipal spatial plan". For water quality, informants expressed their opinion that most legislation is on national level, with the Water Act as a central steering legislation. However, some regulations such as water protection areas are defined either on national or municipal level and may as such vary slightly in term of measures imposed.

Important legislation, policy documents: All except one of the documents (by one informant) were considered at a national level.

The Water Act was highlighted as most important by six of the informants. Based on their opinion the act regulates water interventions and use, based on the act the national water agency (and environmental agency) approve or grant permits for various activities, such as irrigation of agricultural land. It was considered to be important for regulating and reducing nitrates in groundwater and pesticides in water.

The River Basin Management Plan (RBMP) was highlighted by five of the informants as important because it "sets out the measures to be taken by each sector". The RBMP seem most comprehensive because according to the applicable legislation they in detail provide "prohibitions, orders and restrictions on land use". It is also seen essential for "monitoring and improving water quality, allocating water quantities, and achieving and

protecting good water status". Slovenia has two RBMPs (for Danube and the Adriatic Sea river basins). Moreover, although informants define it as a single document applied at the national level, it is two RBMPs, applied at river basin and water body level. The indication of national level by informants probably reflects the predominant way how RBMP are designed (largely top-down, with some horizontal reference), and does not reflect the actual implementation level, which is a water body, which two informants acknowledged.

The EU Water Framework Directive (WFD) was highlighted as important for "protection of water resources in all types of land use". With reference to the WFD, the Nitrate Directive was highlighted as guidance for improving agricultural practice. WFD was outlined as the most important legislation for planned improvement of water status, restrictions for safeguarding biodiversity and as an important legislation that predefines national legislation.

The national rural development program under the CAP was considered important for several measures, such as crop rotation, desirability of vegetation cover, and greening of arable land, increasing water-holding capacity of the soil to increase the nutrient retention and decrease nutrient leaching

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Most of the informants said the legislation directly includes managing excess water to a high degree. The same was the case for water shortage, while some considered this to be included more indirectly and to an intermediate degree. In-field water retention measures were mainly seen as indirectly included, to a lower/intermediate degree.

Water quality: Most informants said water quality is directly included in legislation, but informants were divided between whether this was included to a high degree or not at all/very little.

Sustainable agriculture production, Nature conservation and climate change mitigation were considered by most informants to be included to either an intermediate or high degree, with the first two being more directly addressed than the latter.

Water use efficiency: All of the informants said water use efficiency have intermediate support in the legislation/policy. More support should be directed in to for example improve irrigation scheduling and obtaining irrigation building permissions and water use permission and better selection of crops adjusted to the available amount of water. One of the respondents outlined reuse of wastewater (grey water) is not particularly supported and should be promoted "especially in areas with water deficits", further support should be invested in "not only developing new water resources, but also re-using the existing".

Nutrient use efficiency: Almost all informants also said that nutrient use efficiency have intermediate support in the legislation/policy. Agri-environmental-climate measures were indicated as measures that improve soil water holding capacity and nutrient uptake.

Support for economic sustainability: In general, the informants considered financial support/subsidies, penalties and legal framework to be equally important types of promotion of economic sustainability of technologies on farm and small agricultural catchment level in policy/legislation. Voluntary action was also seen as an important promotion type by some of the informants. Here it was outlined that "If the agri-environmental-climate measures provides financial support for the implementation of a water retention measure, then it is economically viable and sustainable at farm level", while another informant said that the compensation for the implementation of measures is insufficient.

Monitoring of economic sustainability and environmental sustainability: Around half of the informants stated that economic sustainability is recorded on farm and catchment level, while the rest did not know. The data quality was generally rated higher on farm level than catchment level. Examples mentioned were catalogue of production model calculations and Farm Accountancy Data Network on farm level. Around half of the informants said environmental sustainability is recorded both on farm and catchment level, while the rest did not know. The quality of the data was mainly rated slightly higher on catchment level than farm level. Examples mentioned were monitoring of water protection measures, including nitrates in water, fertilization plan and soil analysis.

Effectiveness of communicating policies to end-users at local level: The communication of agriculture policies were generally seen as active from authorities, and its effectiveness was rated as high by those who answered the question (around half did not know). Communication of policies on water management and nature management was considered by most informants to have intermediate effectiveness, and as active, but some also said it was more individual on request. The same was the case for policies on spatial planning and climate change, but around half of the respondents did not know.

Communication to promotion water/nutrient efficiency: Almost all the informants said that water use efficiency is promoted among end-users, but it varied whether they rated the effectiveness as low, intermediate or high. Examples, comments. Although informants say that in practice, this efficiency is difficult to achieve because the approaches to water-use efficiency, unlike nutrient efficiency, are too voluntary and that more should be done on advancing "expert recommendations for irrigation and fertilisation and more work on education of farmers". The stated supports the current development of public operational irrigation decision support system. Only few farmers had the opportunity to test and use it. Digital tools to increase water use efficiency have just become operational in Slovenia and have not existed before year 2021.

4.2.5.3 Gaps and compatibility issues challenging implementation of measures

The informants perceived the current policy mechanism are inadequate in addressing nature conservation policy in agriculture areas. Informants had a divided opinion whether the policy mechanism to addressing other selected environmental challenges are adequate. Although many informants gave the opinion that the current policy instruments addressing water quality - nutrients recovery from streams were adequate, and were divided on adequacy of addressing climate change – mitigation/adaptation measures in agriculture areas as an environmental challenge, it was common for the two challenges that many answered that they don't know.

The informants ranked challenges to implementing soil management measures and structural measures, including the option to fill in other explanations. Figure 4.29 provides an overview of the reasons for the weak implementation of soil management measures. High contribution importance to low implementation success is assigned to low cost-benefit, control/inspection system, and land ownership structure. Figure 4.31 provides an overview of the reasons for the weak implementation of structural measures. High contribution importance to low implementation success is assigned to high administrative barriers (paperwork, time), control/inspection system, land ownership structure.

Figure 4.30: Ranking of challenges / reasons for weak implementation of soil management measures by end-users. The survey question included seven options and the possibility to identify other alternatives.

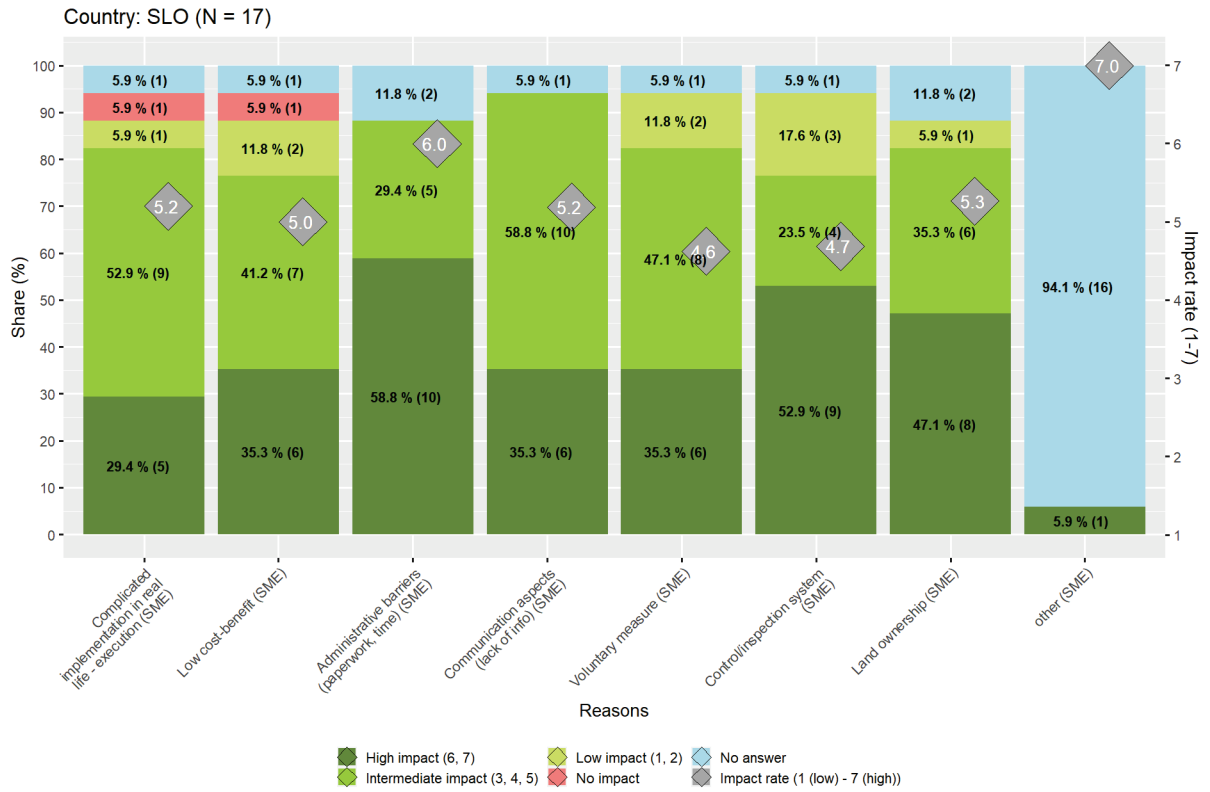


Figure 4.31. Ranking of challenges / reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following provides a qualitative overview of barriers, gaps and compatibility issues identified.

Governance

Insufficient, incoherent legislation: (i) Policies are very over-administered. (ii) No appropriate definition of water re-use; only EU legislation. (iii) Ownership arrangements for the implementation of measures should be carried through. (iii) It was stated that the "Nitrates Directive is not optimal, it does not give adequate results", which probably directs to the fact the threshold values of nutrient application on field are uniform across the whole area of Slovenia. (iv) Water directive: too quantified "what to achieve" too little evaluated what to achieve. (iv) In maintaining watercourses, "we are prevented from taking certain actions, solutions that make a certain matter more expensive".

Insufficient integration, incoherent sectors, authorities: (i) Conventional farming is being promoted too much, thus improving water quality and nature conservation; too sector-narrow; Insufficient involvement of different sectors; insufficient consideration of environmental goals in agricultural production; a too narrow, economically oriented view of agriculture; lack of integration of different sectors. (ii) Too much impact on nature management; there is inconsistency with the field of agricultural practice. (iii) Inappropriate spatial acts and plans; industrial-housing buildings target floodplains.

Insufficient administrative capacity, competence and knowledge: (i) The impact of measures should be examined for the whole river basin; consequences must be taken into account for the whole river basin; measures are administratively designed, too little

from practice. (ii) There are problems in obtaining a water permit. (iv) Enforcement is a problem.

Policy instruments

Insufficient or inappropriate funding schemes: Some measures should be mandatory and subsidized; Farmers and landowners cannot directly finance the implementation of measures, support need to cover costs. Policies need to be more sustainable, including from an economic point of view.

Insufficient technical infrastructure and support: (i) River regulations, irrigation systems, drainage systems; more could be done. (ii) Lack of windbreaks, boundaries, nutrient retention (sludge), reduction of meadows and wetlands.

Insufficient awareness, and communication efforts: Ownership arrangements for the implementation of measures should be carried through.

Further, gaps and compatibility issues presented by type of challenge.

Water quality challenges: (i) Buffer zones: lack of buffer strips to protect from nutrient leaching, Buffer strips not only the most optimal option – Karst areas, leaching to groundwater without surface runoff. Kobiljski potok is one of the 1st order watercourses, although it is a stream. Along the watercourses of the 1st order there is a buffer zone where PPPs and fertilizers 15 m wide may not be used. Abroad, they adjust the width of the buffer zone at the PPP according to the protective measures that prevent the drifting of the spray slurry (use of anti-drift nozzles, boundaries of different heights). Depending on the measures, the buffer zone may be narrowed (changed). (ii) Poor handling of PPPs and nutrients; agricultural land right next to water land.

Water quality and quantity challenges: (i) Farmers operate farms without functional fertilisations plans. (ii) Fertilisers with limited capacity in cases of droughts; Low irrigation development to improve nutrient uptake in such years related with the thinking crops do not need irrigation in our climate zone. (iii) Low use of existing water resources.

Nature protection challenges: (i) Scarce monitoring network at areas of groundwater dependant habitats hampering policy programming, setting up of measures, decision-making process. (ii) Gaps and incompatibility aspects related to insufficient planning implementation of sustainable agriculture that would be more "climate- and environment-friendly. (iii) watercourses over-regulated; there are dead renaturation arms.

Climate mitigation and adaptation policies challenges: (i) Low level of use of climate simulations to programme local policy for adaptation and mitigation; Not in line with climate change. Too slow adjustment of measures. (ii) Necessary spatial planning units that serve (mitigate) environmental change. Lack of concrete action for real change to mitigate climate change. Ignorance of the effects of climate change.

4.2.5.4 Suggested solutions to improve compatibility and implementation of NSWRM

The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.32). Informal education, digital information de-bureaucratisation and improved

financial support ranked the most important. Less so were seen important control, licensing and quality brands.

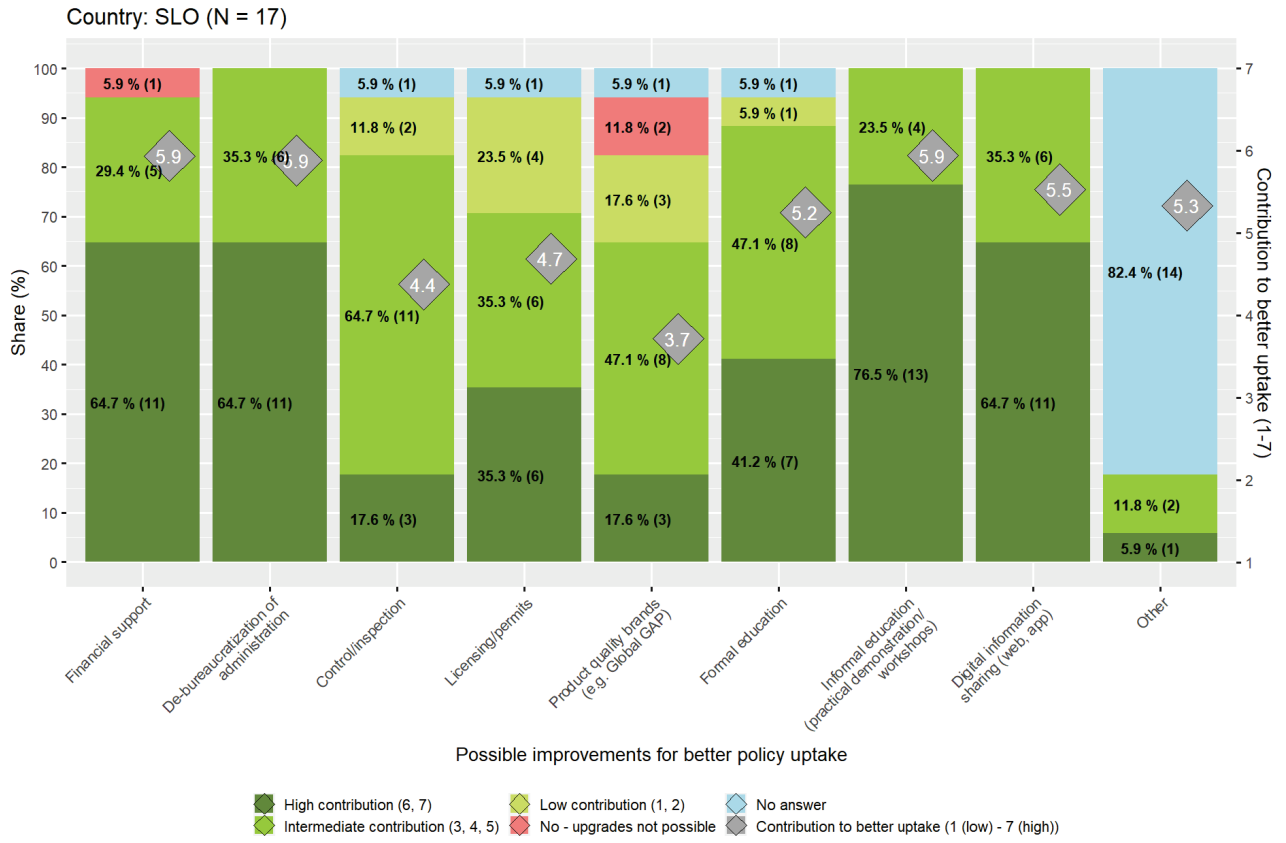


Figure 4.32: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Several qualitative suggestions for improved implementation of NSWRM were identified and are presented below.

Governance

Efforts for better coordination and coherence between sectors: Improved cooperation between ministries; Establishment of local coordination bodies for improved cooperation at different levels and between sectors.

Efforts for improved engagement: It is necessary to ensure greater end-user participation in professional workshops. Cooperation of agriculture with nature conservationists, involvement of managers and experts from different fields.

Efforts for improved administration, competence and knowledge: (i) Additional trainings, multi-sectoral workshops, projects, (ii) Improving expertise at farmer's extension service, improving competences and knowledge also in other sectors.

Policy instruments

Efforts for awareness, education and communication efforts: (i) Raising public awareness of the importance of clean and healthy water for natural water resources; more effort in

efficiently informing the public and municipalities - more frequent appearances in the media. (ii) Increased individual counselling of farmers, and workshops to improve understanding and better explanations of documents at the local level; workshops on the importance of agriculture and its impact on nature. (iii) Improved information channels to farmers regarding tenders and other opportunities for farmers through social networks. (iv) Using a more direct approach, on-field communication. (v) Increasing the number of articles on the importance and improvement of measures in agriculture. (vi) Providing recommendations on how to protect the river / river basin, and on how to handle buffer strips along rivers; (vii) Accompanying regulations with good practice examples.

Further suggested solutions are presented by type of challenge addressed below.

Addressing water quality challenges: (i) Soil analysis and fertilisation plans, Buffer strips and hedges, conservation agriculture, catch crops, additional treatment of livestock manure, proper tillage, use of phytoremediation plants, planting willows, cleaning soil and water. (ii) Nutrient recovery from streams: use of water from reservoirs and groundwater, smaller ponds where water settles and reuse nutrients. An informant said that it is important to select crops adjusted to the optimization of nutrient intake. As such the legally allowed applications sometimes surpasses the capacity of soil to retain the nutrients resulting in leaching. On the other hand there are also instances of over-fertilising. Research indicates smaller fertilisation units could in some instances be adopted without risking lower yields.

Addressing water quantity challenges: (i) Excess water: adjust crop selection. (ii) Soil-management: prevent vulnerability of soil to pluvial erosion with low tillage practice. (iii) Infrastructure: improve water sources maintenance, introduce multi-purpose wet reservoirs, flood embankments, reserve space for floodplains. (iv) Water scarcity: adapted crop cultures, soil greening, using mulching to cover soils. (v) Infrastructure: support construction of multi-purpose reservoirs, dry reservoirs, irrigation systems, water wells, soil-moisture sensors, concept to digital irrigation support service; support in procedures: support in the context of tenders. (vi) Easier water reservoir installations with less permits.

Addressing challenges of nature conservation objectives: (i) Hedgerows would increase biodiversity, buffer strips have multiple benefits. (ii) Establish nesting sites (safe points for animal and insects) to increase numbers of wild insects for higher pollinations and biodiversity. (iii) There is a need to integrate water management with nature conservation objectives that is, to also consider conservation of nature and habitats.

Addressing agriculture and climate mitigation and adaptation policies: (i) Rearranging land-use according to climate scenarios, e.g. forest associations. (ii) Agri-environmental-climate program of measures, and adapt agricultural policy measures; seasonal adjustment of production (e.g. when more water is available). (iii) Formulation of state strategy to climate mitigation and adaptation. (iv) Introduce resistant crop varieties. (v) Cover manure lagoon. (vi) Shading methods, use of trees, use of permeable material; improve understanding of climate change at the local level; introduce technologies to reduce climate impacts.

4.2.6 Case focus Belgium

4.2.6.1 About the informants – background and experience

Six informants were interviewed, two women and four men. Half of the informants have bachelor level education; the other half have master's degrees. A majority works in public sector, one in private sector and one in an NGO, on regional or local level. Water management was the most common area of expertise among the informants, followed by environment, while one had expertise in agriculture, none in spatial planning or climate change. All the informants have addressed water scarcity in their work, and most have also addressed the other main environmental concerns of this project. While the informants have experience with several different measures, they have more experience with hydro-morphological than with agricultural measures. All informants selected water management policies as a main field of competence, and the majority selected nature management, spatial planning, and agriculture and climate change policies as fields of competence.

4.2.6.2 Overview on important legislation, policies and communication for NSWRM

Legislation at different governance levels: When asked to identify the most significant policy or legislative document impacting NSWRM, most of the informants selected documents they perceive to be most significant on regional level, within the agriculture or water management sector, or cross-sectorial policies.

Important legislation, policy documents

EU Level: *The Water Framework Directive (WFD)* is highlighted as having a "strong impact", as it sets the objectives for water quality and "the means to achieve them". *The common agricultural policy (CAP)* and agro-environmental and climatic systems measures (MAEC) under the CAP's second pillar, are also described as important policies in the Wallonia region with "multiple impact" both for agriculture and across sectors.

Regional level: *The Code de l'Eau (water code)* is a region document under the Wallonian region's environmental code to ensure consistent and coordinated legislation and regulations on environment in the region. The water code regulates management of water courses, and authorisations for works on watercourses. An informant commented: "Unfortunately, our field of action is limited to the public domain and most of its measures are located on the private domain". *The Sustainable Nitrogen Management Plan* is a regional level document described as an "obligation linked to agricultural cross-compliance therefore generally well respected in Wallonia". The *Action programme of the Natural Park of the Southern Ardennes* is a local level document that aims to improve public knowledge on biodiversity, and ecological preservation and restoration.

The following sections describes whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Some informants said water quantity concerns in terms of excess or shortage is not addressed by legislation, while others meant it is addressed to a very high degree. Almost all said in-field water retention is not addressed.

Water quality: Similar to the situation of water quality concerns, some informants considered that this is not addressed by legislation, while others considered it to be addressed to a high degree.

Sustainable agriculture and climate change mitigation was considered by some as either not being addressed, others considered it to be addressed to an intermediate or high degree. Nature conservation was the one concern all informants agreed to be included in legislation to a high or intermediate degree.

Support for water and nutrient use efficiency: Half of the informants said water use efficiency has intermediate support in the legislation/policy, while the other half did not know. Nutrient use efficiency was also considered to have low or intermediate support. Examples mentioned: 4000km hedge, purification, MAEC policy.

Support for economic sustainability: Financial support/subsidies was considered to be the most important type of promotion of economic sustainability of technologies on farm and small agricultural catchment level in policy/legislation. A few said that penalties or legal framework promotes economic sustainability, while none included voluntary action as an important promotion type.

Monitoring of economic and environmental sustainability: Most of the informants did not know whether this is recorded. It was mentioned that there are indicators that could be used, e.g. livestock stock per farm.

Effectiveness of communicating policies to end-users at local level: The degree that communication of policies was effective was not known by many of the informants, but most rated water management communication to have intermediate effectiveness. Most informants considered water use efficiency to be promoted among end-users, with intermediate effectiveness. The results were quite similar for nutrient use efficiency. Examples highlighted here: Natagriwal, an NGO institution, aids in the processing of subsidies; An informant indicated that "farmers have awareness to use water and nitrogen efficiently on their farms".

4.2.6.3 Gaps and compatibility issues challenging implementation of measures

Perspectives on adequate or inadequate policy mechanisms: In summary several respondents did not provide an answer to this question, those that did, did not find it to be adequate. Regarding compatibility, the informants that answered varied in the opinion.

The informants ranked challenges to implementing soil management measures (Figure 4.33) and structural measures (Figure 4.34), including the option to fill in other explanations (). Regarding perceived challenges for implementing soil management measures, low cost-benefit was ranked highest, followed by voluntary measures. Regarding perceived challenges for implementing structural measures, land ownership was ranked highest, followed by low cost-benefit and voluntary measures.

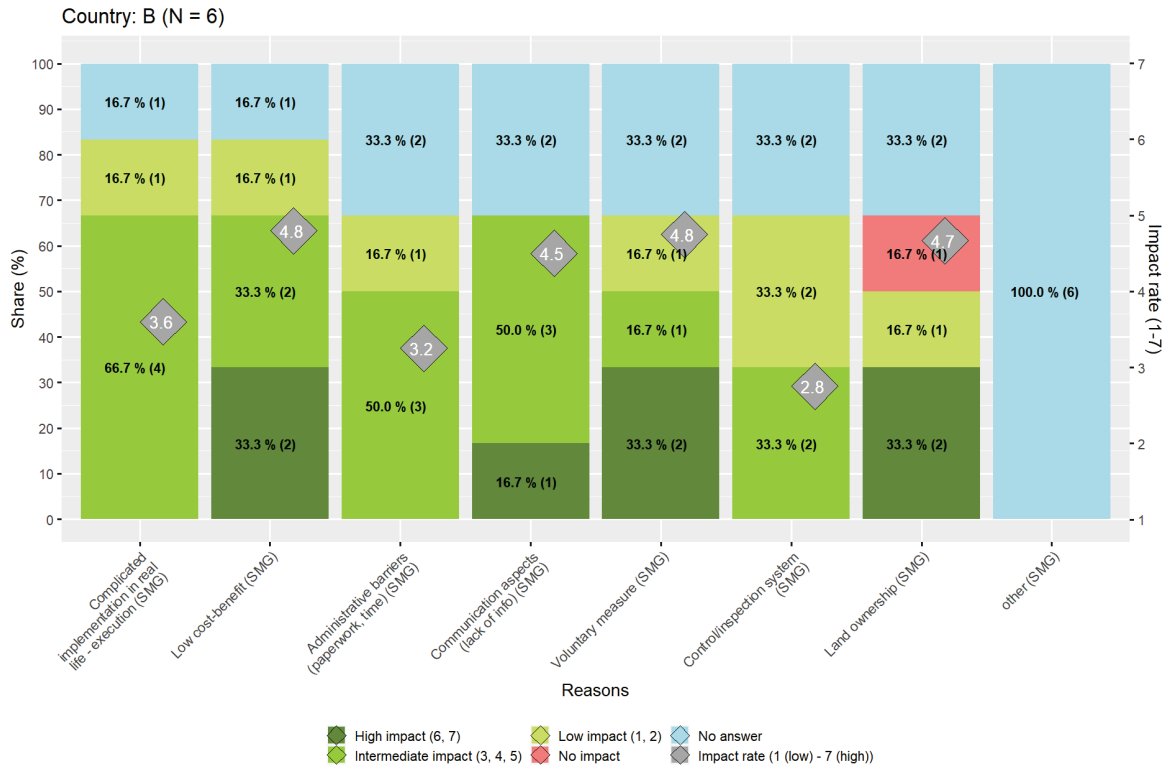


Figure 4.33: Ranking of challenges / reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

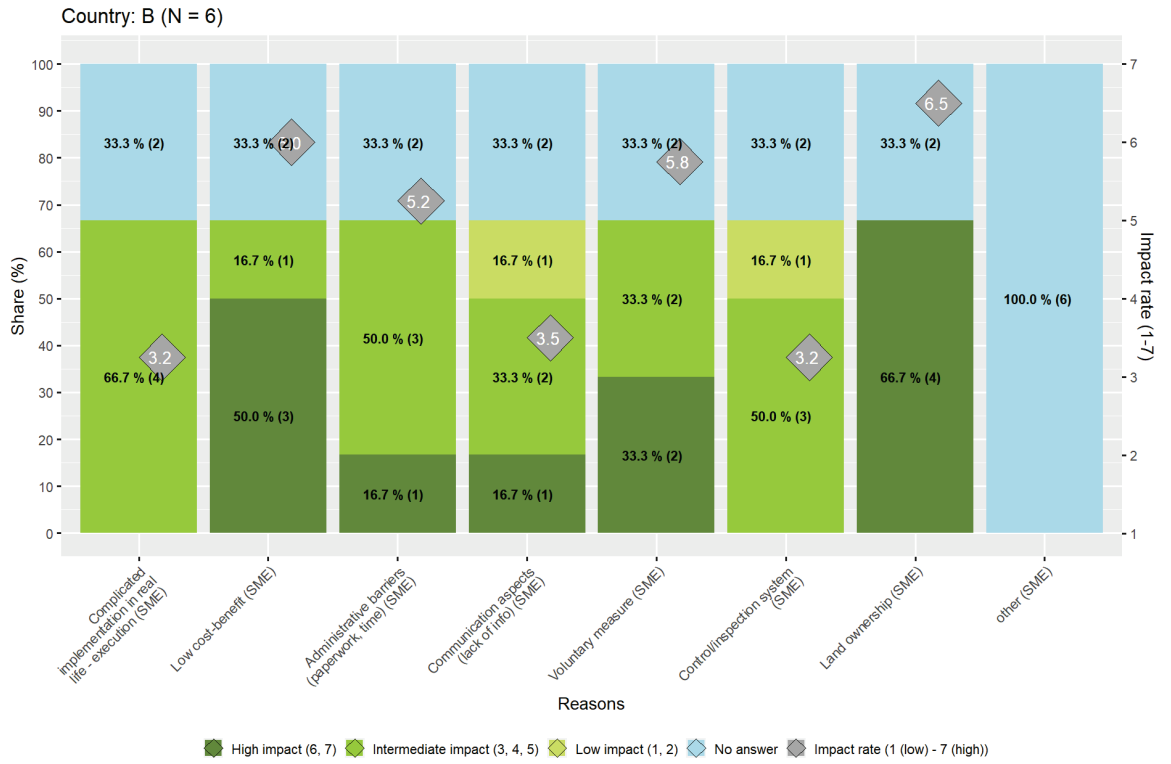


Figure 4.34: Ranking of challenges / reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following provides a qualitative overview of barriers, gaps and compatibility issues identified.

Governance

Insufficient, incoherent legislation: Common Agricultural Policy (under reform): subsidising mass agriculture is not compatible with water/environment conservation. An informant said the legislation "give the strict legal framework but do not propose any way to achieve the objectives".

Insufficient integration, incoherent sectors, authorities: Lack of common objectives must be set; a global vision on the management of the watercourse with so many different managers (4 classes of watercourse and 4 different types of manager) is a challenge.

Insufficient administrative capacity, competence and knowledge: Implementation on the ground is difficult; municipalities have many different issues to deal with and do not have the means to dedicate one person to the subject; the administrative efforts required is too much for the amount of funding received for the administration.

Policy instruments - Insufficient or inappropriate funding schemes, too low or cost-benefit is too low for implementation of measures.

Gaps and compatibility issues according to type of challenge are presented below.

Water quality challenges: (i) Legislation on buffer zones (6 m) on the banks of watercourses is complex and there is too little control. Maize is cultivated next to watercourses, which highly affects water quality of these water resources. (ii) Wastewater: There is a will to clean up, but limited budget for wastewater treatment.

Water quantity challenges: (i) Incompatible spatial planning for water quantity challenges, for example construction in high flood hazard area (concrete car park). (ii) Lack of infrastructure and/or and certain water management practices for water treatment, stormwater management, rainwater harvesting and water discharge.

Nature protection challenges: (i) Conservation areas: Lack of consideration of areas with specific issues (Natura 2000, nature reserves, presence of protected animal or plant species, etc. (ii) Local implementation: Environmental protection initiatives exist but local policies are still not sufficiently responsive to these issues (e.g. the Lessive antennae housing project).

Climate mitigation and adaptation policy challenges: Little change in practices and consumption patterns.

4.2.6.4 Suggested solutions to improve compatibility and implementation of NSWRM

The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.35). Informal education, financial support and formal education received the highest rankings.

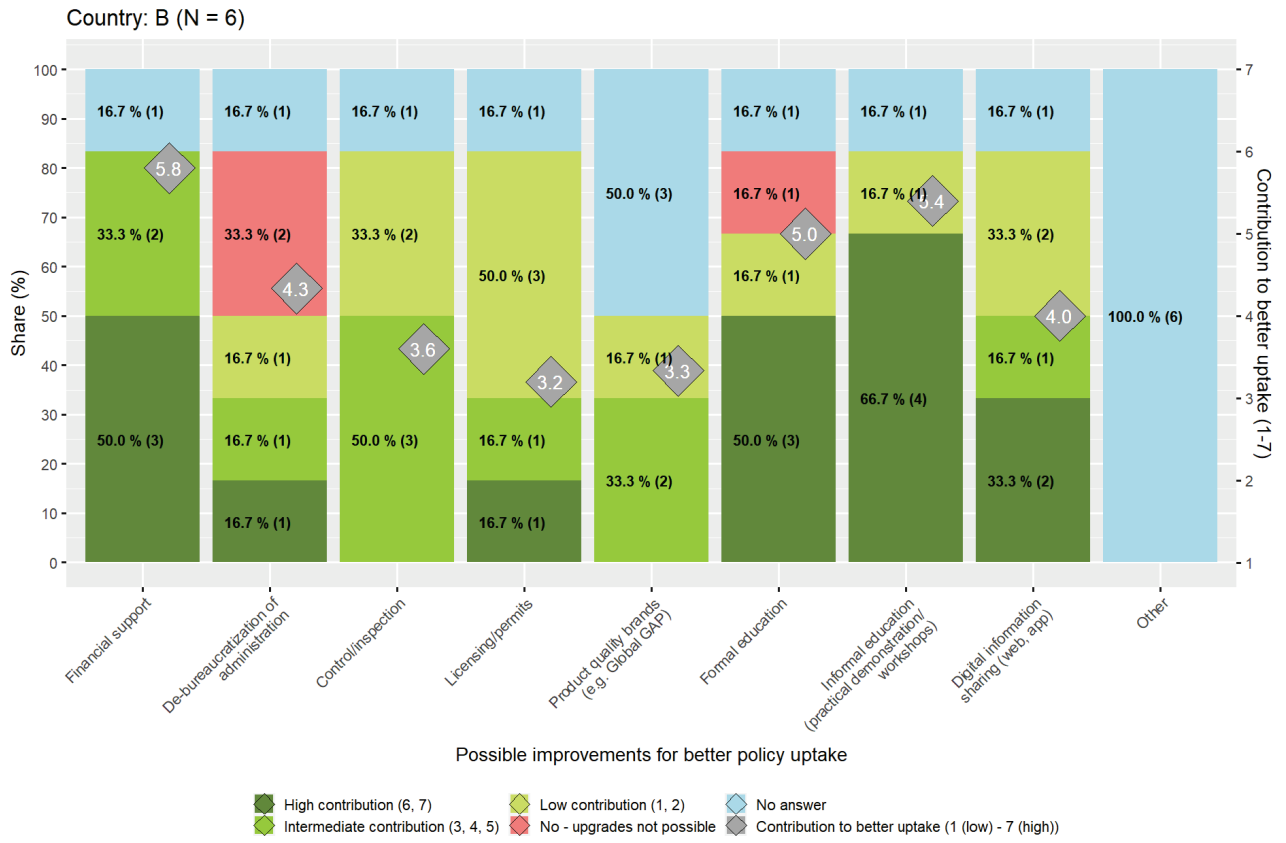


Figure 4.35: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Several qualitative suggestions for improved implementation of NSWRM were identified and are presented below.

Governance

Upgrade legislation: (i) Consider floods July 2021 and implement flood control plans. (ii) Avoiding risky crops in sensitive areas.

Efforts for better coordination and coherence between sectors: (i) Coordination and the administrative burden to needs to be improved; A reference person could be allocated for each municipality for the different competence areas. (ii) More communication between different decision-makers.

Efforts for better / improved engagement: (i) Collaboration between farmers in the same catchment area, create groups of farmers and have one or more agri-referents in each commune. (ii) Set-up of mixed farmer-citizen thematic groups. (iii) Establish meeting platforms between public and private public and private watercourse managers; encourage meetings between public and private watercourse managers.

Policy instruments

Improved financial mechanisms, increased financial support: Need for financing of hedge planting and grasslands for certain plots.

Improved technical support and infrastructure: Technologies are often very expensive and need to be subsidised for deployment; support is needed to promote different techniques.

Efforts for awareness, education and communication: (i) Information, news, publication: circulate articles/publications addressing the situation in Wallonie for its citizens; encourage the communities to talk about these solutions to the inhabitants via the different possible channels (network, local newspaper, stand at festivals, specific events). (ii) Information meetings in the field, organise field trips to show the consequences of global warming. (iii) Organize for training of elected representatives: technical guide, training for elected representatives, reaching all project leaders. Reference to best practice experience: the MAEC policy was highlighted related to ponds, floodplains, hedges, riverbanks.

Other suggested solutions are presented by type of challenge are addressed below.

Addressing water quality challenges: (i) Revalorize permanent grassland, grass crops and hedgerow planting via the CAP. (ii) Increase humus levels on agricultural plots. (iii) Raise public awareness on the need for ensuring groundwater quality by insisting on physical solutions (water retention - reduction of anthropogenic surfaces) and problems linked use of chemicals. (iv) Inform on ecological alternatives for the management of undesirable plants (weeds); limit the use of phytosanitary products.

Addressing water quantity challenges: (i) Propose or impose measures for retention and treatment of rainwater in road creation projects and private projects (vegetated ditches, rain gardens, natural retention basins, greening of roofs, greening of public and private spaces); implement water retention measures in forest areas (ponds, grassy strips or open spaces perpendicular to the slopes in forest areas, creation of temporary ponds, etc.). (ii) Tax sealed and non-vegetated areas.

Addressing challenges of nature conservation objectives: Define areas with high biodiversity challenges. An informant commented, “Subsidies should not "compensate" for a loss due to the maintenance of biodiversity / environment, but value the implementation of ecosystem services”.

Addressing agriculture and climate mitigation and adaptation policies: Support carbon neutral farms, promoting extensive farming practices.

4.2.7 Case focus Lithuania

4.2.7.1 About the informants – background and experience

Five informants were interviewed, four women and one man. All the participants have education on master's degree level or higher. Almost all are employed in the public sector on national level, one informant works in local level private sector. All the participants have environment as their main area of expertise, one also included spatial planning and climate. None have agriculture or water management as a main area of expertise. All participants have addressed challenges related to nature conservation and the majority have worked with climate change related challenges. A little over half have worked with water quantity challenges, while few have experience with water quality concerns in their work.

Most of the informants did not have any practical experience with the agricultural measures listed. Around half of the informants have experience with the hydro-morphological measures, but the level varied. All the participants have some level of expertise on policies within water management, nature management, spatial planning and climate change. The level of knowledge on agriculture policies among the participants is low.

4.2.7.2 Overview on important legislation and policies for NSWRM

Legislation at different governance levels: The informants all said that legislation on water quantity, quality and climate change is only on national level. The documents mentioned are cross-sectoral on national level.

Important legislation, policy documents

EU level: *The EU Water Framework Directive (WFD)* was highlighted as it aims to improve water quality.

National level: *The water development program 2017-2023* and its implementation action plan was highlighted by several informants as important as it aims to reduce pollution of water bodies from agricultural pollution sources, reduce the negative impact of hydro-morphological changes on surface water bodies, and reduce pollution of water bodies from point sources. It was described as cross-sectoral strategy document that refers to legal obligations, economic subsidies and voluntary instruments. While highlighted as important, the informants still said it had low or intermediate impact on end-users (willingness to change).

The following sections describe whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Most of the informants did not know whether legislation addresses excess water challenges. A few said it is addressed to an intermediate degree. The same was the case for water shortages. Some said in-field water retention measures are addressed indirectly to a low-intermediate degree.

Water quality: The informants differed in their perspectives of whether in-field nutrient retention measures are addressed in the legislation or not. Nutrients recovery from streams was not considered to be addressed by any of the informants.

Sustainable agricultural production, nature conservation and climate change mitigation were considered to be addressed by legislation to a high or intermediate degree by most of the informants.

Support for water use efficiency: Informants said that water use efficiency has intermediate support in the legislation/policy.

Support for nutrient use efficiency: Informants said that nutrient use efficiency has low or intermediate support in the legislation/policy. One commented that the amount of fertilizers used on fields are not controlled.

Support for economic sustainability: Most of the informants said, financial support/subsidies and penalties are the most important type of promotion of economic sustainability of technologies on farm and small agricultural catchment level in policy/legislation. It was commented that the "system is more directed towards fraud control rather than sustainability of technique used".

Effectiveness of communicating policies to end-users at local level: More than half of the participants stated that there is no communication of the policies within the various sectors. A few informants said agriculture, water management and nature management policies were communicated, but opinions differed on what they considered to be the communication type (active or individual) and its effectiveness.

Communication to promote water/nutrient use efficiency: A few informants did not know whether water use efficiency is promoted among end-users, but the ones who answered rated it as low or intermediate. Similarly, around half of the informants said nutrient use efficiency is promoted among end-users to an intermediate degree.

4.2.7.3 Gaps and compatibility issues challenging implementation of measures

In summary, several informants did not provide an answer to the questions on whether policy mechanisms are adequate and or compatible, those that did, did not find policy mechanisms to be adequate. Regarding compatibility, only few provided a response and those who did showed a high variation in their scores, which made it difficult to reveal a pattern.

The informants ranked challenges to implementing soil management measures (Figure 4.36) and structural measures (Figure 4.37), including the option to fill in other explanations. Regarding perceived challenges for implementing soil management measures, low cost-benefit was ranked highest, followed by land ownership and administrative barriers. However, as the figure shows there are not many responses. Regarding perceived challenges for implementing structural measures, there were differing opinions among very few responses, making it difficult to identify any pattern.

Figure 4.36: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

Figure 4.37: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: (i) The informants expressed the need for recommendations and not legally binding requirements. (ii) Most issues are resolved mainly through the "Emission Permit" procedure, or through the application for financing measures; little of that applies to small operators.

Insufficient integration, incoherent sectors, authorities: (i) Different public authorities are responsible for implementing the measures, which creates additional administrative difficulties and challenges. (ii) Different bodies responsible for monitoring the implementation of the measures.

Insufficient administrative capacity, competence and knowledge: Several informants stated that there is too much bureaucracy.

Policy instruments

Insufficient or inappropriate funding schemes: (i) The implementation of specific measures is often not connected to financial plan/funding. (ii) Requirements for funding are not realistic. (iii) Lack of diversified mechanisms and appropriate incentives.

Insufficient technical infrastructure and support: Lack of funding and technical opportunities.

Gaps and incompatibility issues are presented according to challenges below.

Water quality challenges: The application rates of fertilizers and the related surpluses of nutrients are not controlled.

Water quantity challenges: There is a need for (i) the development and promotion of measures for the safe use of surface water and the collection, treatment and / or recycling of rainwater for safe use as well as for (ii) underground water use incentives for groundwater use, borehole installation, etc.

4.2.7.4 Suggested solutions to improve compatibility and implementation of NSWRM

The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures, as shown in figure 5.37. De-bureaucratization of administration and increased financial support were ranked highest.

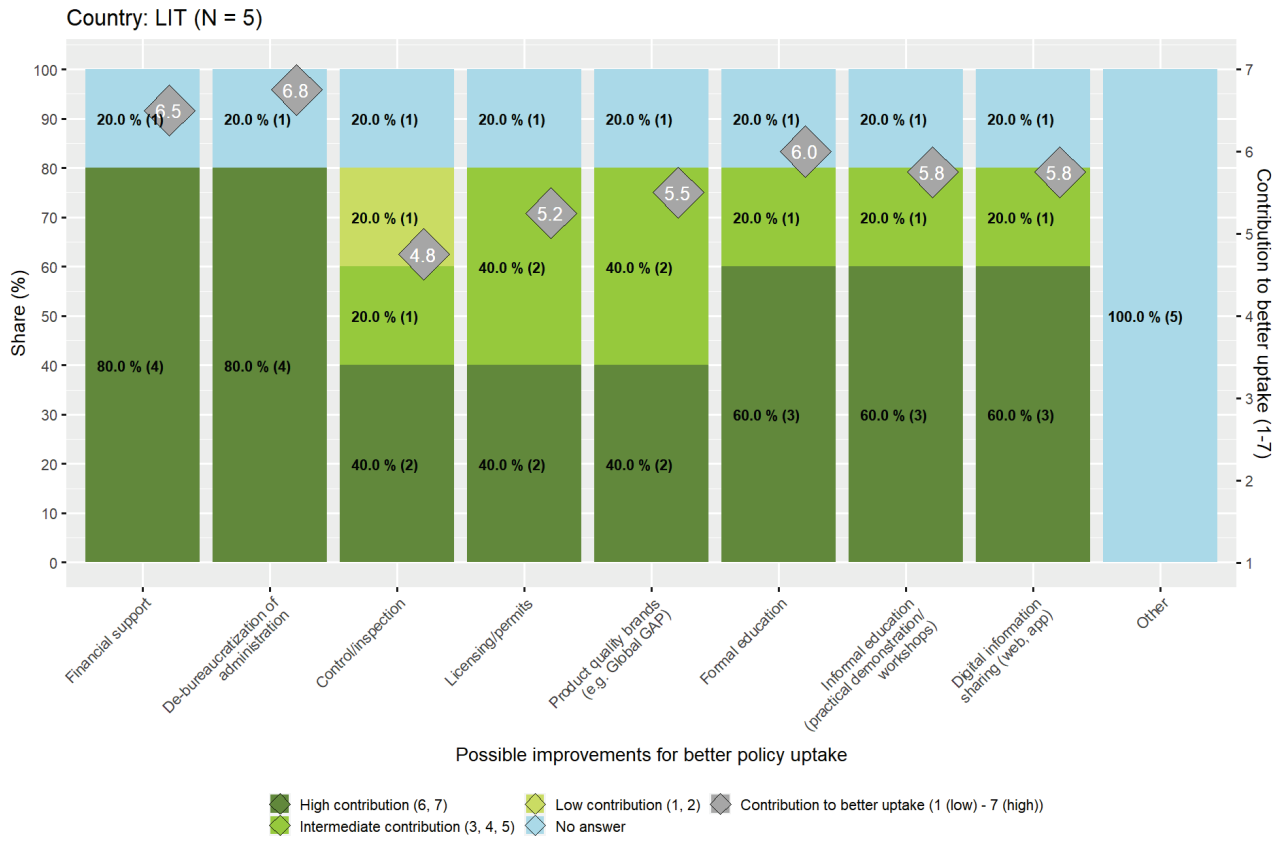


Figure 4.38: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Several qualitative suggestions for improved implementation of NSWRM were identified and are presented below.

Governance

Upgrade legislation: The informants stated that future legislation should take more scientific advancements into consideration.

Efforts for better coordination and coherence between sectors: It was commented that the "same requirements and conditions are needed for all the parties, and that it is better to not divide into small or large farms, communities, etc.". Accordingly, it is required to (i) harmonize conditions and requirements for the implementation of measures in all sectors and institutions, as well as to (ii) set realistic, regionally based requirements.

Policy instruments

Efforts for awareness, education and communication efforts: (i) More events/local meetings to inform about scientific/ technical advancements for measures implementation, and events to communicate financing possibilities for compulsory measures. (ii) Communicate clearly the benefits of such management, in particular by creating a 'give-receive' system of reversible (direct) benefits.

Water quantity: Tools and techniques mentioned to address water quantity challenges were viaducts and wetlands.

4.2.8 Case focus Italy

4.2.8.1 About the informants – background and experience

Five informants were interviewed, one woman and four men. Their education level range from high school to PhD level, with the majority on master's degree level. Three informants work in public sector and two in private sector, mainly on the regional level and one on local level. Agriculture is the most common competence, in addition to one informant with additional competence in water management, and one expert on environment and spatial planning. None have climate change as a main area of expertise.

Most of the informants have addressed all the environmental challenges within water qualitative-quantitative status, climate change and nature conservation to some degree. Four of the informants have dealt with many of the various agricultural measures listed in the questionnaire. Only one of the informants has advanced knowledge and practical experience with hydro-morphological measures. Most of the informants have knowledge on policies within all the fields, with a higher level of knowledge on policies within agriculture, environment and water management, and lower on climate change and spatial planning.

4.2.8.2 Overview of legislation, policies and communication for NSWRM

Legislation at different governance levels: All the informants considered legislation on water quantity, water quality and climate change to be included in regulations on all governance levels. It was specified that objectives and focus areas for the EU Common Agriculture Policy (CAP) are defined at national level, while water and climate related concerns are included directly or indirectly in the rural development programme. The documents highlighted by the informants for having important impact on NSWRM are considered to be on regional level.

Important legislation, policy documents

The CAP's first and second pillars were considered to have high impact as subsidies for farmers are dependent on compliance with the Good Agricultural and Environmental Condition of Land (GAEC) agricultural practices for nature and climate protection. The Rural Development Program (CAP II) was highlighted as it "defines good agricultural practices, and also includes subsidies to promote such practices".

Water acts and water management plans were considered to have impact as they implement and specify general regional guidelines on water management at local level. One informant highlighted that the most relevant water policies are the ones transposing the EU Water Framework Directive (WFD) into national legislation.

Natura 2000 sites regulations and several other regulations and guidelines related to environmental protection and conservation were also highlighted as important, as they "support the implementation of actions aimed at promoting green infrastructures, forest measures and other solutions to protect the (local) environment".

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: The informants were divided on the topic of flood protection, some said it was not supported, while some others said it was supported to a high degree. All considered drought and in-field water retention to be included in the legislation, mostly indirectly and to an intermediate degree.

Water quality: Most informants said that nutrient recovery from streams is not included in legislation, or to a very low degree. In-field nutrient retention was considered by most to be indirectly included in the legislation, but to a low-intermediate degree.

Sustainable agriculture, climate change mitigation and nature conservation: These concerns were mostly considered to be included directly in legislation to an intermediate or high degree.

Nutrient and water use efficiency: There was broad consensus among the informants that both water and nutrient use efficiency is supported in the policy/legislation. The support is mostly considered to be on intermediate level.

Economic sustainability: All the informants considered financial support/subsidies as the most important type of promotion of economic sustainability of technologies on farm and small agricultural catchment level in policy/legislation. All said that penalties and a proper legal framework promote economic sustainability, but this was considered less important. All but one informant also added that that measures should be promoted by voluntary incentives.

Monitoring of economic and environmental sustainability: Most of the informants said that economic sustainability is recorded on both farm and catchment level. The data quality was rated as intermediate. It was mentioned that economic data ”pertaining to a sample of farms are included in (inter) national database (EU and IT FADN)”. Most of the informants said that environmental sustainability is recorded on both farm and catchment level. The data quality was mostly rated as intermediate. One informant said that “farm accountancy data are in general not known outside the farm; relevant data are recorded into a regional system that is used by agricultural advisers to demonstrate the compliance of farmers with legislative obligations and to manage the requests for CAP funding”.

Effectiveness of communicating policies to end-users at local level: The communication of agricultural policies was seen by most as active from authorities, but not very effective. Water management communication was also considered active with intermediate effectiveness. Almost none of the informants knew how the communication strategies worked for policies on climate change, nature management or spatial planning.

Communication promoting water/nutrient use efficiency: All the informants said that water and nutrient use efficiency is promoted among end-users with intermediate effectiveness. No examples of such promotion were given.

4.2.8.3 Gaps and compatibility issues challenging implementation of measures

In summary the informants did not find policy mechanisms to be adequate, while some informants did not provide an answer to this question. Informants considered the compatibility of policies as intermediate to low for water quantity, addressing both excess water management and water scarcity. More detailed perspectives on challenges, gaps and incompatibility issues are presented below.

The informants ranked challenges to implementing soil management measures (Figure 4.39) and structural measures (Figure 4.40), including the option to fill in other explanations. Regarding perceived challenges for implementing soil management measures, most informants ranked all the options as having intermediate impact, with administrative barriers ranking slightly higher. The same was the case regarding perceived challenges for implementing structural measures, with complicated implementation and administrative barriers ranking slightly higher.

Figure 4.39: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

Figure 4.40: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: (i) The WFD does not address specific measures and does not provide any recommendation, it was argued that there is a lack of concrete recommendations. (ii) The terms "water retention" and "nutrient retention" are not explicitly mentioned in the legislation. One informant stated that "it [legislation] considers the applicability of many actions that have such side-effects".

Insufficient integration, incoherent sectors and authorities: (i) Possible conflicts between measures with different purposes, and between different land-uses and resource uses. (ii) Conflicts between agricultural and water policies, as the effects on water management/quality of agricultural measures are not visible immediately (at the time of their implementation) but only in the medium-long term. (iii) WFD (addressing both water quality and quantity) is declined at sub-national level, as it requires that the integrated management of water resources is operated at the level of a river basin. Local reclamation and irrigation boards (in turn referring to smaller sub-catchments) address the prescriptions of WFD while managing water diverted from rivers for irrigation purposes. (iv) Different spatial units as the reference unit for sector policy implementation - some operates better at field or farm level (e.g. agriculture), others at different units.

Insufficient administrative capacity, competence and knowledge: (i) Difficult to assess the impacts of agriculture on the environment. (ii) Bureaucracy, difficult consultation of legislation by end-users on their own; high costs of needed project documentation. (iii) Information asymmetries for the public opinion. (iv) Scarce knowledge and long-term view on the possible effects of measures.

Policy instruments - insufficient or inappropriate funding schemes: Informants emphasised a general low level of economic support subsidies as a compatibility issue. An informant added that funding schemes and obligations to maintain certain practices for several years are not always compatible.

Other gaps and incompatibility issues are presented according to the type of challenge.

Water quality challenges: "Nutrient retention" is not sufficiently addressed by water policies (e.g. WFD) and agricultural legislation (e.g. ND) as a possible measure for improvement.

Water quantity challenges: (i) Lack of incentives from CAP for most of the hydro-morphological measures. (ii) Conflicts between policy aims e.g. flood risk protection and spatial planning or nature conservation.

Climate change mitigation and adaptation challenges: Conflicting goals, funding for biofuels may determine cascade effects on land conservation, food production and biodiversity.

4.2.8.4 Suggested solutions to improve compatibility and implementation of NSWRM

The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.41). The informants suggested informal education and increased financial support as the most important mechanisms for the improved uptake of measures.

Figure 4.41: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Several qualitative suggestions for improved implementation of NSWRM were identified and are presented below.

Governance

Efforts for better / improved engagement: It was recommended to establish formal or informal mutual exchange platforms for knowledge co-creation between policy makers, advisors, managers and farmers to develop coordinated actions. Furthermore, it is needed to involve local government / policy makers in the knowledge exchange with other local actors.

Efforts for improved administration, competence and knowledge: A comprehensive study assessing the manifold effects of agricultural practices is needed to support different sector policies and their long-term effects. Ex-ante assessment of public investments required by law drafting technical reports based on cost-benefit analysis, which have to take into account all the aspects mentioned (synergies between policies and their expected effects are taken into consideration).

Policy instruments

Improved financial mechanisms: Informants expressed the need for increased financial support and reduced bureaucracy for funding. One informant stated: "The possibility and modalities to apply for RDP measures comes directly by authorities (official call) but farmers are not able to manage the request on their own and need help from

advisers/agencies. One informant said that farmers' willingness to change and adopt more sustainable practices voluntarily depends on the amount of payment".

Improved technical support and infrastructure: Informants expressed the need to tailor support to the technological status. The technological level and progress is evolving and must be taken into account when formulating policies.

Efforts for awareness, education and communication efforts: (i) Request farmers to comply with policy prescriptions in due time. (ii) Improve awareness of both end-users and policy makers about current and possible strategies; introduce/explain to farmers the long-view behind and the rationale behind the policies, to enhance their interest and long-term vision of their investments/choices, gain more active involvement of end-users. (iii) Communication of policy impacts to farmers; communicate all the compatibilities and synergies between agriculture-environment-climate; formal or informal education of farmers about the rationale of agricultural policies, their aims and implications/effects on natural resources and climate. (iv) Educate extension, advisory services and consultants in addressing all environmental concerns and correctly report them to farmers; educate for technical skills and knowledge technical and administrative staffs.

Other suggested solutions classified by the type of challenge:

Addressing water quantity challenges: (i) Successful implementation of irrigation methods with higher efficient irrigation methods to face water shortages and make a more rational use of water. (ii) Promote wastewater re-use in agriculture for irrigation purposes.

4.2.9 Case focus Norway

4.2.9.1 About the informants – background and experience

Thirteen informants were interviewed, nine women and four men. Most of the participants have master's degree education, the rest have either on bachelor level or PhD. A majority work in the public sector as advisors, one in private sector and two in NGOs. The informants work mainly on national or regional level, and a few on local level. Agriculture and water management are the most common areas of expertise among the participants, followed by environment. None listed spatial planning as an expertise.

Most of the informants have addressed water quality, water quantity, climate change and nature conservation challenges in their work, but water quantity issues (especially concerning drought) to a lower degree than the other challenges. Several informants have extensive experience with the various agri-hydro-environmental measures, but most have more experience with agricultural measures than hydro-technical measures. Almost all informants selected agriculture and water management as central fields of expertise on high or intermediate level. Several also selected climate, environment and spatial planning policies (5) as important competence areas, but knowledge level was rated as lower.

4.2.9.2 Overview on important legislation, policies and communication for NSWRM

Legislation at different governance levels: Different legislation and policy documents steer decision-making processes on several governance levels. A national level agri-environmental programme, being important for nutrient retention and climate measures, sets the frame for the regional agri-environmental programme that provides financial mechanisms for municipality and famer decision making. Consequently, the national and regional governance levels frequently set frames for strategies to be developed by the municipalities, such as climate change strategies.

Several informants did not want to select only one policy or legislation document with significant impact on NSWRM. It was argued that several acts and regulations together have impact. Regional and local level legislation and strategies were highlighted as core documents as these set the frames for financial support and for environmental requirements in agriculture. Several national level legislation documents were mentioned as important. Below an overview of highlighted legislation and policy documents is provided.

Important legislation, policy documents

National level: *The Water Framework Directive (WFD)* and the *Water regulation,* which implements the WFD, were highlighted as these provide the basic framework for water management in Norway. *The Water Resources Act paragraph 11* was referred to as important for regulating buffer zones along water bodies. *The Land Act* with regulations is perceived as important for water quality and quantity and economic sustainability in the agriculture sector. This act authorize agricultural regulations on regional level. Informants explained that the land act allows the government to formulate operating rules (such as regulations for subsidies) to ensure sustainable agricultural land use, including reducing climate emissions. The land act is also the basis for regulations on subsidies for drainage of agricultural land as well as for the *Regulation on Fertilizers,*

which applies restrictions to fertilizer use in agriculture, and previously included specific mention of ammonia emissions. *The Pollution Control Act* and associated *Pollution Regulation* provide the legal basis for regulating polluting substances. It was however, pointed out that "runoff from regular agricultural practice are not regulated by reference the Pollution Control Act" because agriculture, fishing and forestry are exempted from the duty to avoid pollution. *The Planning and Building Act* regulating spatial planning is the legal basis for all permits and planning considering land use. It was stressed as important for water quantity considerations. *The Climate Act*, the climate adaptation strategy (klimakur) and the *National Program for Soil Health* were highlighted as national policies addressing greenhouse gas emissions.

Regional level: *The Regional Environmental Program (REP),* specifying financial support for measures addressing, water quality, quantity, biodiversity and climate change, was identified as the most important document by half of the informants. It is considered to have medium to high impact on end-users, as it involves cross-compliance with a combination of legal obligations and economic incentives. The REP is developed within the frames of the National Environmental Program. The "possibility to adapt measures to regional challenges and goals" was highlighted.

Local level: The regulation *Special environmental requirements in agriculture* (authorized by the Land Act) is important for compulsory measures in areas vulnerable to agricultural runoff (nutrients). While the regulation is national, it is still considered local by the municipality, as it is the municipality determines the focal strategy of measures and prioritises the use of funds. The strategy of measures needs to consider a national predefined list and funding is received from the state on an annual basis. Funding for hydro-technical environmental measures (national regulation authorized by the Land Act) is considered very important by several informants. *The municipal climate adaptation strategy* was highlighted. Municipalities are required to develop climate adaptation strategies for a local level context. It was mentioned that agriculture is often addressed in these municipal strategies.

The following sections describe whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: The majority of informants considered concerns related to flood and managing excess water to be included in the legislation to an intermediate-high degree, while drought and in-field water retention was seen as included to a lower degree.

Water quality: Nutrient recovery from streams and in-field nutrient retention measures were seen by the majority as included to a high degree, while some informants said it was included but to an intermediate-low degree.

Sustainable agricultural production: Most did not know whether this is included in the legislation, those that answered said it was to a high degree.

Nature conservation: It was the opinion that this is included to an intermediate or high degree.

Climate change mitigation was considered to be included, but there were differing opinions on to what degree.

Water use efficiency: About half were uncertain or did not provide an answer. Informants who rated the support saw it as medium or low. One informant commented that water use efficiency "is not important in Norway".

Nutrient use efficiency: There was a broad consensus that nutrient use efficiency is supported in the policy/legislation among the informants. The support was rated as medium by most informants. It was commented that the fertilizer regulation should be updated.

Support for economic sustainability: Most of the informants considered the legislation and policies to support the economic sustainability of technologies on farms and small agricultural catchment level. Financial support and voluntary action were rated as the most important tools for this, but penalties and legal frameworks were also seen as important to some degree by the informants.

Monitoring of environmental and economic sustainability: It was mainly said that the environmental sustainability of technologies is recorded both on farm and catchment level, while a few said it that it is not recorded or they did not know. The data quality was mainly rated as intermediate or high. The majority of the informants said that the economic sustainability of technologies is not recorded neither on farm or catchment level, or that they did not know.

Effectiveness of communicating the policies to end-users at local level: The communication of agricultural policies were generally seen as active, and it was rated by most informants as effective. Communication of climate change policies and policies on water management were also considered active and effective by most informants. Communication of nature management policies was seen as active but rated as slightly less effective. Most of the informants had no answer about the communication of spatial planning policies, which corresponds to the fact that none of the participants have expertise within this topic. Communication varies a lot in time and between sub-basin districts.

Communication to promote water/nutrient use efficiency to end-users: A little under half informants considered that water use efficiency was promoted to end-users, while the rest said it was not or they did not know about it. There were varying opinions on the promotion, and one informant said that "The communication varies a lot in time and between sub-basin districts. Whether the information provided has been received is also very variable".

4.2.9.3 Gaps and compatibility issues challenging implementation of measures

In summary, most informants stated that the policy support is not adequate, only few informants perceived support to be adequate. Most informants found it challenging to rate tools and techniques in terms of the support they provide for solving environmental concerns.

The informants ranked challenges to implementing soil management measures (Figure 4.42) and structural measures (Figure 4.43), including the option to fill in other explanations. Regarding perceived challenges for implementing soil management measures, there was large variation in the informants' perspectives. Voluntary measures and administrative barriers were ranked slightly higher as challenges for implementing measures. Regarding perceived challenges for implementing structural measures, also

for this question, informants' opinions differed. Administrative barriers and low cost-benefit were identified as the most important barriers to implementing structural measures.

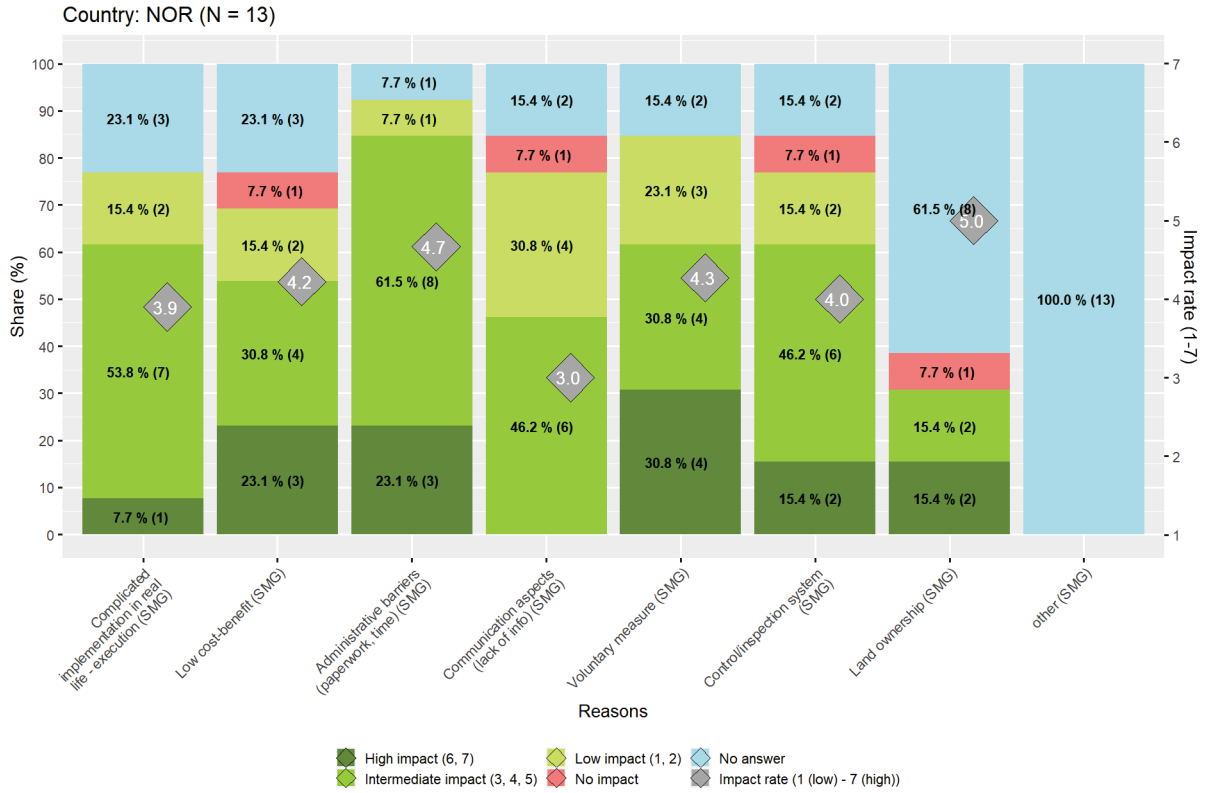


Figure 4.42: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

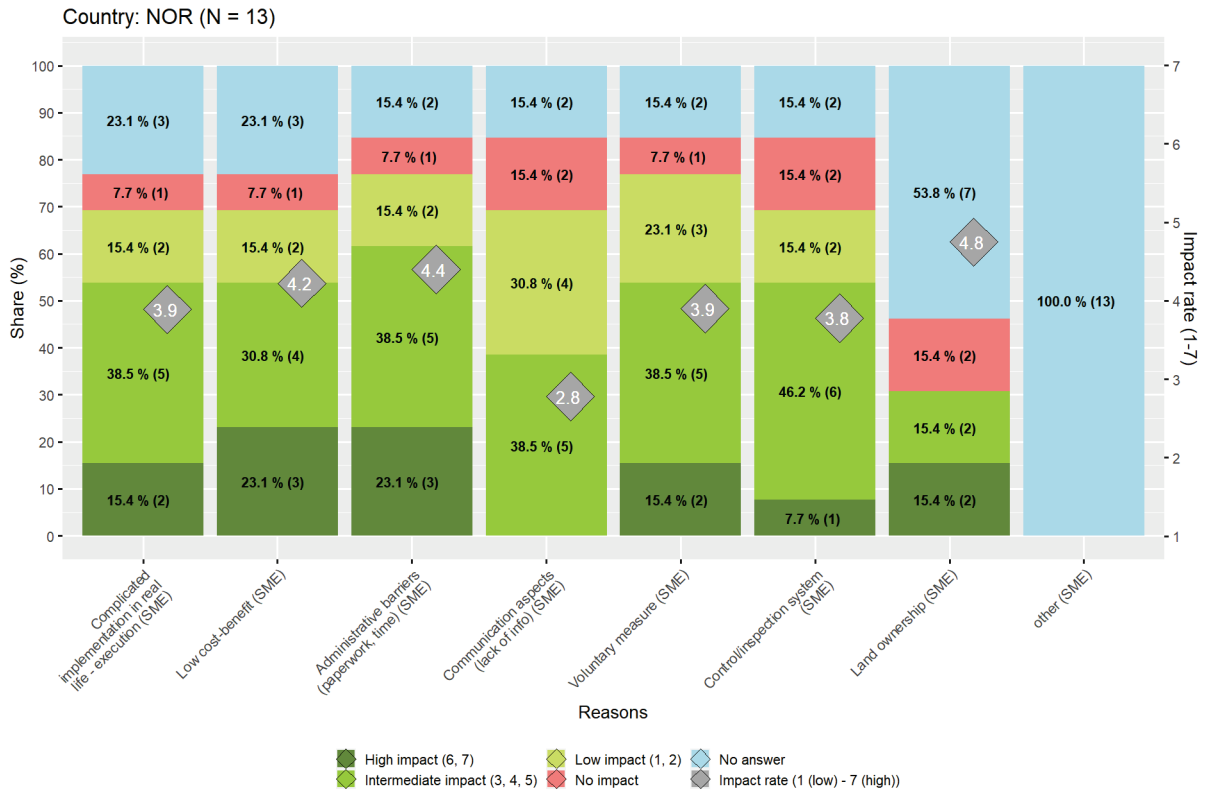


Figure 4.43: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: (i) Revising regulations takes several years, such as the ongoing revision of the fertilizer regulation. According to law, some measures must be approved by several different authorities before they can be implemented, for example measures in streams and smaller rivers must be approved by the county governor, the county municipality, stakeholder consultation, and from NVE (national directorate).

Insufficient integration, incoherent sectors, authorities: (i) Environmental considerations in sector planning has according to some informants been insufficient. There is often an area-conflict between agricultural production and environmental goals/measures. (ii) Increased agricultural production and ecological and environmental objectives represent contrasting national policy goals. An informant said that "reducing nutrient runoff and increasing agricultural food production is difficult to combine". (iii) Water management is fragmented, there are different roles and different regulations.

Insufficient administrative capacity, competence and knowledge: (i) Pioneering and or costly technologies: Some measures are difficult to implement in practice; as an informant said that only few farmers have tried *catch crops* in vegetable fields as it can be costly. Catch crops seeds are costly and snail control is needed. (ii) Access to fertilizer types without phosphorous is difficult.

Policy instruments

Insufficient or inappropriate funding schemes: (i) Economic incentives in general do not cover expenses of measures. The subsidy rate does not follow up the cost carousel and everything becomes more expensive. (ii) Grass fields on farms where without livestock (no market / need for the grass produced and then no access to production support. (iii) High investment costs for the sewage sector.

Insufficient technical infrastructure and support: Machinery is expensive and not everyone has the opportunity to buy equipment required for precision fertilization or direct sowing.

Insufficient awareness, and communication efforts: There seems to be too little understanding of why measures are needed as well as a lack of sufficient knowledge about the measures and the measures' effect on production.

Gaps and compatibility issues according to type of challenge are presented below.

Water quality challenges: *(i)* Policies for buffer zones: Several legislations address buffer zones, particularly the *Forest Act (Sustainability Regulations - FSC)*, the *Water Resources Act (§ 11)*, the *regulation on production subsidies*, the *Water resources (regulations on physical measures in water)* and the *Area planning legislation.* The regulations have different responsible sector authorities. It was said that there is lack of coordination between different authorities when it comes to violations of laws and regulations, and that there are different interpretations about the meaning of the legislation. According to the regulation of production support, buffer zones need to be managed, hence natural vegetation will not be established in accordance with the aim of the Biodiversity act. (ii) The *Water Resources Act* and the *Biodiversity Act are partly contradictory*. For example the need to reduce erosion along riversides using stone (Water Resources Act) and concrete versus the objective of natural vegetation. (iii) No-tillage and the aim of reduced pesticide use: Reduced tillage results in more weeds and a need for increased use of herbicides and pesticides. Overwintering in stumps gives more need for spraying versus the desire of not to spray more. (iv) Update of fertilizer regulation and law: Farmers are required to have fertilizer plans, but it was considered that the follow-up and implementation of these plans should be improved. It was also called for stricter rules and incentives on measures that could contribute to nutrient use efficiency.

Water quantity challenges: (i) Insufficient Area planning legislation (PBL) regarding surface retention: Area planning and urban development does not sufficiently consider the impact that dense surface areas have on water outside of the area in development. Subsequently, agricultural areas become responsible as recipient. In the case of road development, the Public Roads Administration is not responsible for water outside their area. One informant said that "there is too little knowledge in the municipality and in the municipal planning work, it is not known whether an area is prone to flooding if this is not specified on the map. Action is not taken on this regard if it is not specified in national legislation". (ii) Action for drainage is prerequisite for food production as it also contributes to reduced surface runoff. Yet drainage measures cause leaching of nutrients. (iii) Managing excess water, both regarding measures to address flooding, and measures for in field water retention were highlighted as needing additional support by several informants. (iv) There is a weak and insufficient regulation of water used for

irrigation. However, it was noted that drought-irrigation challenges are not so relevant in the case area.

Nature protection challenges: (i) An informant argued that the Biodiversity Act as mechanism for addressing nature conservation in agricultural areas is not powerful enough as the legislation is not compulsory in such areas. (ii) Stricter rules for the management and maintenance of streams are needed. With sufficient funds and rules more measures can be implemented. Currently the municipal administration cannot order the removal of, for example, a dam, or a clean-up in an area.

Climate mitigation and adaptation challenges: These challenges were generally perceived to be insufficiently addressed. One informant said that policies to address climate change are in the start phase and that "more fine-meshed provisions are needed".

4.2.9.4 Suggested solutions to improve compatibility and implementation of NSWRM

The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.44). Increased financial support was ranked highest, followed by informal education.

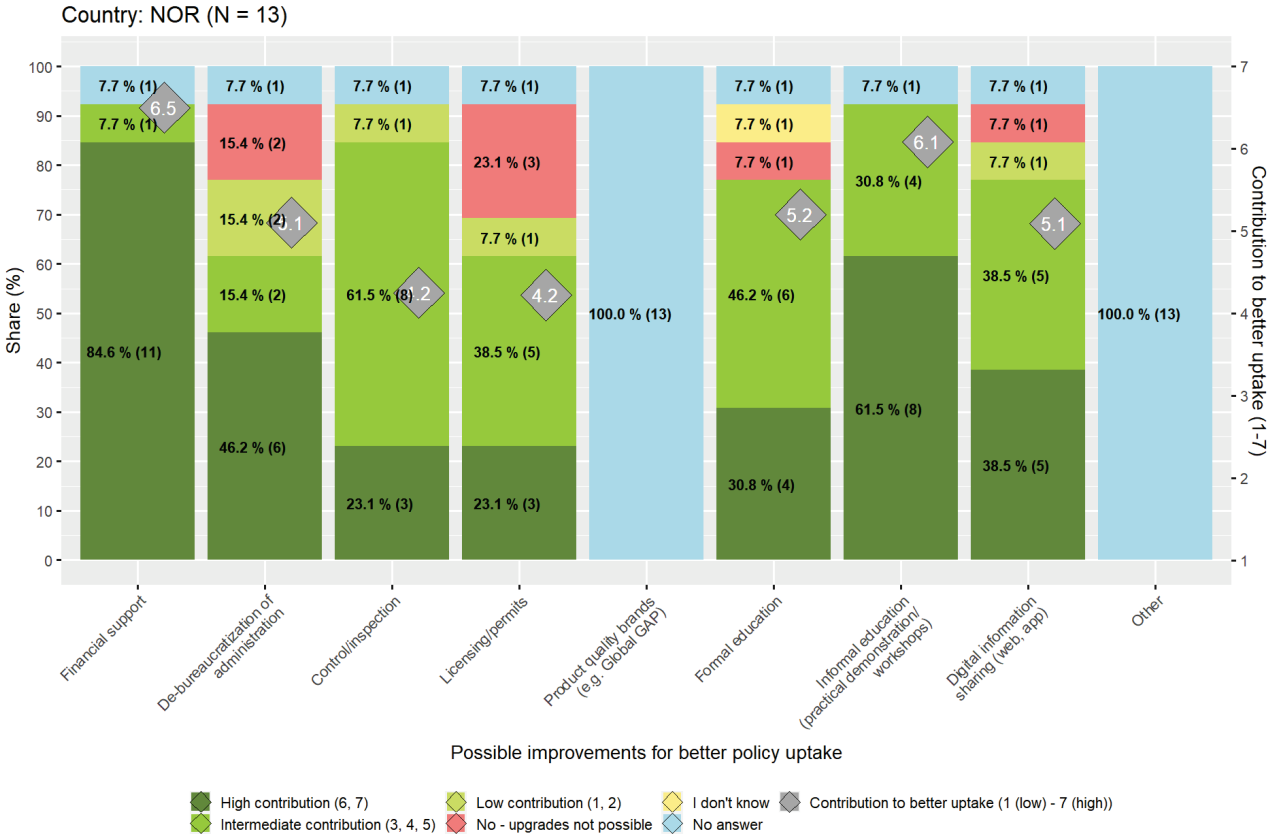


Figure 4.44: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Several qualitative suggestions for improved implementation of NSWRM were identified and are presented below.

Governance

Upgrade legislation: (i) Impose more strict regulations should be considered in the whole area below the marine boundary. It was stated that "the current environmental requirements that exist for the county Viken should also be implemented for the other counties around the Oslo Fjord, where challenges are similar, requirements must be equal". (ii) More strict requirements for spreading of organic manure are needed and no-tillage should be considered for areas in erosion class 3 and 4. (iii) A best practice experience that was mentioned: signed environmental agreements between farmers and the municipality during the first decade in the Morsa sub-basin district referring to a combination of environmental requirements, financial support including individual advisory. Successful factors specified were the combination of information detailing why this is necessary and what is needed as well as economic incentives in combination with legal obligations and environmental agreements with farmers. This required a lot of dialogues with farmers for a long period, and the involvement of farmers unions.

Efforts for better coordination and coherence between sectors: Implementation of environmental measures in agriculture will become more targeted if the regional environmental program (agriculture sector) is better connected with the water management plans (the programme of measures) (WFD).

Efforts for better / improved engagement: Coordinate a revision of related regulations and involve users and disciplines on both sides, both within environment and agriculture.

Efforts for improved administration, competence and knowledge: (i) The control of measures implemented needs to be performed by others than those who pay the subsidy. (ii) The control of permits is important so that the measure is implemented correctly and without leading to an increased risk of damage. (iii) Theoretical modelling must be coordinated with practical conditions.

Policy instruments

Improved financial mechanisms: (i) Economic incentives should be in combination with requirements and regulations - this is the key to achieve results as it was expressed by several informants. Farmers respond very well to schemes in the grants in the regional environmental programme. (ii) The economic situation of the respective farms needs consideration. (iii) It is a good idea to 'start with carrots before whipping' - more supplements are needed for specific cuts. If we do not reach the goals with grants, then we will have to make demands. (iv) Predictability needs to be ensured for investment and implementation of measures, in particular referring to investment in machinery.

Efforts for awareness, education and communication: (i) It is needed to increase the bilateral environmental advisory to farmers to find out whether the information provided has been perceived as valuable. (ii) To stimulate farmers to apply for funding it is needed to assist with practical help with "paperwork". (iii9) Use several channels to provide information: web, visit on farms, brochures etc.

Suggested solutions are classified below by type of challenge.

Addressing water quality challenges: (i) Sewage treatment plants should be required to also treat nitrogen. (ii) The «Fertilizer regulations» needs to be updated. The law on

fertilizers and organic origin has been postponed since 2016. It was specified that "Requirements regarding when to spread manure are of great importance". According to one informant there is also a discussion regarding the Fertilizer Regulations "on how to differentiate the regulations based on different districts". Fertilizer planning is required, but how this is actually followed up is unknown. (iii) Stricter rules are needed regarding spreading of manure and fertilizers and to reduce autumn ploughing. Furthermore, stricter rules or better incentives are needed to maintain or establish buffer zones along streams. (iv) It was recommended to support annual grass-covered waterways that are sowed simultaneously with the grain, and ploughed in the spring. (v) Catch crops: further targeting of for example catch crops is important, especially regarding appropriate seed mixtures.

Addressing water quantity challenges: Water retention: the legislation is ok, but instruments are not sufficient and need more funds. Best practice example: retention ponds and vegetation zones on flooded areas funded by the RMP (regional) and the SMIL (local).

Addressing nature conservation challenges: The situation that a landowner to together with the municipal agricultural office, can to apply for funding from the agriculture regional environmental programme for 70% of the cost of constructing wetlands, represents a best practice example. It was argued that, "If combined with funding for biodiversity objectives, 100% funding of costs can be reached".

4.2.10 Case focus Czech Republic

4.2.10.1 About the informants – background and experience

Eighteen informants were interviewed, seven women and eleven men. The majority of the participants have education on master's degree level. Most of the participants are employed in the public sector on regional or national level. Three participants work in the private sector and three in NGOs or other. Water management is the most common area of expertise among the participants, followed by environment. Four have expertise in agriculture and three in spatial planning, while none listed climate change as their main expertise. All participants have already addressed water quantity and quality challenges in their work to some degree. Most also have experience with climate and nature conservation challenges from their work.

Most of the informants have extensive experience with the various measures listed, both agricultural and hydro-morphological measures. Water management policies are a central area of expertise of almost all the informants. The same is the case for agriculture policies, but informants generally rated their knowledge on this a little lower. A majority also have expertise on environment, spatial planning and climate policies.

4.2.10.2 Overview of legislation, policies and communication for NSWRM

This section describes the case study situation regarding legislation and policies within the agri-hydro-environmental governance domain according to the informants' perspectives.

Legislation at different governance levels: According to the informants, relevant legislation on water quality, water quantity and climate change is on national level only. All the documents mentioned as having most significant impact on NSWRM are also on national level, within a broad range of sectors.

Important legislation, policy documents

EU level: *The EU Green Deal* was mentioned as important for research on NSWRM, as "grants for applied research in the field are not possible without taking into account the Green Deal".

National level:

The Water Act was highlighted by several informants as it "sets out the basic guidelines for all other executive regulations in the field of water", and, "protects surface and groundwater, sets conditions for the efficient use of water resources, preserves and improves the quality of surface and groundwater, creates conditions for reducing the adverse effects of floods and droughts and ensures the safety of water works". An informant commented: "in practice, it mainly affects the permitting of water retention constructions".

The Sustainable Strategy on Food, Agriculture and Water management toward 2030 by the Ministry of Agriculture was described as a strategic framework for long-term development. By 2030, Czechia shall apply principles and approaches for the sustainable management of natural resources. The Strategy responds to climate change and hydrological extremes unfavourable for the water regime, and the needs of society. It is

as a living document and a basic background for strategic management processes within the Ministry of Agriculture and a basis for cooperation with other departments.

The Building Act and in general spatial planning on all administrative levels, including "spatial plans of municipalities, principles of spatial development, spatial development policy" were mentioned by several informants as influencing the adoption of NSWRM. For example, *the Building Act* does not require formal land use change or a specific permit for ponds/wetlands up to 300 m^2 and 1.5 m depth.

The Act on Land Consolidation and Land Offices, was described as making it «possible to introduce NSWRM given that there will be a change in ownership in the area».

The Act of Protection of Nature and Landscape: The implementation of all NSWRM must be in accordance with this Act, especially in Nature Protection Areas. It is seen to be important as NSWRM have indirect, less measurable economic benefits and measures have to be enforced on state level.

Government Regulation 48/2017 on setting requirements according to acts and standards of good agricultural and environmental condition is described as a legislative amendment, which transposes the GAEC standards into national legislation. It includes for example limiting the cultivation of one crop to more than 30 ha of continuous area. *The State subsidy policy* for subsides and deployment of NSWRM was also mentioned as important.

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Flood protection is considered by a majority of the informants to be supported by legislation to a high degree. Water shortage is considered by most to be supported, but to an intermediate degree. Several consider in-field water retention measures to be supported only indirectly and to a low or intermediate degree.

Water quality: Nutrients recovery from streams was considered to be supported to an intermediate degree. In-field nutrient recovery was also seen as addressed, mainly to a low-intermediate degree.

Sustainable agricultural production was seen as either directly or indirectly included to a high or intermediate degree by most informants. Climate change mitigation is seen as mainly directly included, to an intermediate degree. Nature conservation is mainly seen as directly included to a high or intermediate degree.

Support for water use efficiency: The majority of the informants said that water use efficiency has intermediate support in the legislation/policy. It was mentioned that programs / measures to reduce drought problems are reflected in water planning, and that "economical use of water is supported by strategies, but is not adequately linked to legislation (for example reuse of treated wastewater)". One informant said that there is not enough support for various methods such as use of rainwater, grey water, coordinated water supply, etc. in the policy/legislation.

Support for nutrient use efficiency: About half of the informants said that nutrient use efficiency has support in the legislation/policy to a low or intermediate degree, but several said that this was not supported.

Support for economic sustainability: Most of the informants said that financial support/subsidies are important for promoting economic sustainability of technologies on farm and small agricultural catchment level. Several also included penalties, legal framework and voluntary action as promotion types, but with lower/intermediate importance.

Monitoring of economic and environmental sustainability: About half of informants did not know whether economic sustainability is recorded on farm or catchment level. The data quality was mostly rated as intermediate. About half did also not know whether environmental sustainability is recorded on farm or catchment level. The data quality on both farm and catchment level were rated as low-intermediate. It was mentioned that the Ministry of Agriculture has established a database of measures managed in the Land Parcel Identification System (LPIS) with access for farmers. The main purpose is to gain data from farmers, provide information and gather data for subsidies provided in connection with agricultural land.

Effectiveness of communicating policies to end-users at local level: Very few had opinions on whether policies are communicated actively, individually or other. Communication of water management policies was rated as most effective, with other types of policies mostly rated as having low or intermediate effectiveness.

Communication to promote water/nutrient use efficiency: Around two thirds of the informants said water use efficiency is promoted among end-users, mainly with intermediate or low effectiveness. Half of the informants said that nutrient use efficiency is promoted among end-users, mainly with intermediate effectiveness. It was commented that "the use of water and the handling of nutrients and secondary materials are not well promoted in society".

4.2.10.3 Gaps and compatibility issues challenging implementation of measures

Regarding adequacy of policy mechanisms, in summary about half of the informants did not know or did not respond. Among those that did provide an answer, perspectives varied a lot. Informants perceive compatibility as relatively low for excess water management and for nutrient recovery.

The informants ranked challenges to implementing soil management measures and structural measures, including the option to fill in other explanations (Figure 4.45, Figure 4.46). As the figures show, many informants did not know or did not answer the question. Regarding perceived challenges for implementing soil management measures, voluntary measures and land ownership were ranked as most impactful barriers. Regarding perceived challenges for implementing structural measures, complicated implementation, voluntary measures and land ownership were ranked as impactful.

Figure 4.45: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

Figure 4.46: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: (i) Legislation should be stricter and better controlled. (ii) Coherence of legislation (i.e. in the field of water management, agriculture, nature protection, etc.) is not fully compatible.

Insufficient integration, incoherent sectors and authorities: (i) There seems to be a lack of a clear strategy for joint action at all levels of government; water is addressed in individual policies at different spatial levels. (ii) Strategies are created in different departments to solve the same problem, but in a different or contradictory way; there are conflicting requirements of the Ministry of Agriculture and the Ministry of Environment, e.g. contradiction between agricultural subsidies and land protection (erosion, biodiversity). (iii) Time-inefficient enforcement of regulations and controls.

Policy instruments

Insufficient awareness and communication efforts: (i) Low willingness to implement measures. (ii) There is a problem regarding spatial planning of functional areas and landownership. Typically, landowners are many therefore implementation of measures from the administrative point of view becomes challenging and inefficient.

Other gaps and incompatibility issues are presented according to type of challenge below.

Water quality challenges: (i) There is insufficient monitoring and surface pollution sources are not monitored. (i) Lack of enforcement, control of compliance with the minimum residual flow is insufficient. (iii) Application of chemicals and fertilizers (degradation of edaphon causing contamination of surface and groundwater), persistence of pesticides, fungicides and herbicides are excessive.

Water quantity challenges: (i) Managing excess water: Lack of a comprehensive solution for water surplus, especially using new reservoirs at the expense of reducing storm waves by measures in the river basin and agricultural / forest landscape. (ii) Spatial planning does not sufficiently regulate industrial buildings and cities in relation to water retention. (iii) Lack of a comprehensive solution to water scarcity, especially solutions using new reservoirs are planned at the expense of increasing water retention in the agricultural/forest landscape. (iv) Fragmented legislation: Strategies for protection against the negative effects of floods and erosion are well developed, but in practice legislation is fragmented and there is low enforceability. (v) Land ownership: The agricultural land is farmed by tenants, who are often not as interested as landowners to reduce the topsoil in being washed away - "soil and land relations are broken".

Nature protection challenges: (i) There is lack of long-term strategy for protection of local areas for nature conservation. (ii) Urban development planning does not solve the fragmentation of the landscape and the connection of urban areas to the surrounding environment. The Building Act is currently being amended (transfer of competence from the nature protection authority to new building authorities, namely in built-up areas and buildable areas of all protected areas, including all national parks and protected landscape areas). Newly emerging areas have a low level of protection -

preference for construction projects at the expense of landscaping to improve municipal budgets. (iii) Large farming units as a driver for degradation, support for extremely large areas for agriculture that degrades soil (composition and erosion) challenges biodiversity and surface water quality objectives. (iv) One-sided focus on water retention (reservoirs vs. wetlands), only few projects for revitalizations or renaturalisation.

Climate mitigation and adaptation challenges: There is support of crops for energy that have a negative impact on sustainability and soils (interpretation of state rules within the flexibility of strategies).

4.2.10.4 Suggested solutions to improve compatibility and implementation of NSWRM

This section presents the informants' suggested solutions for overcoming poor compatibility and improving implementation and uptake of measures. The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.47). Financial support and de-bureaucratization were ranked highest.

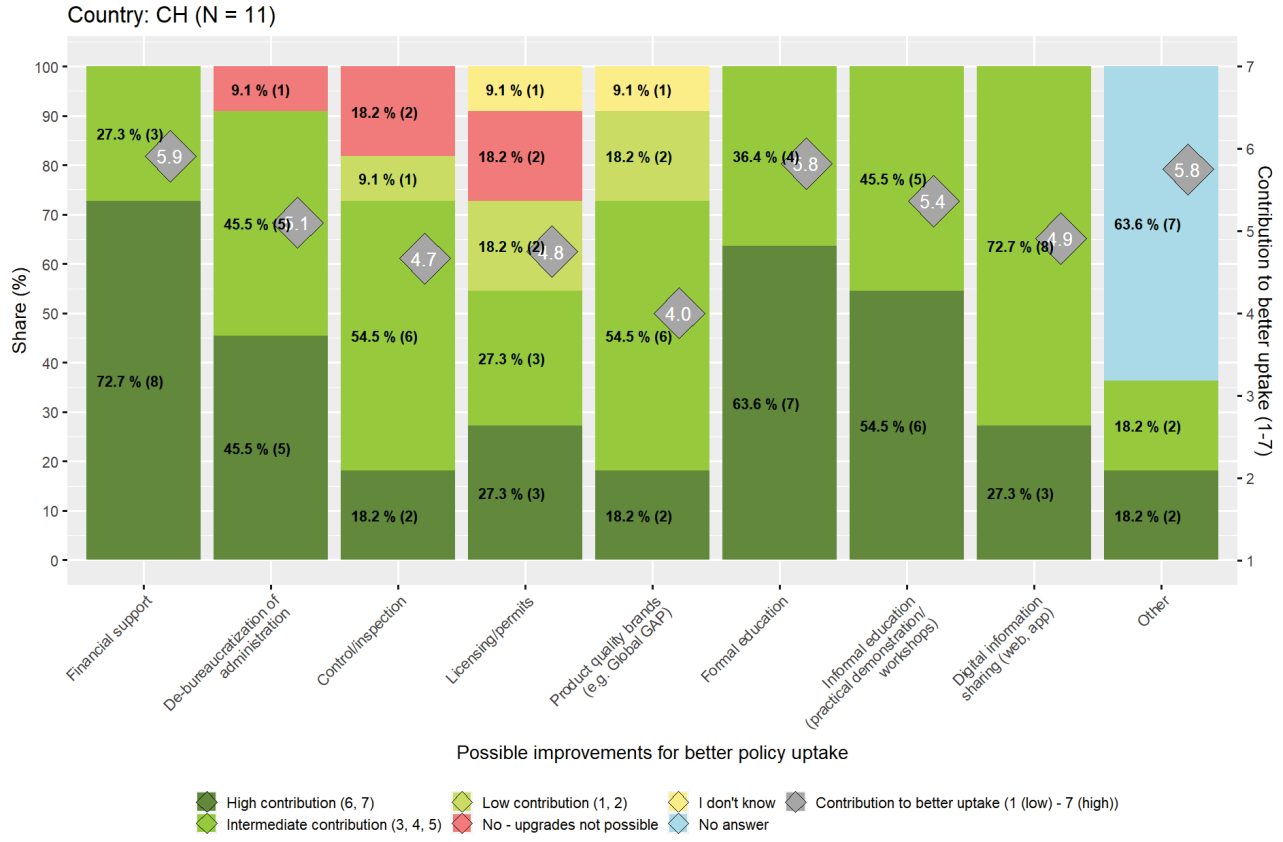


Figure 4.47. The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Additional qualitative suggestions by the informants for improved implementation are presented below.

Governance

Upgrade legislation: (i) Creation of a single binding document with clearly defined measures. (ii) Amend the Water Act to allow re-use of treated wastewater, e.g. for watering in agriculture. Furthermore, amend the provisions of Section 27 of the Water Act - landowners are obliged to ensure that runoff conditions and soil erosion do not deteriorate, to improve the retention capacity of the landscape so that it is enforceable and to prepare an appropriate methodology for water authorities. (iii) Legislatively regulate sowing procedures to ensure soil and nutrient protection. (iv) Legislatively define against large and integrated agricultural areas. (v) Enforce legislation, control who observes the minimum residual flows or does not get rid of sewage sludge illegally.

Incoherent sectors, authorities: (i) Develop policies that support synergies, unify subsidy policies and abolish those that do not support synergies altogether. (ii) Better cooperation at the level of the Ministry of Agriculture and the Ministry of the Environment, and define basic responsibility for the aspects which will be translated into legislation and implementing regulations.

Efforts for better / improved engagement: (i) Active participation of stakeholders in legislation to ensure greater variability of measures. (ii) Establishing cooperation at the regional level in the development of given strategies / policies. “More accommodating behaviour of the state". (iii) Organizing informative meetings on the proposed measures directly in the affected localities with the possibility of participation of landowners.

Insufficient administrative capacity, competence and knowledge: The public administration should have better knowledge of strategies, how it should be created correctly. The unions that are supposed to provide these activities for this state will be given the competencies to supervise and coordinate their creation.

Policy instruments

Improved financial mechanisms and, increased financial support: (i) Financial motivation - the state should provide financial support to landowners and operators. (ii) Differentiate administrative burden, reducing this for large owners, linking responsibilities to landscape fragmentation. For small landowners: enable and pay for more than 90% hiring of an expert who will guide the owner and arrange everything necessary. (iii) Flexible interpretation and approach to fulfilling obligations. (iv) Linking new procedures to the subsidy system - those who meet the conditions will get better conditions for the allocation of subsidies. (v) Financial support for local ecosystem services and direct offers for municipalities, regions and end users. Support for smaller territorial units through redistributive payments, and for organic farming and landscape care.

Improved technical support and infrastructure: Better explain the steps of the state administration on interventions in areas under its administration and a unified procedure.

Efforts for awareness, education and communication: (i) Education at all levels, including students, farmers, the public; also informal education, practical demonstration workshops. (ii) Practical seminars with memoranda of cooperation. Awareness-raising with representatives of municipalities and regions on the impact and interconnection of agricultural production, floods, drought and water quality. (iii) Behaviour along the watercourse and in the tributaries - it is necessary to control their surroundings and

communicate with landowners and farmers. (iv) Ensure access to information at the local level.

Other suggested solutions are presented according to type of challenge below.

Addressing water quality challenges: (i) Support modernizing agricultural technology, such as methods of precision agriculture, integrated production, careful use of artificial fertilizers and pesticides, greater use of organic fertilizers or the use of their variants without unnecessary nitrogen release. Also modernize the agricultural land use registration system (LPIS), to ensure interconnection with other systems. (ii) Sediments - simplify the possibility of handling sediments from agricultural land for reuse.

Addressing water quantity challenges: (i) There is a need to reduce, revise the support for "farming methods from the past" that aimed for, large land blocks, minimum landscape features. (ii) Implement measures for sediment recovery from the field. (iii) Ministry of Agriculture's subsidy program, a voluntary program, "Support for measures on small watercourses and small reservoirs – 2nd stage" is relevant for addressing water and nutrient retention.

Addressing challenges of nature conservation objectives: The landscape was disturbed by the practices of the unified agricultural cooperatives of the totalitarian regime (land consolidation) and this intervention still persists; there is a need to restore in rural areas original types of landscape in the Czech Republic.

4.2.11 Case focus Latvia

4.2.11.1 About the informants – background and experience

Eleven informants were interviewed, seven women and three men (and one N/A). The majority of the participants have education on master's degree. All but two participants who work in the private sector and NGOs, are employed in the public sector, mainly on national level. Environment is the most common area of expertise among the participants, followed by agriculture and water management. Most of the participants have already addressed excess water challenges in their work, while they generally have less experience with addressing water scarcity and in-field water retention. Most also have addressed challenges related to water quality, climate and nature conservation to varying degrees in their work.

The informants mainly have experience with the agricultural and hydro-morphological measures listed. Almost all the participants have intermediate or high knowledge of policies within agriculture, water management, environmental management and climate. Most also have knowledge of policies related to spatial planning, but more on low-intermediate level.

4.2.11.2 Overview of important legislation for NSWRM

This section describes the case study situation regarding legislation and policies within the agri-hydro-environmental governance domain according to the informants' perspectives.

Legislation at different governance levels: The informants said that the legislation on water quantity, water quality and climate change are on national level only. One commented that river basin district management plans provide more details of measures to reach good status of water bodies - "however, these plans are not compulsory".

Important legislation, policy documents: The documents mentioned are mainly on the national level within the agricultural sector, water management or environment.

National level: *Strategic Plan for Common Agriculture Policy (SPCAP)* is produced for each planning period led by the Ministry of Agriculture. The plan incorporates requirements for agricultural practices to receive subsidies from the EU funds for agricultural activities and serves as a motivation for agricultural sector/farmers to meet environmental standards by adopting certain practices. The previous plan (2014-2020) provided subsidies for NSWRM for the whole country. The new plan will be more targeted to water risk objects defined according to the EU Nitrate directive. *The SPCAP 2023-2027* will contribute to the green deal targets, the Farm to Fork and Biodiversity strategy.

Regulations Nr. 600 Procedure for granting state and EU support under open project calls for measure investments in material assets provides information about NSWRM and describing the criteria for implementation of NSWRM in Latvia. It needs to be improved by providing more information about design considerations used for planning and implementation of NSWRM.

Regulation Nr. 834 Requirements Regarding the Protection of Water, Soil and Air from Pollution Caused by Agricultural Activity regulates environmental requirements in

agriculture sectors, and is a basis for permit processes. And it stipulates requirements for the protection of water and soil from pollution caused by nitrates emissions from agriculture. It defines sensitive territories where more strict requirements apply.

Regulation Nr. 34 Regulations Regarding Discharge of Polluting Substances into Water sets threshold values for wastewater discharge and prohibitions for discharge to water. Furthermore, the regulation defines sensitive territories and procedures for operator.

Regulation Nr. 118 Regulations Regarding the Quality of Surface Waters and Groundwaters sets water quality standards, which determine the concentration limit values to priority substances and hazardous substances in water as well as concentration limit values to priority substances in biota.

Regional level: *River basin district management plans* are important on sub-national level. Latvia is divided into four river basin districts, with separate river basin district management plans (RDMPs), including flood protection plans that are regularly updated.

Local level: For the case study area, the nature park *Dviete floodplain nature protection plan for 2020-2032* and *Regulation Nr. 274 Individual protection and use regulation for Nature park Dviete floodplain* stipulate activities and measures in the territory of Dviete floodplains. These are the basis for obtaining permits for certain projects, and justify CAP subsidies for the NATURA2000 territory.

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: Informants said that legislation address water excess challenges to a high or intermediate degree. Water shortages were considered to be included indirectly and to a low or intermediate degree. There were varying views on whether in-field water retention measures are addressed directly or only indirectly, and if they are addressed to a low or intermediate degree. Water legislation is extensive and regulates water abstraction and use, mainly through fees (natural resource tax).

Water quality: In-field nutrient retention measures were seen as addressed to an intermediate or high degree. Nutrient recovery from streams was considered to be included, but opinions varied to what degree. National transposition of the EU Nitrate directive and required fertilization plans were mentioned as an example of mandatory requirement in nitrate sensitive (risk) territories.

Sustainable agricultural production and climate change mitigation was seen as supported to a high or intermediate degree by most informants. Nature conservation was considered to be addressed to a high degree by almost all the informants.

Support for water use efficiency: The majority of the informants said that water use efficiency has low or intermediate support in the legislation/policy.

Support for nutrient use efficiency: The majority said that nutrient use efficiency has support in the legislation/policy. Opinions differed on whether the support is low, intermediate or high. It was mentioned that nutrient efficiency legislation sets clear standards (for example, for manure storage, for intensity of animals on ha, spread of

manure on ha). Respondents mentioned a low utilisation of fertilization plans, but availability of financial support to use improved fertilizing technologies.

Support for economic sustainability: The informants considered financial support/subsidies to have high importance for promotion of economic sustainability of technologies on farm and small agricultural catchment level. Regulations and penalties were considered to have intermediate importance, while voluntary action to have low or intermediate importance.

Monitoring of economic and environmental sustainability: Some participants said that economic sustainability is recorded on farm and catchment level, but several did not know. It is monitored at farm level by the farmer, and the Latvian Rural Support Service is collecting information about management on farms differentiated by the type of land use (grazing lands, etc.). Environmental sustainability is recorded on farm and on catchment level. The quality of the data was rated as intermediate on farm level and slightly higher on catchment level. Environmental information is generally gathered for larger catchments, but not smaller catchments. For the specific case study area, it was commented that the monitoring of the Dviete river basin water quality was carried out after the implementation of river restoration and meadows grazing measures, but that there are currently no regular monitoring activities. Meteorological data is collected in Dviete river basin since 2005.

Effectiveness of communicating policies to end-users at local level: The communication of agricultural policies were generally seen as active from authorities, and its effectiveness was rated as high or intermediate. The same was the case for the communication of policies on nature management and climate change. Communication of policies on water management was also seen as active by most informants, but slightly less effective, while few had any view on how spatial planning policies were communicated and its effectiveness was mainly rated low-intermediate.

Communication to promote water/nutrient use efficiency: Most informants said water use efficiency is promoted among end-users with intermediate effectiveness. Nutrient use efficiency was mainly described as being promoted among end-users to an intermediate or high degree.

4.2.11.3 Gaps and compatibility issues challenging implementation of measures

Regarding adequacy of policy mechanisms, in summary, most informants considered the policies not to be adequate. Regarding compatibility, low compatibility (ranked lowest) were noted for water scarcity issues, then water quantity in field, then water quality nutrient recovery from streams. Below more detailed perspectives on challenges, gaps and incompatibility issues are presented.

The informants ranked challenges to implementing soil management measures and structural measures, including the option to fill in other explanations (Figure 4.48, Figure 4.49). Regarding perceived challenges for implementing soil management measures, there were differing views among the informants, but communication aspects and land ownership received slightly higher ranking. Regarding perceived challenges for implementing structural measures, there were also very differing views, with land ownership ranking slightly higher.

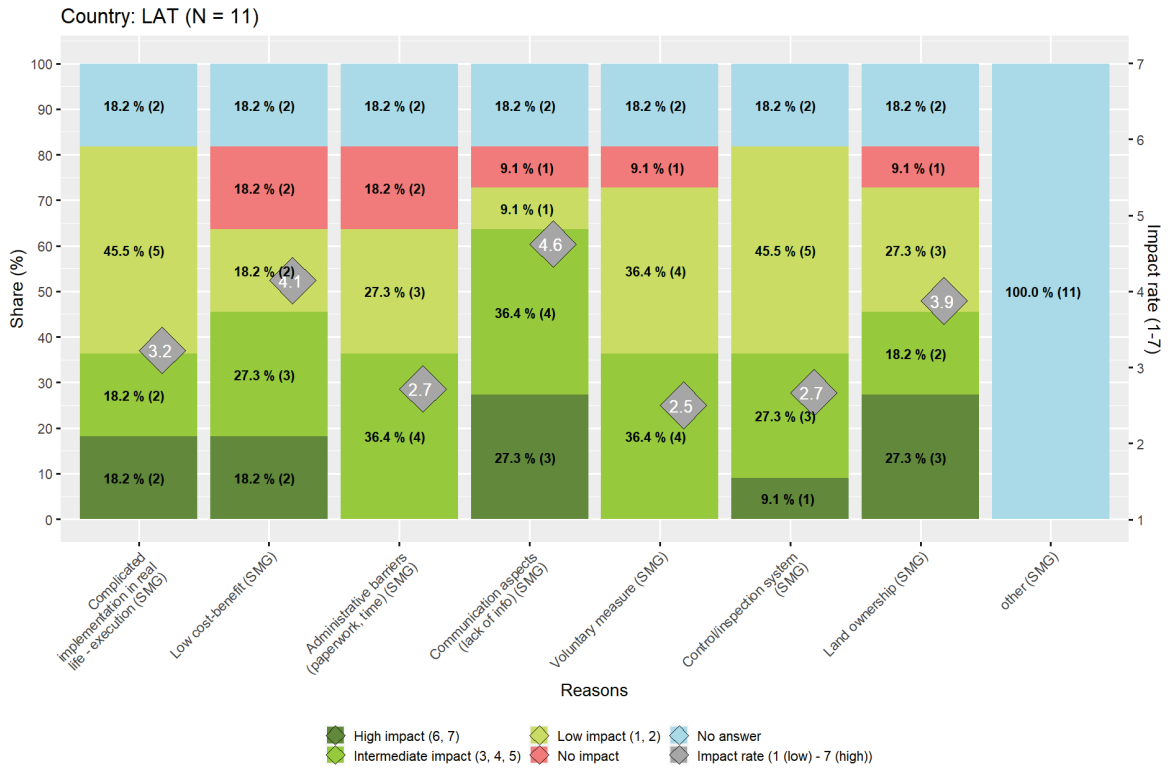


Figure 4.48: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

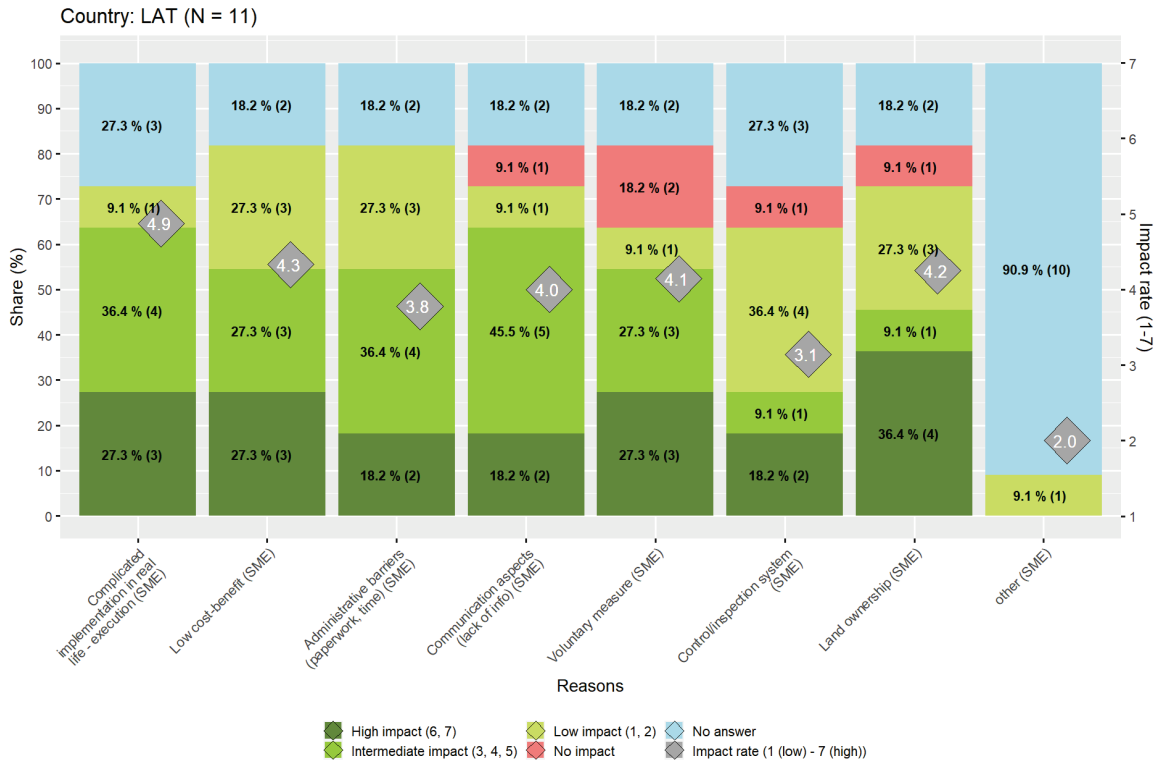


Figure 4.49: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Incoherent sectors, authorities: Different goals of agriculture-nature, agriculture- water sectors. One informant stated that "Nature is not sufficiently mainstreamed".

Insufficient administrative capacity, competence and knowledge: (i) Too little is done to collect data and to validate the efficiency of measures, e.g. costs of introducing buffer zones are not justified by monitoring. There are no estimates of lost income, neither costs of maintaining buffer belts. (ii) Monitoring data availability accordingly inspire directive, data are not compatible for all sectors. (iii) Insufficient controlling capacity at the environmental sector (State Environmental Survey regional units) of the cross compliance situation.

Policy instruments

Insufficient or inappropriate funding schemes: Costs of measures and availability of finances are not in coherence.

Insufficient awareness, and communication efforts: There is a lack of understanding of measures in terms of their implementation process and efficiency. It was commented that "Latvian farmers are conservative in their behaviour and do not want to accept measures which are not tested and validated under the Latvian geographical (soil etc.) conditions."

Other gaps and incompatibility issues are presented according to type of challenge below.

Water quality challenges: (i) Water and nutrient retention measures are supported by financing from CAP instruments, but implementation is insufficient and very few techniques are practiced. The situation is better regarding the tools. Nitrate measures are not sufficiently incorporated in new national CAP strategy and financing is limited. (ii) No legal acts stipulate nutrients retention on the field level because runoff from fields occurs during non-vegetation season. There are incompatibilities regarding *Regulation Nr. 118* defining quality norms for surface waters, and *Regulation 34* as qualitative standards are missing and there are no concentrations limits for emissions. (iii) State monitoring points and frequency is insufficient and do not help locals to form their decisions. The state (rural support service) collects water quality parameters at regional level that does not coincide with catchment level. (iv) Fertilizing plans take into account different soil parameters but disregard water aspects as this is not requested. "There is regulation on use of fertilizers and requirement to develop fertilization plans, but plans for fertilizing are not implemented in most of farms". (v) Buffer zones: There are insufficient capacities to manage coastal belts around lakes. Currently lakes are eutrophicated and bureaucracy to get permits to do cleaning of belts is high.

Water quantity challenges: (i) Flood protection is an issue for people/economy, but it conflicts with aims to maintain wetlands/biotopes/biodiversity. Conflict of policies shall be settled by identifying what are the priorities. (ii) Difficulties to obtain water use permits (from State Environmental Service) for using natural surface waters for agriculture. There are too many procedural steps, even EIA procedure with opinions from

several experts. As a result farmers do not obtain permits and take illegal actions, e.g. building hydro engineering constructions by themselves, often without permits. (iii) Lack of regulation in case of droughts: In dry years, relevant legislation and rules is not exiting in Latvia. "Legislation stipulates landowners responsibility to manage melioration systems, but implementation is week."

Nature conservation challenges: (i) The Ministry of Agriculture is responsible for the management and cleaning of drainage systems, the management is not compatible with the maintenance of upstream/down-stream biotopes, which is the responsibility of the Nature Conservation Agency. (ii) Nature-water protection requirements conflict with water quality protection measures such as regulated riverbed; cleaning of riverbanks. (iii) Insufficient support from the Ministry of Agriculture (Food and Veterinary Service) for grazing support of livestock - reference was given to the *Cabinet Regulations Nr. 5 as of 02.01.2008 General welfare requirements for farm animals*: To receive subsidies, grass has to be cut to 10 cm until September 15, which means that nothing is left, and additional feed (dried grass) has to be brought to the open cattle holdings, adding costs in preparation and transportation. (iv) Insufficient protection of protected species outside protected nature territories and micro-sanctuaries.

Climate mitigation and adaptation challenges: (i) Reduction of GHGs from organic soils is the most effective solution to minimize emissions, while this provides opportunities to reduce agricultural activities somewhere else. (ii) Agriculture production objectives do not comply with afforestation goals in climate targets. (iii) Melioration and climate emissions: drainage increases climate emissions (GHGs), but agriculture in unmeliorated lands is challenging.

4.2.11.4 Suggested solutions to improve compatibility and implementation of NSWRM

This section presents the informants' suggested solutions for overcoming poor compatibility and improving implementation and uptake of measures. The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.50). Increased financial support was rated highest, followed by informal education and digital information sharing.

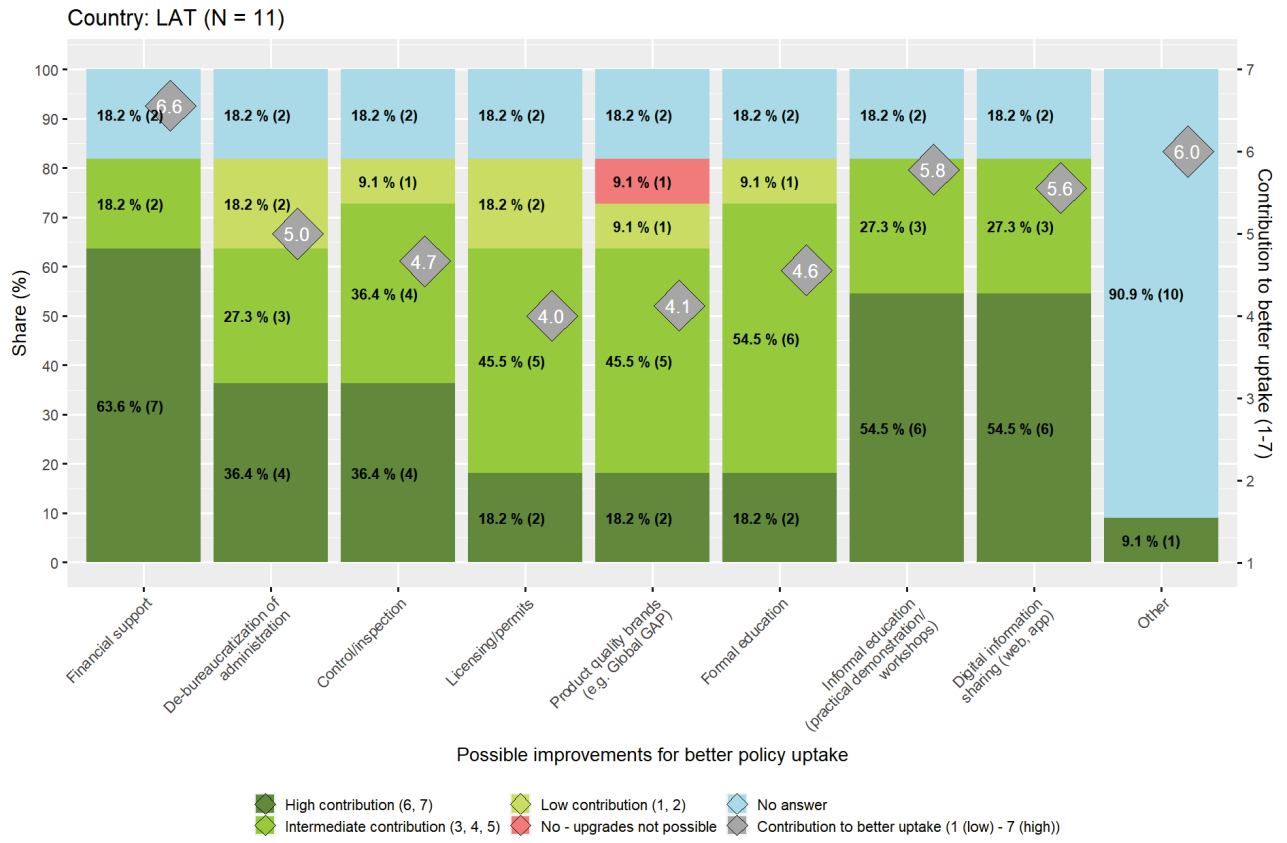


Figure 4.50: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Additional qualitative suggestions by the informants for improved implementation are presented below.

Governance

Upgrade of legislation: (i) River basin district management plans (RBDMP) need to be approved by the government to make them obligatory for all involved parties, and better ensure financing of RBDMP measures. (ii) The low fines that are currently existing do support intentional breaching of rules. Higher fines are needed.

Efforts for better coordination and coherence between sectors: (i) Spatial planning - interests of different policies (sectoral priorities) have to be spatially aligned. Aiming at synergies through local spatial planning integrating all concerns in a systemic manner. (ii) Common terminologies to improve shared understanding between governance fields. (iii) Stating concrete responsibilities and duties of various stakeholders in water management.

Efforts for improved engagement: (i) Improving consultation process of agricultural experts with farmers for better solving of discrepancies between agriculture, environment and nature. (ii) Better organisation of working groups for NGOs, state and local municipal stakeholders/experts. (iii) Promoting higher environmental awareness (especially in young generation) for reaching sustainability.

Efforts for improved administration, competence and knowledge: (i) A national monitoring system that allows for data transfer, and that is user-orientated. (ii) Provide data to better justify buffer zones width (10 m) to receive CAP support. (iii) Support needed to reduce bureaucracy.

Policy instruments

Improved financial mechanisms, increased financial support: (i) The most important are compensatory subsidies for restrictions of agricultural activities (e.g. buffer/protective belts along rivers reduce productive areas of agriculture lands and income). (ii) Costs of measures are higher, permanent subsidies are needed. (iii) Environmental requirements in financing schemes.

Improved technical support and infrastructure: (i) Sufficient information about the design considerations that are used for planning and implementation of NSWRM. (ii) Improve access to geospatial information to identify appropriate sites for implementing measures (as melioration systems). (iii) There are new technologies for improved use of fertilizers (dozation, etc.), financial support is available for farms.

Efforts for awareness, education and communication: Non-financial support, motivating schemes, certificates as well as opportunities to attend courses are important to motivate and support economic sustainability.

Further suggested solutions are presented by type of challenge addressed below.

Addressing water quality challenges: (i) Promote measures with the highest impact on water quality, nature protection and climate adaptation in policy documents (strategies, plans). (ii) Studies to address climate change impacts on eutrophication are needed. (ii) Promote buffer zones as an efficient and strict compliance instrument. (ii) Territories defined as water bodies with certain quality goals shall be better identified with defining land use restrictions in the spatial plans; this is the responsibility of municipalities. (iv) At farm level, the use of fertilizers has to be documented and reported. Suggestion to improve technical measures to manure management in farms are needed (lagoon type storage; concrete basements in barns). (v) National sewage sludge management strategy for Latvia is under development. It will allow to identify options for better treatment, recovery of nutrients and use of sludge as a fertilizer in agriculture. (vi) Nitrate Directive requirements through relevant requirements in national level legislation; right use of plant rotation in the fields; amount of manure to be spread on fields in legislation is set 170 t/ha, considers that manure storage meets EU requirements. (vii) Environmental protection measures as organic farming, stubble fields in winter period, sedimentation ponds near fields improve water quality. (viii) The new Dviete floodplain management plan includes measures to improve the lake water level during droughts, this might help to reduce anaerobic conditions and minimize phosphorus release. Nutrient recovery is promoted through good agricultural practices, e.g. sowing legumes.

Addressing water quantity challenges: (i) Flood risk management plans should include/define the measures based on an assessment of waterbody's quality and quantity, and analysis from different sectoral perspectives. "Align basin plan measures and financial sources, then practical acceptance will be high". (ii) Economic motivation to reduce water use, e.g. by introducing a tax for water resource use exceeding 10 m^3 daily. (iii) Better maintained melioration systems to improve soil quality will increase field

productivity and allow to reduce the size of agricultural lands somewhere else where they are less productive; Melioration ditches to keep water for longer periods and floodplain acts as receiver of biogens and maintain conditions in floodplain areas. (iv) There is complete water exchange with Daugava river, nutrients are taken by floods from Dviete floodplains back to Daugava main river. It is important that Dviete works as a pond for Daugava during spring (unique ecosystem service due to floodplain features).

Addressing nature conservation challenges: (i) Apply clear standards for melioration systems to make synergies with nature protection needs.(ii) Compensations for specially protected biotopes maintenance shall be widened as it would enable more measures to be implemented. (iii) Agricultural territories shall be identified with specific restrictions in the spatial plan. (iv) The clean-up of the Podvaze river (Daugava river catchment) carried out to avoid negative impact on protected biotope of Klaucani-Priekulani lakes system (habitat for floating Water-nut) including, sedimentation ponds, strengthening banks of river to reduce erosion, water level regulating installations, maintaining natural flow of river, removing fallen trees by hand, represents a good practice example.

Addressing climate change challenges: (i) Better support and information on how to reduce GHGs emissions in synergy with other policies. (ii) Better information on climate scenarios for particular catchment areas.

4.2.12 Case focus Sweden

4.2.12.1 About the informants – background and experience

Five informants were interviewed, two women and two men (and one N/A). All informants have education on PhD level. All work in either the public or private sector on national or regional level. Water management is a main area of expertise for all the informants. In addition, several have nature management and agriculture as a main area of expertise, while none included spatial planning as an expertise. Almost all participants have addressed water quantity and quality challenges in their work to an intermediate or high degree. All have experience with climate and nature conservation challenges from their work, but some to a lower degree.

Many of the informants have experience with several of the various agricultural and hydro-morphological measures listed. All the informants have intermediate or high knowledge of policies within water management and environmental management. Most also have knowledge of policies related to agriculture and climate change, but there is little knowledge on spatial planning policies.

4.2.12.2 Overview of important legislation for NSWRM

Legislation at different governance levels: Most of the informants said that legislation within water quantity, quality and climate change are all on national level, as legislation is generally on national level in Sweden. It was however commented that "national level will provide guidance on water quantity, but regions will be responsible to follow up and enforcing policy developed on the national level". Most of the documents mentioned are cross-sectoral on national level.

Important legislation, policy documents

EU level: The *EU Water Framework Directive (WFD)*, including the WFD Common Implementation Strategy, was highlighted by several informants. It was described as a "long-run legal obligation" and requiring "measures on local, regional and national scale with plans on how to reach good ecological status by 2027" for all water bodies across Sweden.

National level: The *Environmental Code (Miljöbalken)* is a legislative framework described as "the foundation of what you are allowed to do in the landscape". "Own and manage ditches" is a guidance document for improved management of ditches, less ponding, drainage of agricultural fields, water retention/buffering, production and less nutrient losses.

Regional level: *Rules on fertilizer and manure spreading in nitrate-sensitive areas* (south and coastal Sweden) were mentioned as well as "*Land drainage ban*" – a ban on draining soil in South Sweden.

The following sections consider whether and to what extent informants perceive legislation to include various environmental concerns, followed by the situation and perceptions of communication aspects.

Water quantity: The informants had differing views on whether the legislation includes water excess and shortages to no, low or high degree. Most said that in-field water retention measures are indirectly included to a low or intermediate degree.

Water quality: Similarly, the informants had very differing views on whether the legislation directly or indirectly includes water quality concerns to no, intermediate or high degree.

Most said that **sustainable agriculture, nature conservation** and **climate change mitigation** is indirectly included in legislation, but to varying degree.

Support for water and nutrient use efficiency: Many of the informants said that they didn't know whether water use efficiency has support in the legislation/policy, and the ones who did, had differing views. One commented that "neither water nor nutrient efficiency is supported in national legislation". It was however mentioned that national policy includes recommendations on nutrient use, and that N and P is often so expensive to use that it has to be exact and efficient.

Support for economic sustainability: Informants said that financial support was the most important type of promotion of economic sustainability of technologies on farm and small agricultural catchment level in policy/legislation. A few also said that penalties and legal framework promotes this. Voluntary action was also considered important, while there were mixed opinions on penalties and legal framework. It was commented that "legislation gives a frame" for nutrient application based on distance from water courses, while subsidies on measures like cover crops and buffer strips "can enhance a behaviour".

Monitoring of economic and environmental sustainability: There were not enough answers to say anything about the monitoring of economic and environmental sustainability on farm and catchment level.

Effectiveness of communicating policies to end-users at local level: Many informants did not know about communication of the various policies, but in general, communication was considered to be active from authorities, mainly with intermediate effectiveness.

Communication to promote water/nutrient use efficiency: While some informants did not know, others said that water use efficiency is promoted with low or intermediate effectiveness among end-users. Nutrient use efficiency was considered to be promoted mainly with high or intermediate effectiveness. It was mentioned that "there is an awareness of water efficiency but it is not well promoted", and that nutrient efficiency "is promoted from an agronomic perspective".

4.2.12.3 Gaps and compatibility issues challenging implementation of measures

Regarding adequacy of policy mechanisms, in summary, the majority of the informants agreed that the policy mechanisms are not adequate. Regarding compatibility, about half of the informants did not provide an answer or were unsure of how to respond. Those that responded provided intermediate compatibility. Below more detailed perspectives on challenges, gaps and incompatibility issues are presented.

The informants ranked challenges to implementing soil management measures and structural measures, including the option to fill in other explanations (Figure 4.51, Figure 4.52). Regarding perceived challenges for implementing soil management measures, views differed among the participants, with low cost-benefit, administrative barriers and land ownership ranked as high impact by more informants. Regarding perceived challenges for implementing structural measures, only three informants provided

answers, and the same barriers as for soil management measures were ranked as higher impact.

Figure 4.51: Ranking of challenges /reasons for weak implementation of soil management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

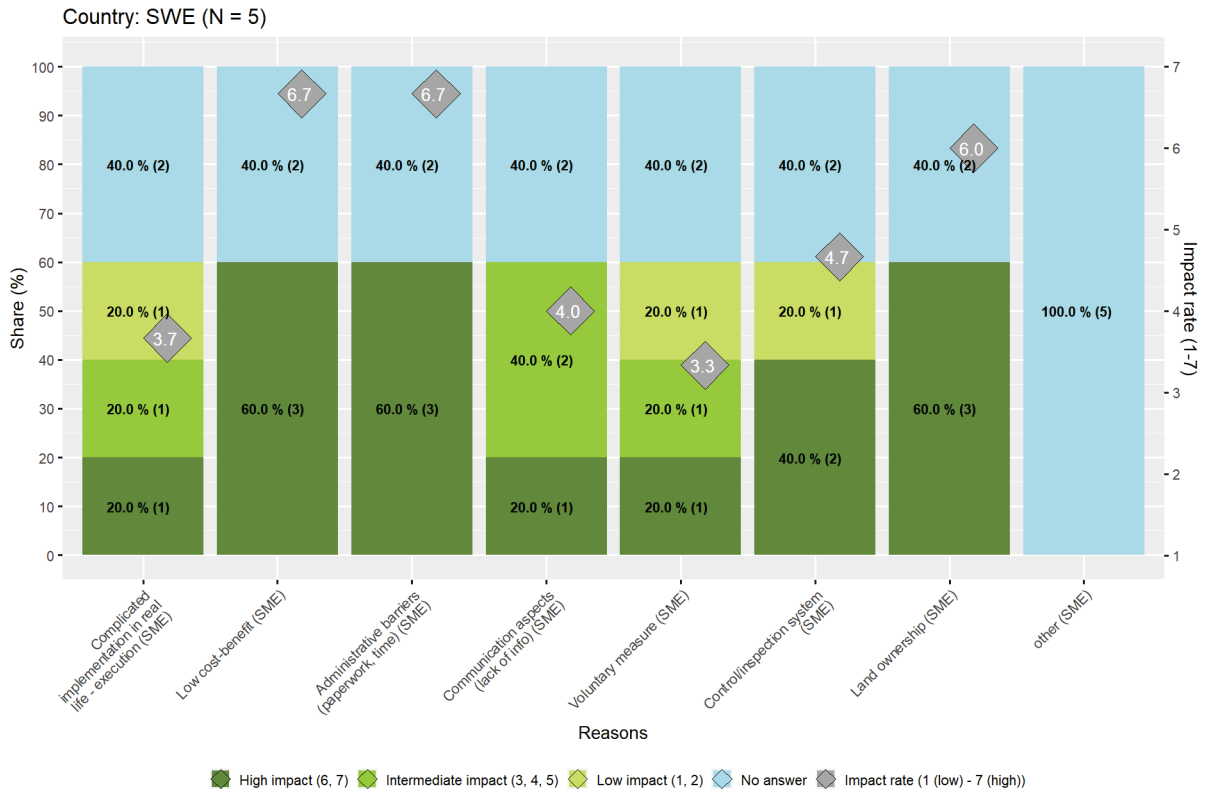


Figure 4.52: Ranking of challenges /reasons for weak implementation of structural management measures by end-users. The survey question included seven suggested options and the possibility to identify other alternatives.

The following describes the informants' perceptions and examples of barriers, gaps and compatibility issues.

Governance

Insufficient, incoherent legislation: (i) While there is no single policy covering all these aspects, there are some minor linkages between the different aspects such as CAP, WFD, Habitat directive, etc.. Water legislation for spatial planning and water legislation for agricultural areas has to be synchronized and followed better. The targets for NSWRM supported through the RDP are not estimated to reach WFD and BSAP goals. (ii) Most of the national policies are intended for single purposes, compatibility is generally not a criteria, i.e. there is no policy that covers all the areas of concern. There are different interests such as agriculture, forestry and other policies that might not be compatible with the environmental legislation.

Insufficient integration, incoherent sectors and authorities: Flood and drought management is still not sufficiently coupled to nutrient management, and agricultural production issues are not well connected to either topic. (ii) There is a disconnection between programmes of measures and on-farm actions. Furthermore, policy objectives differ between sectoral polices, e.g. the WFD aiming for good status in all waters vs. production of food and expansion of cities. (iv) Issues of compatibility between agriculture and interests of biological diversity (environment). Different aims – economic growth vs sustainability; build more vs. protect agricultural soil.

Insufficient administrative capacity, competence and knowledge: Excessive reporting requirements.

Other gaps and incompatibility issues are presented according to type of challenge below.

Water quantity challenges: There is more focus on removing water from the fields than on water retention. Water retention measures in cities are under-dimensioned.

Nature conservation challenges: Competing objectives/aims: Agricultural production vs. water/nature protection.

Climate change mitigation and adaptation challenges: There is a disconnection in scale between climate actions and agricultural measures. For water retention measures such as ponds there could be a compatibility issue between water quality and climate change assuming the ponds are releasing methane.

4.2.12.4 Suggested solutions to poor compatibility / weak implementation of NSWRM

The informants ranked various suggested ways to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures (Figure 4.53). Financial support, de-bureaucratization and informal education were ranked equally high.

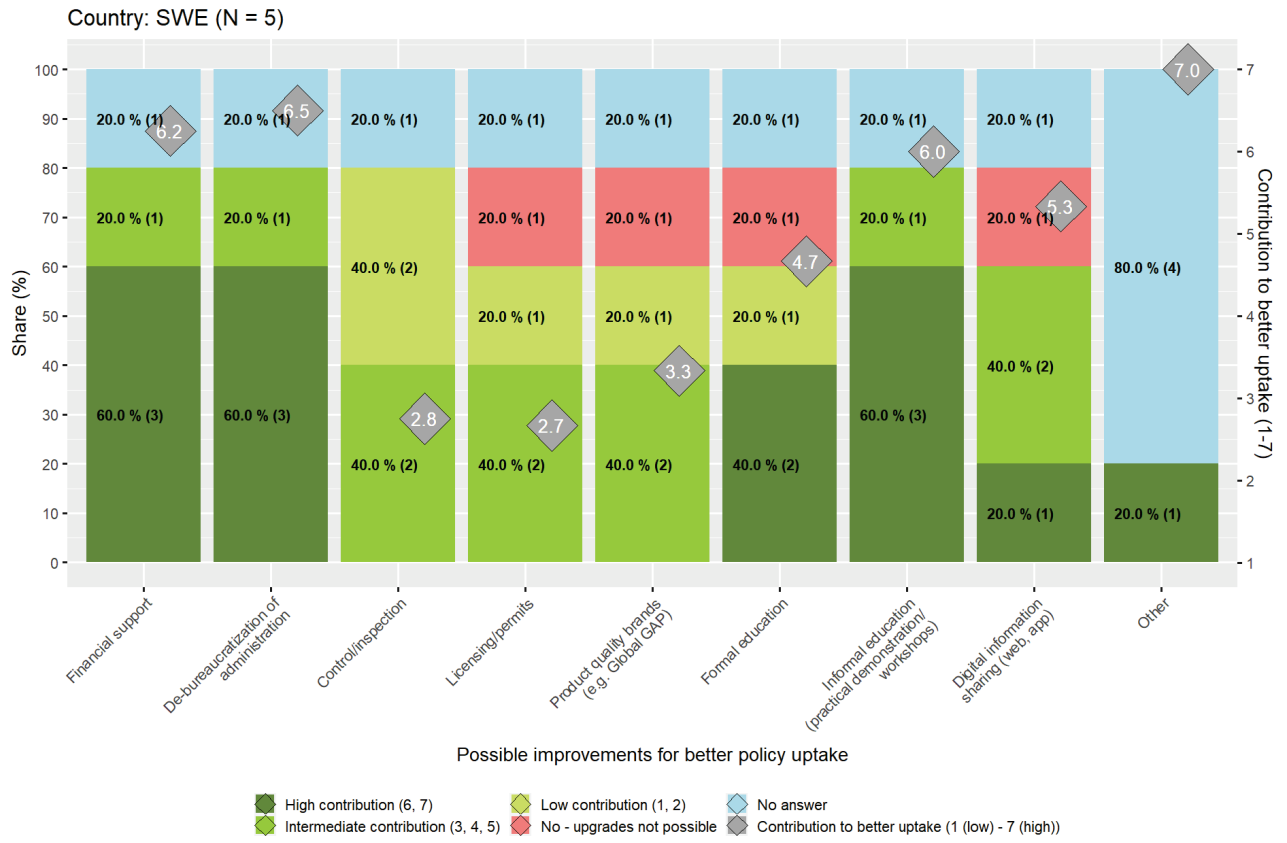


Figure 4.53: The figure illustrates the information provided by the informants as response to the question on how to upgrade policy / legislation for improved uptake implementation of water and nutrient retention measures.

Additional qualitative suggestions by the informants for improved implementation are presented below.

Governance

Upgrade legislation: There is a need for both national and international legislation to incorporate the different aspects, although it is a quite difficult /impossible task.

Efforts for better coordination and coherence between sectors: (i) Integration of the different aspects when developing policy or legislation on national level; Identify common goals. (ii) Require any policy addressing a single problem to include evaluation of possible impacts on the others. Using a holistic perspective of the task that should be carried out. (iii) Closer ties to agencies with responsibility for biodiversity.

Efforts for improved administration, competence and knowledge: Make sure the design is not counteracting the goals.

Policy instruments

Improved financial mechanisms, increased financial support: Financial support to landowners and improved governmental strategy.

Efforts for awareness, education and communication: Brochures and field visits with advisors, better training for farm advisory services; Need for more knowledge and experience transferred to local actors.

Other suggested solutions are presented according to challenge below.

Addressing water quality challenges: Constructed wetlands are a very popular measure for nutrient retention, mitigating hydrological extremes and enhancing biodiversity. Floods directive implementation seems to work.

Addressing water quantity challenges: (i) Implementation of sedimentation dams or smaller wetlands for nutrient reduction to downstream surface water bodies. Max N-application rates affect N-losses. (ii) Financial support for leaving buffer strips in agricultural land has been a successful measure to reduce nutrient impact, although it is important to state that the land left has been compensated financially.

Addressing nature conservation objectives: Promotion of constructed wetlands by agricultural advisers has been an important factor in their uptake by land managers.

Addressing climate change mitigation and adaptation objectives: Management through national programmes including the "Greppa Näringen" initiative - an agricultural counselling service on climate and environmental measures represents a best practice example.

5 Discussion

5.1 Financial support

As a motivation for implementing measures, the financial subsidy is the type of support most often mentioned by the informants. There are only minor differences between individual bio-geographical regions, where financial support is in second place in the Pannonian region. With sufficient financial support, it can effectively help to increase the scope of implementation and vice versa. However, there are cases where the implementation of the measure stopped when the funding was terminated. The fact that the cost-benefit ratio is important and influences the implementation of measures was confirmed by the informants as they chose it as the reason with the most significant effect on the implementation of soil management and structural measures (Figure 4.10). Financial support/subsidies were also identified as the most important type of support used for promotion through policies and legislation (Figure 4.12).

Interestingly, limited financial funds are not among the most critical barriers to policy coherence (10th place) or solutions to increase synergies (8th place) between policies. Most proposals aim to increase support, and only a few informants expressed the need to reduce financial subsidies (Table 4-6). The informants ranked financial support as a measure with a high contribution (6/7) to improving the adoption and implementation of water and nutrient retention measures (Figure 4.14). Most informants associate additional funding with more formal and informal education and raising awareness of the importance of the measures among users and the general public. In this context, additional funding of measures that contribute to the sustainable use of land (manure management for biogas production, conservational tillage, cover crops, buffer strips, agro-forestry, bio-char) is mentioned above all. Funds also appear in connection with upgrading sectoral government strategies, increasing control, strengthening research, and simplifying the conditions for establishing measures. Compensation payments for loss of income (flood areas, landscape fragmentation) and financial rewards for legally (mandatory) implemented measures are also often mentioned, which would contribute to limiting the grey area of activity of land owners and managers (i.e. water permits). Greater financial support for investments in green (wetland, stormwater pond) and grey (water reservoir) water retention systems was mentioned several times by informants.

The possibility of state co-financing measures, supported by local communities as necessary and effective in terms of scope and results, is also proposed. Among the more interesting proposals is the so-called "retention package" scheme, which, with good financial support, would motivate nature-friendly water retention in agricultural areas. This scheme would include various agri-environmental measures for soil management and structural measures to preserve or arrange landscape elements that affect the water and nutrient cycles. Measures integrated into the scheme would have a multiplicative effect and address basic food production, permanent preservation of the fertility of agricultural land, preservation and improvement of water resources, and ensuring a suitable income level of agricultural holdings. At the same time, they have a favourable effect on the biodiversity of agri-ecosystems and enable gradual adaptation to climate change. Examples of measures that could be part of the so-called "retention package" scheme are existing or restored wetlands or floodplains or river meandering or beavers' ponds as structural measures, in combination with strip-cropping or contour cropping

or sustainable agricultural practices (no-till, min-till, low-till) or controlled traffic or forested field buffer strips along rivers as soil management measures.

5.2 Knowledge support and public media communication efforts

Informants evaluate knowledge support as the second most important and often concomitant form of support, which is intended to broaden the horizons of all types of stakeholders. The effects are gradual, and often years pass before a change in thinking and practice occurs. Financial supports are effective in rapid transformation, but at this point, the story of environmental mainstreaming of measures is only at the beginning. The strengthening of general awareness and theoretical and practical knowledge about water and nutrient retention measures strengthens awareness and brings long-term effects and changes in established approaches in practice. At the same time, there are only minor differences between the individual bio-geographical regions. Informants in the Pannonian region mentioned the transfer of knowledge most often. In the Continental region, it is placed in second place after financial support and in the Boreal region in third place, far behind financial support and immediately after authorities' organisation and the preparation of government strategies (Table 4-8).

The informants pointed out the importance of the decision-makers knowledge about the environmental concerns discussed in formulating policies at higher government or supranational levels with impacts on lower levels (municipality, watershed) (Table 4-3). Many informants thus stated that the lack of knowledge is noticeable when assessing the costs and benefits of measures, and as a result, they are more challenging to implement in practice. In implementing policies, landowners and farmers appeared to be the biggest obstacle (Figure 4.9), while lack of information or poor communication also appeared as an important reason for the poor implementation of soil management measures (Figure 4.10).

In order to achieve greater policy effectiveness in communicating water and nutrient retention measures and thus their implementation, the informants suggest any form of meetings (Table 4-5). They particularly emphasize practical demonstrations of measures, workshops and focus groups. At the same time, priority should be given to informing about the benefits of the measures. Of course, personal advice is still important, but sharing information in larger groups and between participants has a greater reach. Opinions exist that a lot has already been done, and knowledge is available and shared by stakeholders of all types.

The informants note that knowledge and communication are not the direct reason for the lack of compatibility between policies, but they are one of the solutions that can improve synergies between policies (Table 4-6). Therefore, a very strong emphasis on sharing knowledge and communication is in educating all types of stakeholders from all levels of decision-making and implementation. Informants particularly highlighted co-creation, knowledge exchange between sectors, and general knowledge about other sectors, allowing them to understand other policies' objectives more efficiently.

Of all the environmental concerns we address, knowledge is the most important type of support in mitigating and adapting to climate change, addressing water scarcity, and nutrient recovery from streams. The informants understand topics of natural/small water and nutrient retention measures as relatively new to the majority of stakeholders in

observed biogeographic regions and therefore need additional explanation and communication. However, financial support prevails in terms of importance.

5.3 Coordination of authorities in the development of strategies

Coordination of authorities in developing strategies is a horizontal type of support that also covers communication aspects between various sectors. A well-designed governance structure that engages various sectors and authorities in solving environmental concerns already at the stage of design and preparation of proposals enables more effective planning. This means that we can already identify the challenges of other sectors at the stage of drafting documents and not at the stage of practical implementation of measures, thus avoiding difficult unplanned situations. It also enables the positive effects of the measures to be extended to other sectors.

There are only slight differences between individual biogeographical regions. Informants in the Boreal region mentioned the coordination of authorities and strategy development (2nd place after finances) and communication between sectors (6th) support types most often. In the Continental and Pannonian regions, the mentioned support types are ranked third (authorities) and seventh to eighth (communication), respectively (Table 4-8).

From the point of view of the compatibility of national policies (water, agriculture, space, nature, climate) in the retention of water and nutrients, the informants assessed the topic of flood protection and in-field nutrient retention measures as the most compatible (Figure 4.6). Both topics are extensively included in the framework of the WFD river basin management plans with the goal of achieving a good chemical and ecological status of waters. Flood protection is part of the Flood Directive and, thus, the spatial policy. Nutrient retention is extensively included in implementing the Nitrate Directive, which is firmly incorporated into CAP measures. In the opinion of informants, there are still unused potentials for upgrading for greater compatibility of policies on all topics, but especially in the remaining three topics (water scarcity, water retention in the soil and nutrient recovery from streams). The informants estimate that an improvement in the administration of the authorities is certainly possible, as laws, programs and strategies are very ambitious at the declaratory level, but they often run out of breath when implemented in practice (Table 4-3). This is manifested in poor management and a lack of financial resources, personnel and equipment.

The informants note that most of the differences that weaken the coherence of policies occur due to uncoordinated aims, principles, views and priorities between sectors as shown in Table 4-2 and Table 4-6. Among the examples are i) the provision of large quantities of cheap food through intensive agriculture, which harms biodiversity, soil and water; ii) standards for nature conservation and environmental protection limit the development of agricultural holdings and the increase of food production (Table 4-6) while climate adaptation, energy and spatial planning strategies often overlook the importance of previously mentioned topics. The fact that it is necessary to coordinate better the actions of the authorities between sectors and at different levels is also shown by the fact that national legislation/plans/programs and the implementation of policies, regulatory agencies and control organizations are recognized as important barriers to the implementation of measures, immediately after landowners and farmers (Figure 4.9).

5.4 Upgrade legislation and provide administrative support

Regular updating of legislative documents and provision of administrative support in its implementation is crucial from the point of view of users and implementers of measures. This primarily means that the authorities understand the conditions and needs of the implementers of measures and administratively facilitate their access to financial support, knowledge, and professional assistance when deciding to implement measures. It is a horizontal type of support that relieves landowners and farmers of the administrative burden. In addition, the rapid and prompt change of legislative documents encourages and enables the implementation of measures involving tools, techniques and technologies in the early stages of development.

Administrative burdens represent an important barrier to the successful implementation of measures, especially concerning EU biodiversity strategy goals. Power struggles among interest groups reduce the effectiveness, efficiency and coherence and seem to hamper public acceptance of the CAP. The literature indicates that the CAP has a minor effect on land-use changes, mostly reinforcing existing trends. CAP seems to slow down the speed of changes in farm structure (increase in farm size) but provides insufficient support for maintaining small farms. Effects on farm management are mixed, as the CAP both supports intensification and enhanced agrochemical use (especially in new Member States (MSs)) and limits them through regulations and financial incentives like Agri-Environment-Climate Measures (AECM) (Pe'er et al., 2017).

From the point of view of the impact on the implementation of water and nutrient retention measures (NSWRM), the informants singled out water management and environmental protection as essential policies (Table 4-1). Therefore, the most crucial legislative documents are the EU Water Framework Directive (WFD) with River Basin Management Plans (RBMP) and the EU Common Agricultural Policy (CAP) with Rural Development Plan (RDP) or Strategic Plans.

According to the informants, all topics discussed are moderately well included in the legislation. However, in the future, greater integration of topics such as in-field water retention in agri-production, nutrient recovery from streams and climate change mitigation and adaptation is expected. Furthermore, informants estimate that the authorities should place greater emphasis in legislative documents on both the level of support and the effectiveness of the promotion of water and nutrient use efficiency (Figure 4.13). Despite good intentions, with financial and knowledge support, the current system has shown partial inefficiency in some of the OPTAIN project case study areas. This is manifested i) by the rejection of the measure due to the so-called "excessive bureaucracy" and ii) in the participation in trainings and workshops only by the same "convinced farmers".

Informants note that the legislator updates legislative documents too slowly and does not follow the ongoing development of sustainable and digital solutions. They also expect that, in some cases, the implementation of solutions is facilitated by simplifying the requirements for obtaining documentation, as extensive and demanding procedures take time, discouraging the implementers of measures from deciding to implement measures (Table 4-3). Among these informants, they most often mention infrastructural measures ranging from hydro-morphological (water retention) to

agricultural (irrigation systems, reuse of wastewater) and spatial (replacement of land). Informants propose reviewing measures objectives from the perspective of conflicting policy goals. One such measure is purchasing agricultural machinery for sustainable soil cultivation, which also requires positive economic effects such as increased agricultural production. An increase in agricultural production will meet economic goals but can adversely affect environmental goals.

5.5 Support efficient measures with professional advice and technical support

Support in the form of the implementation of professionally proven effective measures with expert advice and technical support increases the user's confidence in the effectiveness of the measures, confirms the correctness of the user's decision and increases confidence in the decision-making system of the authorities. Furthermore, if all three benefits are achieved, the user becomes the best promoter of the action among potential new implementers of measures (landowners, farmers).

Informants among policies at the highest level observe different approaches to determining the effectiveness of measures and methods of professional advice. Thus, they propose that (i) measures should be included in the programs/plans only based on data, (ii) new knowledge from science should be included in the process of preparation of measures, (iii) technical assistance should be provided at the implementation phase (iv) studies of the impact on the effectiveness of the implementation of measures should be carried out, (v) support for the implementation of beneficial activities should come from several responsible sectors (Table 4-2). Otherwise, the informants note that the differences in approaches between policies are decreasing over the years. An increase in awareness and implementation of many new measures is observed, but there is still much room for improvement.

However, the opinion that the decision-making system is still most familiar with the grey infrastructure and not so much with sustainable environmental solutions (restoration, renaturation, winter and non-winter cover crops) still dominates, which indicates the neglect of expert knowledge and solutions in the light of adaptation to climate change. When deciding on the inclusion of measures in the implementation program (WFD RBMP, CAP RDP, CAP Strategic Plans), decision-makers must emphasise the analysis of economic sustainability, especially from the point of view of cost-effectiveness, which should become the criteria for setting priorities. This also applies to nature-based solutions, as contractors and decision-makers are interested in the effectiveness of measures and maintenance costs. Multi-purpose, geographical and temporal aspects should be considered to achieve greater efficiency. In order to achieve adequate professional support, trained experts are needed.

5.6 Spatial planning support

When placing large or small-scale hydro-morphological measures (renaturation, wetlands, reservoirs), integrated, comprehensive, inclusive, multi-sectoral and long-term planning is the key to successful implementation. Among the three biogeographical regions, spatial planning as a possible support type for placing measures for water and nutrient retention was mentioned only in the Continental region (Table 4-8). However, informants from all regions point to a lack of support at the local level, be it the lack of

interest of local authorities in implementing measures, the lack of interest of landowners and farmers, or the lack of financial resources for implementation (authorities, landowners) or opposition from the general public.

Support for previously controversial projects often increases in the face of environmental disasters and extreme weather events (floods, droughts, pollution of water bodies). Such an example is the flood in Germany and Belgium in July 2021, which also showed the absence of sound spatial planning at all administrative levels, where the public now demands the implementation of flood control plans. Another example is from Norway, where the demands of the public to eliminate eutrophication in lakes convinced local and regional authorities to take practical actions, including interventions in spatial planning.

Only a small part of the informants work directly in the spatial planning sector (7%), but almost 82% state that this is part of their work responsibilities. However, the informants' knowledge of legal documents on spatial planning is the lowest among studied environmental concerns, which applies to all three biogeographical regions. Given that all the professions included in the analysis operate in the physical space (landscape) of small agricultural watersheds, this is problematic. However, by ranking local municipal spatial plans in second place and national legislation on spatial planning in fourth place, the informants showed that spatial policy has a great influence on promoting or hindering the implementation of measures to retain water and nutrients in the landscape (Table 4-4). The informants classified the spatial planning communication strategy as the least effective of all the policies studied (Figure 4.11) and, at the same time, suggested its improvement with more frequent meetings of various stakeholders.

Informants from all three regions note that among all policies, spatial planning is the least comprehensive in dealing with climate change, water quantity and water quality concerns (Figure 4.7). The main barriers in spatial planning are conflicting goals with other policies, lack of communication between stakeholders, and low integration of environmental policies. Such an example is the determination of new buildable areas on agricultural land and so-called “poor wet soils” (i.e. wetlands) (Table 4-3).

5.7 Solutions for adaptation to climate change

Climate change alters the patterns and distribution of precipitation with an increased frequency of periods of water scarcity, high temperatures, and locally excessive amounts of water. However, when considering the increasing numbers and durations of extreme events, many regions are not prepared to the extent that they could comprehensively mitigate the effects and adapt to these new conditions. Therefore, according to the informants, the first step that authorities at all levels of administration must take is to analyse the situation and expectations and prepare strategies that should also include measures to retain water and nutrients in small agricultural river basins.

A change of view on the role of water management as an engineering science is also necessary. This includes a shift from grey infrastructure to green, natural and semi-natural nature-based solutions where possible. For example, a redefinition of the importance of river beds and drainage ditch management is necessary. Adaptations are also needed in managing water bodies (WFD RBMP), as water regimes are changing due to climate change.

Agriculture (CAP RDP, CAP Strategic Plans) will also have to prioritise dealing with the drought and help the most vulnerable sectors to adapt. Adaptations to the new conditions must address changes through cropping and tillage practices, crop varieties and infrastructure development. Fixed instructions for the implementation of measures and date limits for the use of fertilisers and pesticides will need to be reconsidered, and local supervisors/managers of the implementation of the measures may be introduced, who will judge the cost and benefits based on the knowledge of the local environment and temporarily adjust the rules (derogate) so that agricultural production and environmental benefit will be optimal. Many agricultural practices suitable for dealing with climate change are already implemented on a smaller or larger scale but are not yet widespread in general practice or are often not accepted by farmers. There are many reasons why decision-makers should address the lack of dedicated water and nutrient retention measures within the existing legislative documents/programs (CAP RDP or CAP Strategic plans). Examples of such reasons are the lack of financial support for acquiring new technology and infrastructure and the insufficient dissemination of cost-benefit knowledge about the studied measures.

Of course, regions and the need for measures differ depending on local environments' characteristics of climate, soil and water regimes. For example, in many watersheds, the need to drain water from agricultural land exceeds the need to retain it for successful crop production and to protect residents' property.

Due to the non-systematic, ad-hoc approach to dealing with the consequences of extreme weather events, measures are sometimes taken spontaneously and therefore are insufficient, inappropriate and less effective. To a large extent, there is a lack of a comprehensive solution for water surplus in all three studied biogeographical regions, where the Boreal and Continental regions stand out. Comprehensive solutions for water scarcity are most needed in the Pannonian and Continental regions.

6 Recommendations

Deliverable D6.2 aims to derive general and specific policy recommendations and options to improve balance among different levels of governance and identify the best possible applications of these options in strategies for agricultural climate change adaptation from a soil water and nutrient management perspective. Legislative recommendations are formulated so policymakers may adopt them at different levels for future harmonisation of water and agricultural policy and other cross-sectoral policies. The report includes recommendations for EU mechanisms such as the Common Agricultural Policy (CAP) (Rural Development Programme, Strategic Plan), Water Framework Directive River Basin Management Plans (WFD RBMP) as well as climate change impact through EU Adaptation Strategy and member states National Adaptation Strategies (NAS) and National Adaptation Plans (NAP). The recommendations are grouped around two main analytical categories: (i) governance and (ii) policy instruments.

6.1 Governance

6.1.1 Upgrade legislation for improved coherence of agri-environmental policy objectives

In this context, we recommend decreasing the complexity of bureaucratic requirements, increasing access to free-of-charge advisory services addressing environmental concerns at the farm and catchment level, and revising regulations involving international teams of experts from the environment and agriculture.

Further, more concrete recommendations are needed from Natura 2000 and Habitats and Birds Directives with explicit consideration of other environmental concerns/targets (e.g. low-flow requirements, flooding frequencies). This includes a definition of a legal baseline against large agricultural areas and promoting heterogeneous landscapes with ecological elements and structural measures that form healthy ecosystems. Land-use plans for municipalities should include agricultural regulations more specifically.

Additionally, areas vulnerable to soil erosion and surface runoff should be identified and considered for stricter regulation (e.g. reduced application of organic manure; no-tillage in winter; grassed waterways; greening – in winter and summer.

Different rules and different understandings of similar terminologies challenge successful agri-environmental management. Revision of related regulations should involve decision-makers, users and disciplines in both sectors (environment and agriculture). The respective agencies of ministries may take responsivity for working groups to provide input when legislation is being revised. Common rules and regulations would make collaboration more accessible and improve knowledge on the subject.

Legislative documents that should be harmonized or upgraded more often in order to improve the uptake of measures are CAP (agriculture) and WFD (water management) at the EU level, Water Acts and Spatial Management or Planning Acts at the national level, and on the local level, preparation of municipal spatial plans and WFD RBMP. Therefore, we recommend that policy and legislation documents are upgraded to improve the uptake and implementation of water and nutrient retention measures. The upgrade includes properly targeted financial support, accompanied by informal

education (demonstrations, workshops) of the broadest possible population (including farmers who only receive basic payments per area), with administrative simplifications and active help to shorten the time of procedures in the placement and implementation of measures. In addition, the digitalisation of information dissemination should play an important role.

6.1.2 Better coordination and coherence between sectors and the involvement of actors

Sector policies developed in silo compartments were reported as a typical situation across case studies. Establishing inter-ministry and inter-department groups for coordination and discussion of issues related to reaching the aims of the CAP, the Green Deal, the WFD and climate change and adaptation can provide clear signals for coherent work at the different administrative levels. In order to improve cooperation and achieve policy coordination, we recommend that the individual community/society/state/region/local community as a whole should define and decide on common priorities. This would give strategy makers a clear signal and direction for coordination. Common goals are important for horizontal inter-sectoral cooperation (water, agriculture, nature, spatial planning, climate, etc.) on vertical priorities (flood, drought, nutrient efficiency, food production, drinking water). A responsible secretary (leader) at each platform needs to be appointed. The responsible sector would coordinate interactions from early draft phases, and other sectors would check whether the policy/strategy/legislation/measure meets, complements or upgrades the objectives of individual sectoral policies. When solving environmental concerns, the authorities should focus more on general policies (food policy, water policy), which include different sectors in coordination (agriculture, water management, spatial planning, nature conservation, and energy). This way, the relevant stakeholders' needs can be effectively aligned.

Reference groups for the involvement of non-governmental stakeholders on state and/or federal governance levels for a separate discussion of strategies, issues and perspectives are important. Regular meetings between the cross-sectoral ministry group and the reference group enable the exchange of knowledge and perspectives. The reference group's responsible secretary (leader) needs to be selected.

Resources available for the facilitation of the system are essential. A system of sub-basin district (catchment) committees (partnerships), as part of implementing the WFD and RBMP, contribute to improved coordination, coherence and knowledge exchange on the local level. Successful factors highlighted include the employment of a secretary to serve the municipalities, the involvement of majors and county governor in the committee board, and the involvement of representatives of key stakeholder groups as the representative in the board (observation status). The committee serves to discuss local policy priorities and strategies related to climate, agriculture, nature protection and energy as relevant in the specific sub-basin district. In addition, water-related challenges need to be addressed on catchment levels.

Furthermore, working groups organised by municipalities in the catchment to address agriculture, hydrology, water management, sewage water, nature protection, and climate change, involving municipal expert authorities, representatives from regional or national agencies, and representatives from farmer unions at the local level, should be

used to serve local coordination bodies, for exchange of perspectives and knowledge. Such working groups can be managed by a secretary employed by municipalities in the catchment. It is beneficial if the secretary represents and ensures information exchange between the working groups and sub-catchment or catchment committees.

There is an urgent need for better cross-referencing between agri-environmental strategies and water management plans. In this context, the agri-environmental programmes should be better connected with the water management plans. The agri-environmental strategies and measures listed in the CAP and national agricultural programmes should become more targeted if these refer to the principles and objectives of water management plans (WFD). Also, spatial planning documents should refer to agricultural and environmental strategies.

In areas where groundwater is a vulnerable resource, policies addressing spatial planning, irrigation, and efficient and sustainable extraction need careful coordination regarding the local agricultural situation and conditions. In addition, users who pay for water require a proper and adequate supply.

Strategies are often perceived as national or supranational (EU, OECD, UN) documents (EU Adaptation Strategy, Member States National Adaption Strategies and Plans), later transposed into national legislations, and - by becoming legally binding - authorities can pursue strategic goals. However, we recommend that national authorities encourage (administratively and financially) regional and local communities to prepare their own local environmental, water, agricultural, nature-specific or inter-sectoral strategies. The aims identified by these strategies can serve as a foundation and direction for implementing local communities' future development. Furthermore, if communities have their local specific strategy, they can more efficiently invest the time and money needed for change. For example, with the help of national or regional authorities' communities can candidate and acquire funds through regional and urban development policy mechanisms of European structural and investment funds (ESIF) (i.e. European regional development fund, European social fund, Cohesion fund, European agricultural fund for rural development, European maritime and fisheries fund). ESIF funds play an essential role in targeting investments to (i) promote a transition to a more resilient environment; (ii) circular economy; (iii) support the effective implementation of EU Member States' Rural Development Programmes (RDPs) by generating and sharing knowledge; and (iv) support economic development, such as helping farmers and small businesses, improving education opportunities, fighting poverty and promoting sustainable development.

Climate change challenges authorities if there is a lack of a comprehensive solution for water surplus or deficit. This means that authorities should invest in comprehensive, integrated catchment analysis (under WFD RBMP) and cooperate with all sectors to define potential locations and the required extent of the water retention measures to mitigate climate impacts and adapt sectors. This could be solved especially with the combination of specially dedicated flood areas and wet retention reservoirs that would efficiently reduce storm waves (financial support from European structural and investment funds) and secure water for irrigation in drought (financial support from CAP Strategic Plans). However, even agricultural land and forests with optimal management have maximal limits in retention capacity. Therefore, strategies must be prepared at the

lowest possible local administrative level. Needs and solutions can thus be best adapted to land users and natural conditions.

6.1.3 Improved administration, competence and knowledge

In this context, easy access to environmental data is essential for identifying appropriate measures based on monitoring results and justifying measures' implementation to the end-users. However, the level of access to relevant data varies across the case study countries and is, in some countries, still very low. User-oriented databases presenting water quality and quantity data, including groundwater status, is highly encouraged for more efficient and competent administration. Easy access to data also contributes to transparent decision-making and trust. To bring transparency and secure availability of public data, the EU INSPIRE Directive came into force, establishing an infrastructure for spatial information in Europe to support Community environmental policies and policies or activities which may impact the environment.

Similarly, further work needs to be invested in specifying the criteria and data used to recommend NSWRM implementation in specific areas. Geospatial information coupled with modelling should be used to identify appropriate sites for NSWRM. This can contribute to increased understanding, acceptance and competence among experts and actors and significantly improve evidence-based decision-making.

Further work is necessary to improve and ailing indicators used for agri-environmental and climate schemes (CAP RDP or CAP Strategic Plans). For example, (i) increase the content of organic matter (carbon) in the soil and reduce CO_2 emissions from the soil (carbon-neutral farms), (ii) improvements of the water balance of the soil/catchment with NSWRM measures (conservational tillage practices), and (iii) improvements of the nutrient balance in the soil or at the farm gate with fertilisation plans based on soil analysis.

Further, there is also a need to develop programmes of measures to address significant water quality and/or water quantity challenges that target specific local, regional or bio-geo-regional areas. For example, a programme of measures in an area where water quality or quantity is perceived to be challenged by local actors will receive more support. Such sensitive area-targeted programmes can be identified with reference to agricultural strategies, climate adaptation strategies and river basin management plans or strategies. Programmes should be co-financed by the state authorities.

High bureaucracy and complex administration levels are perceived as barriers to implementing NSWRM. The governance system should therefore specify roles on local and regional levels responsible for: i) supporting farmers directly in application processes and ii) active and professional agronomic advice with opportunities to provide feedback. This recommendation builds on the perspective that implementing a measure is not the burden of the farmer or landowner alone. The state should financially support such local administrative support.

Because measures' environmental and economic long-term effects are uncertain, it is recommended to undertake studies to address different socio-economic, socio-cultural, and environmental effects of specific practices. For example, studies can be undertaken on selected farms in collaboration with the individual farmer. Such farms can serve as demonstrations of good practices. Priority should be given to effective and also

expensive measures, such as buffer zones. Studies can then justify better measures required to receive CAP support.

Additionally, spatial planning needs to consider a sufficient level of water retention in the landscape (soil, plant canopy, natural, semi-natural and artificial retentions). Finally, local communities/municipalities' spatial planning needs to include and address the impact of agricultural areas on water and nutrient retention and other land use types in the area on agriculture.

There is a concrete need to increase the use of digital tools in spatial planning to reduce the impact on soils. Programmes for water and nutrient retention should use tools such as GIS (geographic information system) to improve spatial planning. Land use that involves soil sealing (such as concrete or pavement) will increase runoff. This can negatively impact agricultural areas and needs proper consideration. In spatial planning, construction that involves soil sealing should be approached carefully in active cooperation with water management and agricultural experts, as well as land owners and farmers from individual catchments.

In relation to spatial planning, it is essential to improve the visibility and position of individual sectors in spatial planning documents on national, regional and local governance levels. This is especially important for agriculture and water management, but not only for more visible topics such as flood and irrigation management. Spatial planning must also consider landscape water retention (soil, plant canopy, natural, semi-natural and artificial retentions) to a sufficient level. After all, it is about comprehensive water management in the landscape/ecosystem. In this regard, local communities/municipalities' spatial plans should also include agricultural regulations, mainly by defining protection areas due to the retention capacity of the land/ecosystems for water and nutrients. In spatial planning, construction (soil-sealing) should be approached thoughtfully and carefully in active cooperation with water management and agricultural experts, land owners, and farmers from individual catchments. Presenting the position of different sectors in spatial planning contributes to the increased understanding of issues that needs consideration.

In order to ensure that measures involving cross-compliance or conditionality mechanisms are implemented correctly, several countries require a certain level of control. However, there are often challenges related to administrative capacity at the authorities responsible for the enforcement, especially on the regional and local levels. In order to ensure transparency and accountability, responsibility for control of measures should be separate from the authority that grants the related subsidies.

Finally, European and international platforms and networks contribute to knowledge exchange and competence. Therefore, we propose that national authorities or regional/local communities establish or connect with a formal or informal platform/networks for co-creation and mutual knowledge exchange and develop coordinated actions between policymakers, extension service field advisers and managers, landowners and farmers. Examples of such platforms/networks are:

(i) The European NWRM platform (gathers information on Natural Water Retention Measures (NWRM) at EU level) (http://nwrm.eu/).

(ii) The GWP Toolbox (learn, explore and connect on designing and implementing Integrated Water Resources Management (IWRM) action towards a water secure world) (https://www.gwptoolbox.org/).

(iii) The EU Adaptation Support Tool (Assist policy makers and coordinators on the national level in developing, implementing, monitoring and evaluating climate change adaptation strategies and plans) (https://climate-adapt.eea.europa.eu/en/metadata/portals/european-natural-water-retention-measures-nwrm-platform).

(iv) The WOCAT- global network on Sustainable Land Management (SLM) (https://www.wocat.net/en/) that promotes the documentation, sharing and use of knowledge to support adaptation, innovation and decision-making in SLM.

It is necessary to mainstream the use of the platforms into policy-making and practice to support faster and more efficiency adoption of NSWRM.

6.2 Policy instruments

6.2.1 Financial mechanisms and technical support

In this context, we recommend implementing the environmental agreements between farmers and/or landowners and the relevant governance level within a national framework. Such agreements can be developed to implement combinations of measures tailored to the farm-specific context. This is an example of policy instruments that include a combination of environmental requirements and financial support, including individual advisory. Necessary for enabling these types of agreements is a dialogue with farmers over a more extended period and the involvement of farmers' unions.

Further, EU financing mechanisms such as the CAP or national and regional agricultural programmes or strategic plans should not only cover eligible costs based on calculating economic costs of practices involving the measures compared to usual practices, as there are also indirect costs involved. When we want to change practices by creating new incentives, this should not add additional financial risk for farmers. Compensatory subsidies must be granted when incentives restrict agricultural activities (for example, compensation for the loss of productive land when widening buffer zones along rivers). It is also an option to add environmental requirements in financing schemes, but the costs of measures are usually higher and need permanent funding. For that, we recommend that the implementers of measures addressing sustainable solutions for water and nutrient retentions (e.g. conservational tillage, cover crops, buffer strips, agro-forestry, bio-char, preservation of natural vegetation areas, and beaver areas) should be given generous financial support, together with additional training. This means that EU mechanisms such as CAP (an essential source of EU funding for agri-environmental and climate measures), national/regional agricultural programmes (all countries) or State Aid mechanisms (EU) should not only pay for eligible costs based on an economic calculation between usual practice and practice involving measure (eligible costs) but should add an additional premium on willingness to change (compensation).

There is a need to strengthen technical support for machinery and equipment. Predictability needs to be ensured for investment and implementation of measures, particularly regarding machinery investment. In modern agriculture, several new

techniques are available to improve environmental impacts, such as precision agriculture, integrated production, targeted application to reduce the use of fertilizers and pesticides and organic methods. Such methods often require investments in costly equipment and machinery.

The financial period of interconnected sectoral policies (i.e. the CAP and the WFD) should be aligned. To improve synergies between policies, the financial period of interconnected sectoral policies (i.e. the CAP and the WFD) should be aligned, enabling observations, implementation and measurements of the results-based effects of the measures set policy objectives. There is also a need to establish a financial program for regional and local governments to improve land purchase mechanism application along watercourses to establish effective buffer zones.

Finally, there is a concrete requirement to advance spatially targeted funding for measures that do not allow intensive agricultural production (wetland restoration) but allow sustainable land use. The promotion of wetland/peatland restoration could be improved.

6.2.2 Strategies for facilitation and support to end users

When including the measure in the program for implementation (EU CAP or national agricultural programs, and RBMP Programme of water management measures), we recommend that the authorities also foresee the implementation of educational events and awareness-raising campaigns among key stakeholders. Furthermore, a stakeholder analysis must be carried out to transmit knowledge most effectively, which identifies the key group of stakeholders for the exposed challenge. In this context, we recommend that authorities ensure and require additional training from stakeholders for proper implementation and maintenance of NSWRM.

Further, we recommend increasing personal and free-of-charge environmental advisory services for farmers. As it is often time-consuming to apply for funding for measures, farmers would also benefit from practical assistance and advice with application forms and other documentation. In addition, several different information channels should be used to target end-users, for example, websites, electronic newsletters, brochures, farm visits and demonstrations. Finally, it is critical to ensure that the stakeholders have received the information and that opportunities for feedback are provided.

Next, practical experience is vital when adopting and implementing new agricultural practices. Demonstrations of measures in the field or larger pilot projects are good ways of improving knowledge, raising awareness, and receiving feedback from key stakeholders. We, therefore, recommend organizing smaller focus groups for practical field demonstrations of measures. This can also be for giving advice on other best practices, such as fertilizer or pesticide use, and the measures proposed by the WFD or Natura 2000.

Similarly, we recommend involving key stakeholders in research and pilot projects that implement measures to provide further opportunities for practical experience and knowledge exchange between farmers and authorities. It requires not only an active role of the user but also of the authorities, which should result in a regular exchange of experience and the effectiveness of solutions. At this point, mutual trust must be established. Through cooperation, the implementers of the measures must realise that

by changing practices on the farm or their land, they do not waste money or time but effectively redistribute it between activities. The proposed recommendation supports a gradual and not ad-hoc transformation of managing the land or the farm. The governance system must be at the service of the users or implementers of the measures if it wants to achieve the set goals (i.e. EU Green Deal).

In addition, the education of other stakeholders (farmers not implementing measures, decision-makers, NGOs) and the general public should also be financially supported. Regional or local communities should initiate more programs and measures to address locally significant problems, which should be co-financed by national authorities to support adaptation to climate change (i.e. National Adaptation Strategies and Plans).

6.2.3 Improved education, awareness raising and communication efforts

In this context, educational events and awareness campaigns are essential for NSWRM implementation among key stakeholders. Such activities need to be identified and included in the programs for measures implementation, such as the CAP (RDP, NP) or national agricultural programs (non-EU), for agricultural measures and the WFD RBMP for water management measures.

Next, it is important to tailor the approach to the different stakeholder groups to ensure that communication reaches the relevant stakeholders. We recommend that authorities actively reach out to stakeholders on their terms and disseminate planned measures using digital and social media platforms rather than only providing the requested information. This can be done in many ways, including websites, electronic newsletters, public meetings and workshops, promotional campaigns, and organising working groups and programmes in collaboration with other actors and NGOs. Authorities should also inform less engaged stakeholders (e.g. conventional farmers) and the general public about the importance of implementing measures using information campaigns through digital and traditional media.

Facilitating dialogue between sectors and actors, particularly in rural areas, is crucial for successfully implementing measures. Both formal platforms and informal networks can contribute to coordinated actions between policymakers, extension service field advisers and water managers, landowners and farmers. In addition to platforms and networks, as mentioned above, it is vital to facilitate dialogue between actors and sectors involved in implementing NSWRM at the local level. This includes communicating best practice examples to municipalities referring to successful projects. It is also recommended that farmers form their interest groups enabling individual farms to acquire relevant information with the help of the group and giving better negotiation positions in relation to other sectors.

7 Policy brief on key lessons learnt

Tackling the quantity and quality of water in small agricultural catchments provides several challenges. The number of hydrological and nutrient processes and stakeholder interactions is relatively high, so analysis is required. Issues of natural/small water and nutrient retention are impacted by the local impact of climate change or/and changes in local micro-climate. At the level of the small agricultural catchment, water management supports not only sustainable agricultural production but also local ecosystems. Affordable and easy-to-implement at the farm-level measures that link agricultural land management and soil-water management for increased nutrient uptake and water retention should be promoted in policy documents.

This policy brief aims to present views on challenges and solutions in policy arrangements that tackle relevant environmental concerns, such as water quality (nutrient recovery, nutrient uptake), water quantity (floods, droughts and retention) and adaptation to climate changes in small agricultural catchments.

The OPTAIN project aims to increase the knowledge and understanding of the multiple benefits spatially targeted combinations of Natural/Small Water Retention Measures (NSWRM) have on managing small agriculture catchments. Better management of landscapes, from which surface runoff is carried away by a single drainage system and agricultural production, is an important land use activity with significant environmental and socio-economic impact and is relevant across biogeographical regions of Europe. We are interested in determining the conditions under which NSWRM performs most effectively. Moreover, the project aims at increasing the acceptance and better implementation of NSWRM. NSWRM measures have been identified as an essential part of a strategy for reaching agri-environmental policy objectives, including good water quality, balanced water quantity, protection of natural resources, and adapting and climate change adaptation and mitigation.

This document targets policymakers involved in preparing legislation, governance arrangements and strategies. It will reflect on the European Green Deal, where the EC argues that only new measures on their own will not be enough to achieve the objectives and that the EU will ensure that legislation and policies relevant to the Green Deal are enforced and implemented in member states.

The policy brief presents results from our survey on policy arrangements in twelve European countries. It presents seven preliminary recommendations for better adaptation of the agriculture and water sectors in small agricultural catchments to climate changes and nutrient uptake. The survey was conducted in the winter and spring of 2022. In the survey, the informants were asked to share their views about challenges and possible solutions in legislation and governance arrangements that impact water-use efficiency, use of tools and techniques for water and nutrient management, and economic sustainability of technologies at the farm and small agricultural catchments level. With the survey, we addressed five environmental concerns/challenges (i) water quantity - managing excess (flood protection), (ii) water quantity - shortages of water (drought-irrigation), (iii) water quantity - in-field water retention measures, (iv) water quality - in-field nutrient retention measures, (v) water quality - nutrients recovery from streams.

The lessons are formulated for policymakers who may adopt them at different levels for future harmonisation of water and agricultural policies and other cross-sectoral policies. The document includes key lessons learnt important for EU mechanisms such as the Common Agricultural Policy (CAP) (Rural Development Programme, Strategic Plan), Water Framework Directive River Basin Management Plans (WFD RBMP) as well climate changes impact through EU Adaptation Strategy and member states National Adaptation Strategies (NAS) and National Adaptation Plans (NAP).

Key messages:

Implementers of measures addressing sustainable solutions for NSWRM require sufficient financial support while implementing the measures is subject to additional training. Barriers preventing better uptake of the NSWRM, include insufficient financial resources for installation and reimbursement of costs, the need for time and labour invested by farmers, and placing measures on private property.

When including the NSWMR (voluntary or mandatory) in the implementation programme, the authorities should also foresee educational events and awareness-raising campaigns among key stakeholders., with the aim to improve personal communication with farmers and landowners, knowledge sharing, and seeking adapted approaches that will strengthen landowners' and farmers' cooperation with the authorities.

In order to improve cooperation and achieve policy coordination as quickly as possible, the individual community should define and decide on shared priorities. This would give strategy makers a clear signal and direction for coordination. Challenges related to nutrient recovery from streams have relatively low compatibility among different policies. Therefore, more resources should be invested in cross-sectoral coordinated policymaking; policies dealing with water shortages (drought-irrigation) and environmental objectives are examples. Typically, formal and informal arenas that enable a discussion of agricultural policy goals and environmental challenges are rare or non-existent.

Policy and legislation documents should be upgraded to improve the uptake/implementation of water and nutrient retention measures with appropriately targeted financial support, accompanied by informal education (demonstrations, workshops) of the broadest possible population, with administrative simplifications and active help to shorten the time of procedures in the placement and implementation of measures. In-field water retention measures in agricultural soils and nutrient recovery from streams should be more extensively included in the national/regional legislation. In addition, climate change policy on measures for carbon management (e.g. measures such as catch and cover crops increase soil organic matter) is included or referred to in the legislation; however, the extent to which incentives are specified for climate change mitigation and adaptation efforts is not sufficient in case study countries.

It is necessary to actively and professionally advise the stakeholders on implementing the measures, educate them practically by demonstrating good practices, regularly perform measurements, analyse them and provide feedback on the results for possible adjustment of practices. Improved uptake and implementation of water and nutrient

retention measures require stimulating financial support and de-bureaucratisation of administration, followed by informal education (practical demonstration/workshops), digital information sharing (web, app) and integration of topics into formal education.

Authorities should improve the visibility and position of individual sectors and topics in spatial planning legislative documents. This is especially important for landscape water retention in relation to agriculture and water management. The effectiveness of communication strategies is low, especially concerning spatial planning, nature management and climate change adaptation and mitigation. Therefore, when the informants participating in the survey (knowledgeable public) express doubts about communication strategies, we may expect less-informed public doubts to be even more significant.

To a large extent, there is a lack of a comprehensive solution for water surplus in all three studied biogeographical regions, where the Boreal and Continental regions stand out. Comprehensive solutions for water scarcity are most needed in the Pannonian and Continental regions. This means that authorities should invest in comprehensive, integrated catchment analysis (under WFD RBMP) and, in cooperation with all sectors, define potential locations and the required extent of the water retention measures that would mitigate climate change impacts and support adaptation of affected sectors.

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Annexes

Annex F: Interlinkages between focal policies

Annex G: Case study governance structure

Annex H: The survey questionnaire

Annex I: Survey results statistics tables

Annex J: Survey results - graphical – figures

Annex A - Integration of Common Agricultural Policy (CAP) and Water Policy from the process point of view

ID	Topic	WFD – Water policy	CAP	Comment
1	PURPOSE – see also PROCESS	Purpose – general: at least good environmental status of water bodies (Art. 1 of WFD) prevents further deterioration and protects and enhances the status of aquatic ecosystems and, concerning their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems; promotes sustainable water use based on the long-term protection of available water resources; aims at enhanced protection and improvement of the aquatic environment, among other things, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances;	Purpose – support farmers and improve agricultural productivity, ensuring a stable supply of affordable food; safeguard European Union farmers to make a reasonable living; help tackle climate change and the sustainable management of natural resources; maintain rural areas and landscapes across the EU; keep the rural economy alive by promoting jobs in farming, agri-foods industries and associated sectors.	The purpose of both policies could be identified as aiming toward the maximised aggregated marginal social benefits. Nevertheless, the overall trade-off is not clearly defined, and the political dimension is missing.

ID	Topic	WFD – Water policy	CAP	Comment
		ensures the progressive reduction of pollution of groundwater and prevents its further pollution, and contributes to mitigating the effects of floods and droughts For the purpose and objective setting N° 8 - Public Participation in Relation to the Water Framework Directive – see "process" category		
2	PURPOSE - EXCEPTIONS	Common Implementation Strategy (CIS) N° 36 - Article 4(7) Exemptions to the Environmental Objectives: Extension of the deadline, in other words, good status/potential must be achieved by 2021 or 2027 at the latest (Article 4(4)) or as soon as natural conditions permit after 2027; Achievement of less stringent objectives under certain conditions (Article 4(5)); Temporary deterioration of the status/potential in case of natural causes or "force majeure" (Article 4(6)); Deterioration or failure to achieve good status/potential as a result of new modifications to the physical characteristics of a	CAP refers to the environmental objectives with the term-limited conditions agricultural production or greening component. Targeted multi-purpose payments, each with specific objectives: A 'basic payment' per hectare, the level of which is to be harmonised according to national or regional economic or administrative criteria and subject to an 'internal' convergence process; a 'greening' component, as additional support to offset the cost of providing environmental public goods	Important process related, OPTAIN project objective definition NSWRM – procedures modelling, when exceptions might be applied and achieving the target (good water status) how to achieve the target (which measures to apply) how to ensure that the objectives of the CAP are still met with the engagement of targeted payments

ID	Topic	WFD – Water policy	CAP	Comment
		surface water body or alterations to the level of bodies of groundwater, or status deterioration of a body of surface water from high status to good status as a result of new sustainable human development activities (Article 4(7))	that are not remunerated by the market; additional payment for young farmers; a 'redistributive payment' whereby farmers may be granted additional support for the first hectares of farmland; additional income support in areas with natural constraints; coupled support for production, granted in respect of certain areas or types of farming for economic and/or social reasons; a voluntary, simplified system for 'small farmers', offering payments of up to EUR 1.250. (1-3 obligatory, other member states voluntary) 30% of the direct payment allocations must fund greening components	
3	KEY AREAS OF INTERVENTION	Related to water bodies, pressures and measures, objective status as a goal, monitoring process, and reporting regarding the status of water bodies.	Agricultural holdings (farmers), monitoring the economic status of farmers, monitoring production, production safety,	Cross section is already being at least partially addressed by the EU Nitrate directive, addressing groundwater status and application of nitrates. Other issues in the cross-section of both key areas of intervention (retention, water availability, green infrastructure). "Maintain rural waters and water bodies across the EU?"

ID	Topic	WFD – Water policy	CAP	Comment
4	DEFINITION	Definition of water bodies, CIS N° 2 – Identification of Water Bodies CIS N° 9 - Implementing the Geographical Information System Elements (GIS) of the Water Framework Directive [replaced by N° 22] [replaced by N° 35	Agricultural holdings – monitoring and supervision provided by different monitoring systems (EU-wide, national) LUCAS Copernicus: Earth-observation-relevant in situ data on land cover and use throughout the European Union JRC MARS Bulletin Vol. 29 No 3 - Crop monitoring in Europe, March 2021	Established relations between Agricultural holdings and water bodies (surface, groundwater), implicit, explicit, modelling related, see also link to heavily modified water bodies (i.e. agricultural drainage systems). WISE (WFD) reporting, verification, and publication system versus, Modelling effort for the identification of the pressure/state processes between the Agri holdings and water bodies
5	DEFINITION	Identification of pressures (that shall be monitored) Monitoring following the failure of objectives Member states shall ensure that: the causes of the possible failure are investigated, relevant permits and authorisations are examined and reviewed as appropriate, the monitoring programmes are reviewed and adjusted as appropriate. Moreover, additional measures as may be necessary to achieve those objectives are established,	Agricultural holdings Pressures from the agricultural holdings are not systematically monitored.	Implementing the OPTAN - NSWRM is considered an additional measure that might be necessary to achieve the objectives defined by the WFD. A connection between the observed farm unit and the observed river basin unit (sub-basin) is necessary.

ID	Topic	WFD – Water policy	CAP	Comment
		including, as appropriate, the establishment of stricter environmental quality standards following the procedures laid down in Annex V.		
6	DEFINITION	STATUS OF WATER BODY – groundwater Groundwater CIS-CIRCABC - N° 1 - The EU Water Framework Directive: Statistical aspects of the identification of groundwater pollution trends and aggregation of monitoring results CIS-CIRCABC - N° 2 - Groundwater Body Characterisation CIS-CIRCABC - N° 3 - Groundwater Monitoring CIS-CIRCABC - N° 4 - Groundwater Risk Assessment CIS-CIRCABC - N° 5 - Groundwater Management in the Mediterranean CIS-CIRCABC - N° 6 - Groundwater Dependent Terrestrial Ecosystems CIS-CIRCABC - N° 7 - Recommendations for the review of Annex I and II of the Groundwater Directive 2006/118/EC CIS-CIRCABC - N° 8 - Methodologies used for assessing	Nitrate directive and emissions, Priority substances	Emerging pollutants, persistent pollutants, phasing out pollutants?

ID	Topic	WFD – Water policy	CAP	Comment
		Groundwater Dependent Terrestrial Ecosystems CIS-CIRCABC - N° 9 – Groundwater Associated Aquatic Ecosystems		
7	MONITORING	Combined approach (WFD article 10), all discharges referred to in paragraph 2 into surface waters are controlled according to the combined approach in this Article.	Monitoring of the use/application of: Phytopharmaceutical substances (some of them related as priority substances Directive 2013/39 as regards priority substances in the field of water policy – PRIORITY SUBSTANCES DIRECTIVE and list of banned substances for agriculture (i.e. Atrazine) Phasing out, monitoring procedures, Allowed substances subject to the limitation on protected areas (i.e. drinking water protection zones)	Priority substances in water bodies (emissions, status) – identification
8	MONITORING	Investigative monitoring (article 11): Where monitoring or other data indicate that the objectives set under Article 4 for the body of water are unlikely to be achieved, the Member State shall ensure that:	Compliance monitoring Rewarding mechanism for high environmental performance – not approved by the European Parliament (October 2020)	Investigative monitoring is identified in the case of the possible failure of the objectives. Are countries performing investigative monitoring, and to which extent?

ID	Topic	WFD – Water policy	CAP	Comment
		the causes of the possible failure are investigated, relevant permits and authorisations are examined and reviewed as appropriate, the monitoring programmes are reviewed and adjusted as appropriate, and additional measures as may be necessary in order to achieve those objectives are established, including, as appropriate, the establishment of stricter environmental quality standards following the procedures laid down in Annex V. Based on the characterisation and impact assessment carried out following Article 5 and Annex II, Member States shall, for each period to which a river basin management plan applies, establish a surveillance monitoring programme and an operational monitoring programme. In addition, Member States may also need, in some cases, to establish programmes of investigative monitoring.	Related to the removal of annual reporting on result indicators and their postponement to multiannual reporting, the Parliament: Maintained the provision of justifications to the Commission when the Member States deviated from the planned targets (Amendment 682 to Article 121). However, it now requires the Member States to submit an action plan only "when necessary". Removed the performance bonus to reward good performance concerning climate and environmental targets (Amendment 688 to Article 122 and Amendment 689 to Article 124).	
9	MONITORING	Combined approach Art. 10 – IPPC directive – replaced by the IED Directive (definition of the BAT	Food processing (including potentially) is 1st step of agricultural processing	IPPC directive, now IED Directive, is not the focus of the OPTAIN project; some components should be

ID	Topic	WFD – Water policy	CAP	Comment
		and BREF documents) – emissions		addressed if, for some specific reasons, water bodies are complex and under pressure also by industrial emissions.
10	MONITORING	Combined approach Art. 10 – Urban waste water treatment directive (UWWTD) – emissions	Emissions from the dispersed agricultural settlements could be part of the comprehensive approach.	Usually, agricultural households are in dispersed settlements, which are not the priority of the UWWTD. Therefore, some target measures focus on the agglomerations under 2.000 PE.
11	MONITORING	Combined approach – Environmental Quality Standards (EQS)	"Amendment 800 to recital 58 acknowledges the lack of, and weaknesses in, indicators for monitoring CAP results concerning environment-specific objectives (biodiversity, water, soil). The Commission already identified these weaknesses a long time ago. On many occasions, the Commission asked the Member States to tackle these issues, with little success." https://www.europarl.europa.eu/doceo/document/TA-9-2020-0287_EN.html	Amendment 800: (58a) The existing knowledge base regarding the quantity and quality of available information varies considerably to monitor the specific objectives set out in Article 6 of this Regulation. For some specific objectives, particularly for monitoring biodiversity, the knowledge base is currently weak or insufficiently adapted to create robust impact indicators, such as pollinators and crop biodiversity. Specific objectives and indicators set for the EU in Article 6 and Annex I should be based on a shared or comparable knowledge base and methodologies in all Member States. The Commission should identify areas where knowledge gaps exist or where the knowledge base is insufficiently adapted to monitor the impact of the CAP. It should use the EU budget to

ID	Topic	WFD – Water policy	CAP	Comment
				provide a common response to knowledge-related and monitoring obstacles related to all Article 6 specific objectives and indicators. It should draw up a report on this issue and make its findings public.
12	MONITORING	CIS N° 6 - Towards a Guidance on Establishment of the Intercalibration Network and the Process of the Intercalibration Exercise CIS N° 14 - Guidance on the Intercalibration Process (2008-2011) CIS N° 19 - Surface water chemical monitoring CIS N° 32 - Biota Monitoring CIS N° 33 - Analytical Methods for Biota Monitoring CIS N° 34 - Water Balances Guidance	Same as above: "Amendment 800 to recital 58 acknowledges the lack of, and weaknesses in, indicators for monitoring CAP results concerning environment-specific objectives (biodiversity, water, soil). The Commission already identified these weaknesses a long time ago. On many occasions, the Commission asked the Member States to tackle these issues, with little success."	The technical process identifies the knowledge base to create robust impact indicators.
13	MONITORING	Annex IX - Emission limit values and environmental quality standards Directive (76/464) on pollution caused by certain dangerous substances discharging into the aquatic environment of the Community The Mercury Discharges Directive (82/176/EEC) (1); The Cadmium	Probably not relevant for the CAP	Not relevant

ID	Topic	WFD – Water policy	CAP	Comment
		Discharges Directive (83/513/EEC) (2); The Mercury Directive (84/156/EEC) (3); The Hexachlorocyclohexane Discharges Directive (84/491/EEC) (4); The Dangerous Substance Discharges Directive (86/280/EEC		
14	MONITORING	Mass balance – modelling of the fate of pollutants and other phenomena See also other monitoring and investigative monitoring.	Mass balance accounting and reporting: Production Application of fertilisers Use of irrigation water Application of phytopharmaceuticals Mass balance is also part of the FADN reporting. Double-entry bookkeeping, material accounting, mass flow analysis? Eligibility check, implementation control, and efficiency control for the green measures. Measures subject to CROSS-compliance check (SLOVENIA) – relative to NSWRM measures:	Data on applying fertilisers at the farm level are sometimes unavailable to the public (status in different EU countries). Application of phytopharmaceuticals similar. MONITORING – interaction with the mass balance. QUESTION: Do cross-compliance procedures provide any relevant information for the OPTAIN project? Article 3 of Council Directive 86/278/EEC of 12 June 1986 on protecting the environment, particularly the soil, when sewage sludge is used in agriculture (OJ L 181, 4.7.1986, p. 6).

ID	Topic	WFD – Water policy	CAP	Comment
			PZR 1: Protection of waters against nitrate pollution from agricultural sources: Implementation of the "Nitrates Directive"; DKOS 1: Protective belts along watercourses: Protection of water resources against pollution and sewage; DKOS 2: Water permit for irrigation: Management of water resources for irrigation. Where the use of irrigation water requires a permit, comply with the permitting procedures; DKOS 3: Protection of groundwater against pollution: Protection of groundwater against pollution: prohibition of direct discharge into groundwater and measures to prevent indirect contamination of groundwater by discharge into the soil and infiltration of hazardous substances listed in the Annex to Directive 80/68 / EEC in the version in force on the last day of its validity as regards agricultural activity;	Article 3 of Council Directive 91/414/EEC of 15 July 1991 concerning placing plant protection products on the market (OJ L 230, 19.8.1991, p. 1).

ID	Topic	WFD – Water policy	CAP	Comment
			DKOS 4: Minimum floor cover: Providing a minimum floor cover under the usual farming methods in terms of preventing various forms of soil degradation and deterioration of soil structure; DKOS 5: Minimum land management (erosion): Minimum land management that reflects specific conditions to limit surface erosion; TFP 2: Conservation of wild birds: Implementation of the Wildlife Conservation Directive; TFP 3: Conservation of natural habitats and wild fauna and flora: Implementation of the Directive on the conservation of natural habitats and wild fauna and flora; DKOS 7: Preservation of landscape features: Preservation of landscape features, including, where appropriate, hedges, ponds, ditches, trees in a row, group or individually, borders, irrigations and terraces, including a ban on hedge cutting and tree felling in the time of reproduction and rearing of	

ID	Topic	WFD – Water policy	CAP	Comment
			birds in birds and possible measures to deter invasive plant species; https://www.europarl.europa.eu/factsheets/en/sheet/110/second-pillar-of-the-cap-rural-development-policy EU LEVEL CROSS COMPLIANCE REQUIREMENTS: SMR2 protection of groundwater against pollution 1 SMR3 Use of sewage sludge in agriculture SMR4 protection of waters against pollution caused by nitrates from agricultural sources SMR9 Placing of plant protection products on the market GAEC authorisation procedures for irrigation - Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures	

ID	Topic	WFD – Water policy	CAP	Comment
			GAEC buffer strips establishment of buffer strips along water courses Focus: Payments linked to Natura 2000 and the Water Framework Directive; Payments for areas facing natural or other specific constraints; Payments for the forest, environmental and climate services and forest conservation;	
15-Specific phenomena	FLOODS	Floods directive: Directive 2007/60/EC on the assessment and management of flood risks WFD CIS: N° 29 - Reporting under the Floods Directive Also related to CC issues Also related to heavily modified water bodies (modified in the past as a part of flood protection measures). See process interaction between the flood risk management plans and RBMPs (see process group).	The necessity for productive agricultural land – flood management (contractual framework, insurance, stability, production under CC conditions). Support for 'non-productive' investments, such as the refurbishment of ditch banks. The less steep vegetated slope of the ditch serves as manure- and pesticide-free buffer strip and plays a positive role in flood prevention.	Agricultural land is necessary (lower than urban areas) for flood protection. Are flood-sensitive installations relative to agricultural production? Floodplains (defined by the floods directive) as primary zones for Agri production (interaction)? Soil management under flood conditions. Fertile soil is a limited resource (erosion, deposition) — protection of fertile soil.

ID	Topic	WFD – Water policy	CAP	Comment
16- Specific phenomena	DROUGHTS	CIS: N° 31 – Ecological Flows (final version) CIS Guidelines on Water Reuse Also related to CC issues	Special conditions for agriculture (arid, semi-arid). It also enables an environment for agriculture (water availability), agriculture and CC. Agriculture as competitive water use for limited water resources Drought in Europe: Commission presents additional measures to support farmers https://ec.europa.eu/commission/presscorner/detail/en/IP_18_5301 Support for investments in agricultural holdings, such as drip irrigation equipment. Drip irrigation versus sprinkler irrigation can help reduce the water volume abstracted for irrigation.	Relevance for the irrigation and water resources available for the irrigation.
17 - Specific phenomena	RURAL DEVELOPMENT	Water requirements for the measures related to rural development are not explicitly addressed	Pillar II of the CAP - RURAL DEVELOPMENT Development of water resources in rural areas	Water is also a prerequisite for rural development—water availability for agricultural production (irrigation, but not only irrigation).

ID	Topic	WFD – Water policy	CAP	Comment
			Articles 38 to 44 of the Treaty on the Functioning of the European Union (TFEU); Regulation (EU) No 1303/2013 (OJ L 347, 20.12.2013, p. 320) (common provisions concerning the European Structural and Investment Funds); Regulation (EU) No 1305/2013 (OJ L 347, 20.12.2013, p. 487) (support for rural development); Regulation (EU) No 1306/2013 (OJ L 347, 20.12.2013, p. 549) (financing, management and monitoring of the common agricultural policy); The Omnibus Regulation (Regulation (EU) 2017/2393; OJ L 350, 29.12.2017, p. 15) (introducing changes to Regulation Nos 1305/2013 and 1306/2013).	
18	ECONOMICS	Water economics – CIS N° 1 - Economics and the Environment - The Implementation Challenge of the Water Framework Directive;	Rules for direct payments to farmers (EU regulation 1307/2013); a common organisation of the markets in agricultural products (EU regulation 1308/2013);	Verification of cross-cutting issues between the Water economics (CIS no1) and the CAP financial support measures -

ID	Topic	WFD – Water policy	CAP	Comment
		Reporting on water economics to WISE.	support for rural development (EU regulation 1305/2013); financing, management and monitoring of the common agricultural policy (EU regulation 1306/2013). COMMISSION REGULATION (EU) No 702/2014 of 25 June 2014 declaring specific categories of aid in the agricultural and forestry sectors and rural areas compatible with the internal market in application of Articles 107 and 108 of the Treaty on the Functioning of the European Union Council Regulation (EC) No 994/98 of 7 May 1998 on the application of Articles 92 and 93 of the Treaty establishing the European Community to specific categories of horizontal State aid FADN – Farm accounting data framework: COMMISSION DELEGATED REGULATION (EU) No 1198/2014 of 1 August 2014 supplementing Council Regulation (EC) No 1217/2009	

ID	Topic	WFD – Water policy	CAP	Comment
			setting up a network for the collection of accountancy data on the incomes and business operation of agricultural holdings in the European Union COMMISSION DELEGATED REGULATION (EU) 2017/2278 of 4 September 2017, amending Annex I to Council Regulation (EC) No 1217/2009, setting up a network for the collection of accountancy data on the incomes and business operations of agricultural holdings in the European Union COMMISSION IMPLEMENTING REGULATION (EU) 2017/2280 of 11 December 2017 amending Implementing Regulation (EU) 2015/220 laying down rules for the application of Council Regulation (EC) No 1217/2009, setting up a network for the collection of accountancy data on the incomes and business operation of agricultural holdings in the European Union	

ID	Topic	WFD – Water policy	CAP	Comment
			COMMISSION IMPLEMENTING REGULATION (EU) 2016/1786 of 7 October 2016 amending Implementing Regulation (EU) No 908/2014 as regards declarations of expenditure for rural development programmes COMMISSION IMPLEMENTING REGULATION (EU) No 834/2014 of 22 July 2014 laying down rules for the application of the common monitoring COMMISSION REGULATION (EU) No 651/2014 of 17 June 2014 declaring specific categories of aid compatible with the internal market in application of articles 107 and 108 of the Treaty	
19	SOCIOLOGY	This dimension is not explicitly addressed by the Drinking Water Directive and Water Policy Public participation, water democracy, a process flow of the RBMP development, education knowledge base	The CAP defines gender issues, the ageing of farmers, and similar priorities.	Involvement of farmers and farmer representatives in the development of RBMPs and other water-related planning documents.

ID	Topic	WFD – Water policy	CAP	Comment
		N° 8 - Public Participation in Relation to the Water Framework Directive		
20	LOCATION	Definition of water bodies	Definition of agricultural holdings	Cross-reference between water bodies and agricultural holdings is necessary,
21	DEFINITIONS	Art. 2 of WFD – Definition of water bodies (surface waters, lakes, groundwater, transitional waters.) definition of good status of different water bodies	Subject to cross-compliance	
22	POLLUTION	CIS N° 23 - Eutrophication Assessment in the Context of European Water Policies,		Key interaction between the CAP and WP
23-Protected areas	DRINKING WATER – Water intended for human consumption	Article 7 - Defined as a specific priority by the WFD, addressed explicitly by the recast of DWD (Drinking Water Directive recast 2020). (definition of drinking water protection zones, also Nitrate directive). Definition of water services as a specific category.	Agricultural production in sensitive areas, specific measures for the areas with limited agricultural production (Nitrate directive). As a part of HACCP procedures, also water is intended for animal consumption and water for the food processing industry.	Especially Important link between CAP and WP.

ID	Topic	WFD – Water policy	CAP	Comment
		nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC and areas designated as sensitive areas under Directive 91/271/EEC; and		
24 - Protected areas	BATHING WATERS	Article 6, Annex IV (iii), bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC	Agricultural production in sensitive areas, specific measures for the areas with limited agricultural production (emission of coliform bacteria – especially pastures).	Not specifically addressed
Protected areas	WATER FOR ECONOMICALLY SIGNIFICANT AQUATIC SPECIES	areas designated for the protection of economically significant aquatic species; - shellfish directive		Not specifically addressed
Protected areas	WATER FOR NATURE	areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive	Green measures under CAP pillar I and pillar II.	Water for nature is part of the NSWRM

ID	Topic	WFD – Water policy	CAP	Comment
		92/43/EEC (1) and Directive 79/409/EEC (2).		
25	HEAVILY MODIFIED WATER BODIES	CIS N° 4 – Identification and Designation of Heavily Modified and Artificial Water Bodies	Heavily modified water bodies related to agricultural production were most often developed from 1920 up until 60' and 70'. Significant development of melioration works, agricultural drainage, ... Maintained in function.	Artificial water bodies are constructed for seasonal water retention (used for irrigation purposes). Specific requirements are set for the heavily modified water bodies.
26	HEAVILY MODIFIED WATER BODIES	N° 37 - Steps for defining and assessing the ecological potential for improving comparability of Heavily Modified Water Bodies		
27	REPORTING AND SUPERVISION	CIS N° 21 - Guidance for reporting under the WFD [replaced by N° 35] N° 35 - WFD Reporting Guidance N° 35 - WFD Reporting Guidance_Annex 5 – Updated WISE GIS Guidance (Apr 2016) [replaces N° 22] N° 35 - WFD Reporting Guidance_Annex 6	COMMISSION IMPLEMENTING REGULATION (EU) 2018/56 of 12 January 2018 amending Implementing Regulation (EU) No 908/2014, laying down rules for the application of Regulation (EU) No 1306/2013 of the European Parliament and of the Council concerning paying agencies and other bodies, financial management, clearance of accounts, rules on checks, securities and transparency	

ID	Topic	WFD – Water policy	CAP	Comment
			COMMISSION IMPLEMENTING REGULATION (EU) No 821/2014 of 28 July 2014 laying down rules for the application of Regulation (EU) No 1303/2013 of the European Parliament and the Council as regards detailed arrangements for the transfer and management of programme contributions, the reporting on financial instruments, technical characteristics of information and communication measures for operations and the system to record and store data. Cross compliance check as defined above.	
28	CLIMATE CHANGE	Specific climate change reporting is not established (a reference to hydrometeorological services). Climate-change proofing of RBMPs Guidance document No. 24 RIVER BASIN MANAGEMENT IN A CHANGING CLIMATE	Adjusting the timing of farm operations, such as planting or sowing dates and treatments; technical solutions, such as protecting orchards from frost damage or improving ventilation and cooling systems in animal shelters; choosing crops and varieties better adapted to the expected length of the growing season and water availability and more	Complex challenge – measures under CAP are under obligatory 30% green measures. https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/key_policies/documents/cap-specific-objectives-brief-4-agriculture-and-climate-mitigation_en.pdf

ID	Topic	WFD – Water policy	CAP	Comment
			resistant to new conditions of temperature and humidity; adapting crops with the help of existing genetic diversity and new possibilities offered by biotechnology; improving the effectiveness of pest and disease control through, for instance, better monitoring, diversified crop rotations, or integrated pest management methods; using water more efficiently by reducing water losses, improving irrigation practices, and recycling or storing water; improving soil management by increasing water retention to conserve soil moisture, and landscape management, such as maintaining landscape features providing shelter to livestock; introducing more heat-tolerant livestock breeds and adapting diet patterns of animals under heat stress conditions. https://ec.europa.eu/info/food-farming-fisheries/sustainability/environ	

ID	Topic	WFD – Water policy	CAP	Comment
			mental-sustainability/climate-change_en	
29	MEASURES	CIS N° 37 - Mitigation Measures Library Measures as a part of the process flow, part of the reduction of pressures, are defined for RBMPs, follow up of the implementation of the measures (periodical review) and efficiency of measures (trend towards the good water status) CIS: Policy Document on Natural Water Retention Measures CIS: Best practice for establishing nutrient concentrations to support good ecological status	Measures as a part of the CAP addressed in some components (i.e. Nitrate directive, also measures related to habitats directive), not fully integrated. Are measures implemented (codes of Good Agricultural Practice or legal requirements – national legislation): Measures limiting the periods when nitrogen fertilisers can be applied on land in order to target application to periods when crops require nitrogen and prevent nutrient losses to waters; measures limiting the conditions for fertiliser application (on steeply sloping ground, frozen or snow-covered ground, near watercourses, etc.) to prevent nitrate losses from leaching and run-off; requirement for a minimum storage capacity for livestock manure; and	Measures are in the centre of a combination of WFD – WP and CAP. Reference: https://ec.europa.eu/environment/water/quantity/pdf/guidance_en.pdf Important addressing multiple perspectives: national water administration (WFD) – river basin authority national agricultural administration – implementation of CAP farm-level perspective Especially farm-level perspective is essential! Guidance for administrations on making WFD agricultural measures clear and transparent at the farm level https://ec.europa.eu/environment/water/quantity/pdf/guidance_en.pdf

ID	Topic	WFD – Water policy	CAP	Comment
			crop rotations, soil winter cover, and catch crops to prevent nitrate leaching and run-off during wet seasons. https://ec.europa.eu/environment/water/water-nitrates/index_en.html	
30	PROCESS FLOW	River basin management plans – deadlines procedures for the preparation and adoption. Reporting requirements	Report on the CAP implementation in a specific country (country reports), certification of the national measures and controlling institutions.	Deadlines and processes are different from country to country and difficult to compare. The optimisation of measures defined by the RBMPs (a programme of measures) is unclear. Measures usually require pre-feasibility and/or feasibility study, decision-making process including environmental impact assessment and strategic environmental impact assessment (if required by the scale, type of measure/intervention). Feasibility – cost-benefit analysis: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/cba_guide.pdf
31	PROCESS FLOW	Programme of measures from the WFD – measures operational? Efficiency and effectiveness of the measures.	Measures (Pillar I and Pillar II) – subject to cross-compliance procedures	OPTAIN - verification – the programme of measures defined by the WFD and measures by the CAP are they coherent, are they being implemented, and data availability?

ID	Topic	WFD – Water policy	CAP	Comment
		Also, the Floods Directive defines a programme of measures (1st by 22. December 2012). Article 11(7) of the WFD https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2019:0047:FIN:EN:PDF REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC) Second River Basin Management Plans First Flood Risk Management Plans		In Italy (Po RBMP), of the five agricultural measures to be implemented in the short term, only three measures are operational in all regions. A fourth measure is only implemented in one part of the river basin district, and the final measure is only applied in some areas owing to a conflict with local legislation; In France (Loire-Brittany RBMP), the measures are too general to be operational as they need to be further developed by local water management plans (SAGEs). By September 2013, less than half of the river basin district was covered by a SAGE; and In Greece (Thessaly RBMP), five of the six measures examined during the Court's audit visit were not operational on 22 December 2012. European Court of Auditors (2014) Special Report Integration of EU water policy objectives with the CAP: a partial success: https://www.eca.europa.eu/Lists/ECADocuments/SR14_04/SR14_04_EN.pdf

ID	Topic	WFD – Water policy	CAP	Comment
33	PROCESS FLOW	Public participation – see sociology above	Public consultations in preparing CAP – CAP II (extended to 2023).	Issue of public participation – a challenge Guidance for administrations on making WFD agricultural measures clear and transparent at the farm level https://ec.europa.eu/environment/water/quantity/pdf/guidance_en.pdf

Annex B: Mapping of governance structure in the case studies (task 6.2 phase A)

This annex contains the visual presentations and diagram descriptions for each of the OPTAIN case study countries. These overviews were compiled to provide a backbone for the study of policy gaps, compatibility issues and suggested solutions for improved NSWRM adoption, as described in chapter 4.2 on methods for addressing governance structure in the case studies.

The information is provided by the case study leaders and researchers based on inputs by experts in the respective countries. All case study countries are presented, except Poland, Latvia and Sweden which did not participate in the mapping of governance structures in the case studies. There is one chapter for each country with a visual overview and a text providing a brief overview of main legislation, regulation, strategies and responsibilities across the agriculture water / environment domain – the overview describe the information provided in the diagram. The key for the diagrams is presented here:

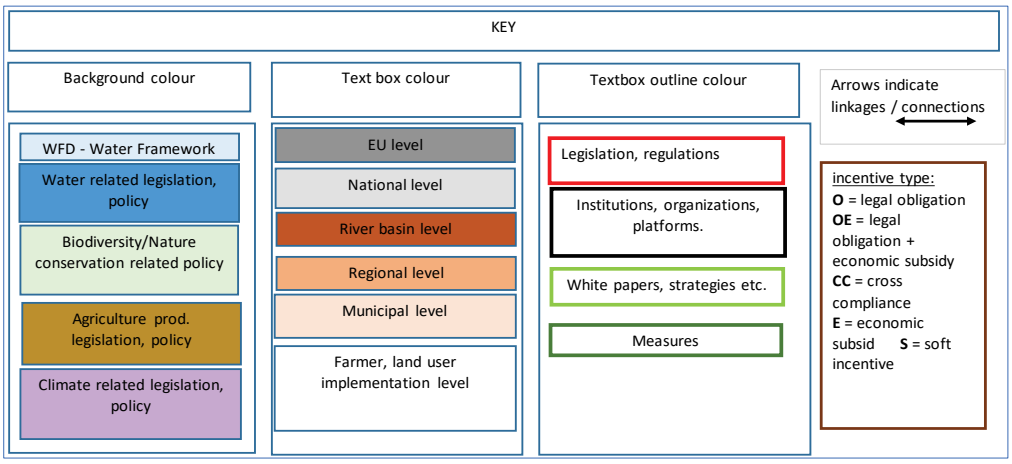

Figure 1: Key for diagrams presenting overview of governance situation.

1. Germany (Schwarzer Schöps) governance structure

Visual overview

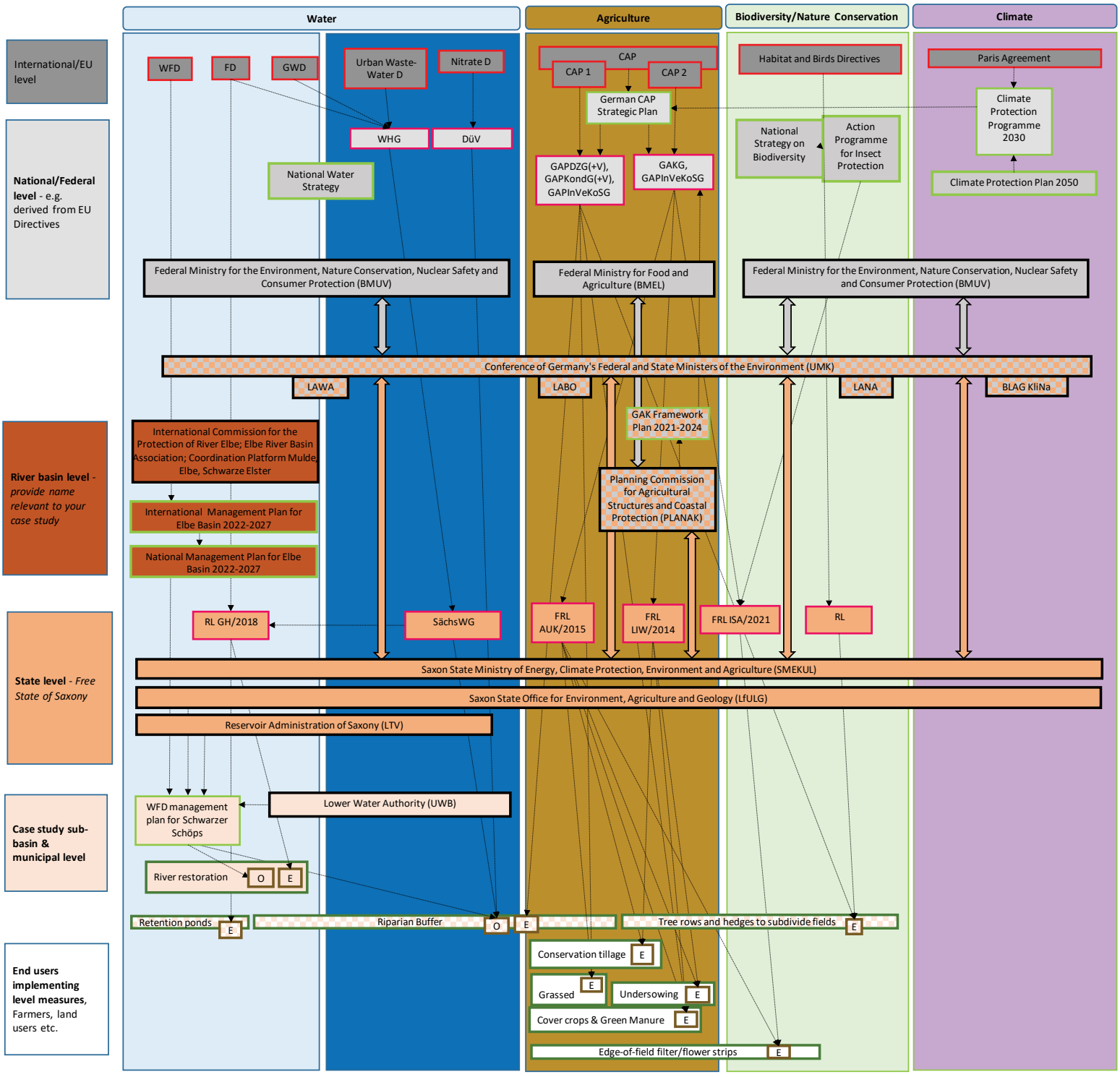

Figure 2. Visual overview of governance structure related to water-agriculture-environment-climate in Germany.

1.1 Summary of situation

EU directives and international climate agreements: In the context of the water agriculture and environment domain context, Germany implements WFD, FD, GWD, ND, UWWTD, CAP 1, 2, Habitat and birds D, and Paris agreement.
Governance: Decision-making occurs on both national (or federal) and state level. whereas land-use planning on local level only conceptualizes future developments of municipalities without specifying details on agricultural practices or any environmental measures – this is the situation across the topics. On national level, the BMUV - Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection - is responsible for governance across the focal environmental sectors and topics. On national level, the BMEL Federal Ministry of Food and Agriculture has specific responsibility for national level agricultural lex (e.g. lex associated with CAP 1 and 2). On the state (German "Bundesländer") level, it is the cross sector ministry: Saxon State Ministry of Energy, Climate Protection, Environment and Agriculture (SMEKUL) that is responsible for the lex. SMEKUL is supported by the Saxon State Office for Environment, Agriculture and Geology (LfULG) which performs tasks linked to consultation, coordination, applied research, funding, monitoring, reporting and documentation.
Platform for coordination: The Conference of Germany's Federal and State Ministers of the Environment (UMK) is responsible for coordination among the different states to adopt a clear position towards the national level and to find mutual solutions. The UMK has eight working bodies of which four are dealing with topics related to OPTAIN measures: LAWA (water), LANA (nature protection), LABO (soil protection), BLAG-KliNa (climate protection).
Measures : The identified measures are for most parts authorised by state-level lex. However, standards for good agricultural and environmental conditions as defined by EU (CAP1) and national law are also relevant for OPTAIN. . These standards do not fully represent the measures as defined in OPTAIN but, conversely, the implementation of OPTAIN measures would fully comply with those standards. Only a few measures are obligatory, namely those defined in the WFD management plan. All other measures are voluntary, i.e. associated with economic subsidies coming from CAP2 and authorised by state-level directives. Measures "river restoration" and "retention ponds" are decided and implemented by local municipalities. Subsidies for these measures are specified in directive GH/2018. SMEKUL is responsible for all the state-level directives mentioned above (all CAP-related state-level directives will be updated soon according to the new CAP). No particular measures are specified as relevant under the climate topic.

1.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

EU directives and international agreements and national level responsible authorities: Germany implements WFD, FD, GWD, ND, Urban waste water, CAP 1, 2, Habitat and birds D, and Paris agreement. There is one national institution, the BMUV - Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and Consumer Protection - being responsible for a range of government policies that are reflected in the name of the ministry itself, among that policies addressing water, biodiversity and climate protection. There is also one national

level institution responsible for agriculture, The BMEL - Federal Ministry of Food and Agriculture.

1.2.1 Water management

The BMUV is the national level institution responsible for water protection and management National-level lex, and some regional-level lex authorises the measures on local level.

National level

Legislation: WFD, GWD, FD and UWWTD are being implemented by the German Water Act (WHG) The ND is being implemented by the Fertilizer Ordinance (DüV) at national level. The responsible ministry is the BMUV.
Institutions, organizations platforms: The main responsible ministry is the BMUV. The BMUV is responsible for all the relevant water related legislation.
The Conference of Germany's Federal and State Ministers of the Environment (UMK) platforms for coordination of authorities and for involvement of actors on national level.
Strategies, programmes to be mentioned: One national strategy / policy – the BMU (2021a) address water management national level.

Regional level

Legislation: Two acts are addressing OPTAIN measures: the SächsWG and the RL GH/2018 (see section 1) – both being in the responsibility of the cross sector ministry SMEKUL.
Institutions, organizations platforms:
River basin level: Several coordination platforms at the river basin level (International Commission for the Protection of River Elbe, the Elbe River Basin Association and its sub-coordination platform for rivers Mulde, Elbe, and Schwarze Elster) provide frames for the planning and development of local WFD Management Plans which are coordinated by the cross-sector state office LfULG. The Reservoir Administration of Saxony (LTV) and the Lower Water Authority of the County of Görlitz (UWB) are responsible for the implementation of the local WFD Management Plan in the case study area (Schwarzer Schoeps River). LTV is responsible for first-order water bodies, UWB for second-order water bodies.
State level: A cross sectoral ministry is responsible for state-level lex: the Saxon State Ministry of Energy, Climate Protection, Environment and Agriculture (SMEKUL). The Saxon State Office for Environment, Agriculture and Geology (LfULG) is a special administrative authority, directly under SMEKUL. LfULG is supported by a broad network of partners in industry, science, counselling and education, and committed actors in the region and across national and state borders.

Local municipal / sub-basin level

Legislation: No regulations on municipal, sub-basin or local level.
Institutions, organizations platforms: The Lower Water Authority of the County of Görlitz (UWB) implements the WFD management plan for second-order water bodies.
Strategies, programmes to be mentioned: Land use plans with low/no binding character for land users. Most important is the WFD management plan for River Schwarzer Schoeps.
Measures and mechanisms:

- River restoration (O, E) is obligatory at some sites/streams in the case study area according to the WFD management plan, (LTV is responsible first-order streams, UWB for second-order streams); river restoration is further supported with economic incentives by federal lex RL GH/2018
- Retention ponds (E) are supported by economic incentivesassociated with federal lex RL GH/2018
- Riparian buffer (O,E) are obligatory for some sites in the case study area according to the WFD management plan (LTV is responsible first-order streams, UWB for second-order streams). There is no other obligation to implement riparian buffers (i.e. restore or reforest buffers, as defined in OPTAIN). Though, there are some national-level (WHG) and state-level regulations (SächsWHG) for the use and management of riparian buffers (e.g. no fertilizer and pesticides application allowed within 5m distance to the stream; protection of existing grassland, trees and hedges within 10 m distance to the stream), exempt for small streams (shorter than 500m from source) and drainage ditches which are often the main sources of pollution. Federal states have the legislative power to remove or further narrow down these exemptions, but the state of Saxony does not fill this 'gap' with its own lex (SächsWHG).

1.2.2 Agriculture

Acts, strategy documents and guidelines adopted on national/federal level provides frames for planning work on state and local level. There are no platforms for coordination of authorities and for involvement of actors on national, state and local level. Coordination occurs between state-level agricultural authorities (in particular information and service offices of LfULG) and farmers.

National level

The CAP 1, 2 are implemented. As we are in the transition phase to the new CAP regulations (2023-27), the following lex refer to the new regulations.
Legislation: CAP 1 is implemented by reference to the Act (GAPDZG) and Regulation (GAPDZV) on the CAP direct payments, the Act (GAPKondG) and Regulation (GAPKondV) on the Conditionality of CAP direct payments, and the Act on the Integrated Administration and Control System for CAP payments (GAPInVeKoSG). CAP 2 is implemented by reference to the Joint Task for the improvement of Agricultural Structures and Coastal Protection (GAK) adopted by Germany's Federal and State Ministers of Agriculture and the Federal Minister of Finance.
Institutions, organizations platforms: The Federal Ministry of Food and Agriculture (BMEL) and the state-level agricultural ministries (in our case SMEKUL) are responsible for the agricultural lex.
Strategies, programmes: Germany's CAP Strategic Plan for the new CAP funding period (2023-2027) has been submitted to the European Commission for approval in February 2022. Another important strategy is the GAK Framework Plan which coordinates the CAP2 implementation in collaboration with the State Ministries for Agriculture.

Regional level

Legislation: CAP 2 (via GAKG and GAPInVeKoSG): FRL AUK/2015, FRL ISA/2021, FRL LIW/2014.

Institutions, organizations platforms:
Cross sectoral: Saxon State Ministry of Energy, Climate Protection, Environment and Agriculture (SMEKUL), Saxon State Office for Environment, Agriculture and Geology (LfULG).

Local municipal / sub-basin level

Legislation : No
Institutions, organizations platforms : No
Strategies, programmes: No
Measures and mechanisms:
The majority of measures is decided and implemented by farmers in the area. However, certain conditions have to be met ("standards for good agricultural and environmental condition" – GAEC) and thus single aspects of OPTAIN measures can be considered obligatory for receiving full CAP (1st pillar) area payments. The new "conditionality" rules are implemented at national level by GAPKondG+V. Here, our OPTAIN measures are addressed as follows:

(1) fertilizer application is not allowed within a 3m buffer to streams, again with exemptions for small streams and drainage ditches (as mentioned above). This partly relates to - but does not fully reflect - OPTAIN measure riparian buffer. If riparian buffers are implemented as defined in OPTAIN, this standard would be met.
(2) tillage in winter (1.12.-15.1.) is not allowed on areas classified as prone to soil erosion. This partly relates to - but does not fully reflect - OPTAIN measure conservation tillage. If conservation tillage would be applied (as defined in OPTAIN), this standard would be met.
(3) In winter (1.12.-15.1.) there are minimum requirements regarding soil cover. This partly relates to - but does not fully reflect - OPTAIN measures cover crops and conservation tillage. If cover crops or conservation tillage would be applied (as defined in OPTAIN), this standard would be met.
(4) There are minimum requirements regarding crop rotation diversity. This partly relates to - but does not fully reflect - OPTAIN measures cover crops and undersowing. Cover crops or undersowing (as defined in OPTAIN) would be an option to meet this standard but only for a maximum of 50% of the area.
(5) Four percent of the agricultural area must be spared for non-productive area or contain structural landscape elements. Edge-of-field flower/filter strips and hedges or tree rows as defined in OPTAIN would be an option to meet this standard.

Another instrument of the "green infrastructure" of the new CAP will be eco-schemes (also under CAP1). These are voluntary measures (of one year duration) for which farmers get economic subsidies. OPTAIN measures "edge-of-field filter/flower strips" and "grassed waterways" might fall under the definition of eco-schemes.
Most OPTAIN measures are addressed by CAP2 payments for environmental, climate and other management commitments. These payments compensate farmers and other land managers for voluntarily committing themselves for several years at a time to practices (decided by Member States) beneficial for the environment and climate. Implementation of those payments in Germany is done at state level; in the state of Saxony via directive AuK/2015 (directive on the support of agri-environment measures, still needs to be updated for the new CAP by SMEKUL). AuK/2015 includes the following OPTAIN measures: 'conservation tillage', 'undersowing', 'grassed waterways', 'cover crops', 'edge-of-field

filter/flower strips'. The latter (flower strips at the edges of fields) can also be supported by directive ISA/2015 (but only if not funded by AuK/2015 at the same time!). Directive LIW/2015 supports investments in sustainable machinery and knowledge transfer which might be relevant for measures 'conservation tillage', 'undersowing', 'cover crops'.

1.2.3 Biodiversity / Nature

Habitat and Birds Directives; and international conventions are listed.

National level

Legislation: There is no OPTAIN-relevant legislation at national level.
Institutions, organizations platforms: BMUV - Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
Strategies, programmes: National Strategy on Biodiversity, Action Programme for Insect Protection.

Regional level

Legislation : RL NE/2014
Institutions, organizations platforms: Saxon State Ministry of Energy, Climate Protection, Environment and Agriculture (SMEKUL), Saxon State Office for Environment, Agriculture and Geology (LfULG).

Local level

Legislation: No particular lex; **Institutions, organizations platforms:** No particular
Strategies, programmes: No particular.
Measures and mechanisms:
OPTAIN measure 'hedges and tree rows' is supported by directive NE/2015, associated to the Habitats and birds directive.

1.2.4 Climate

Paris agreement.

National level

Institutions, organizations platforms : BMU Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. and BMEL.
Strategies, programmes: The Climate Protection Plan 2050 and the Climate Protection Programme 2030 are referring to the CAP strategic plan (which is currently approved by the EC) to make sure climate protection is addressed by the CAP.

Regional and local level

No particular lex, institutions and measures.

2. Switzerland (Petite Glane) governance structure

Visual overview

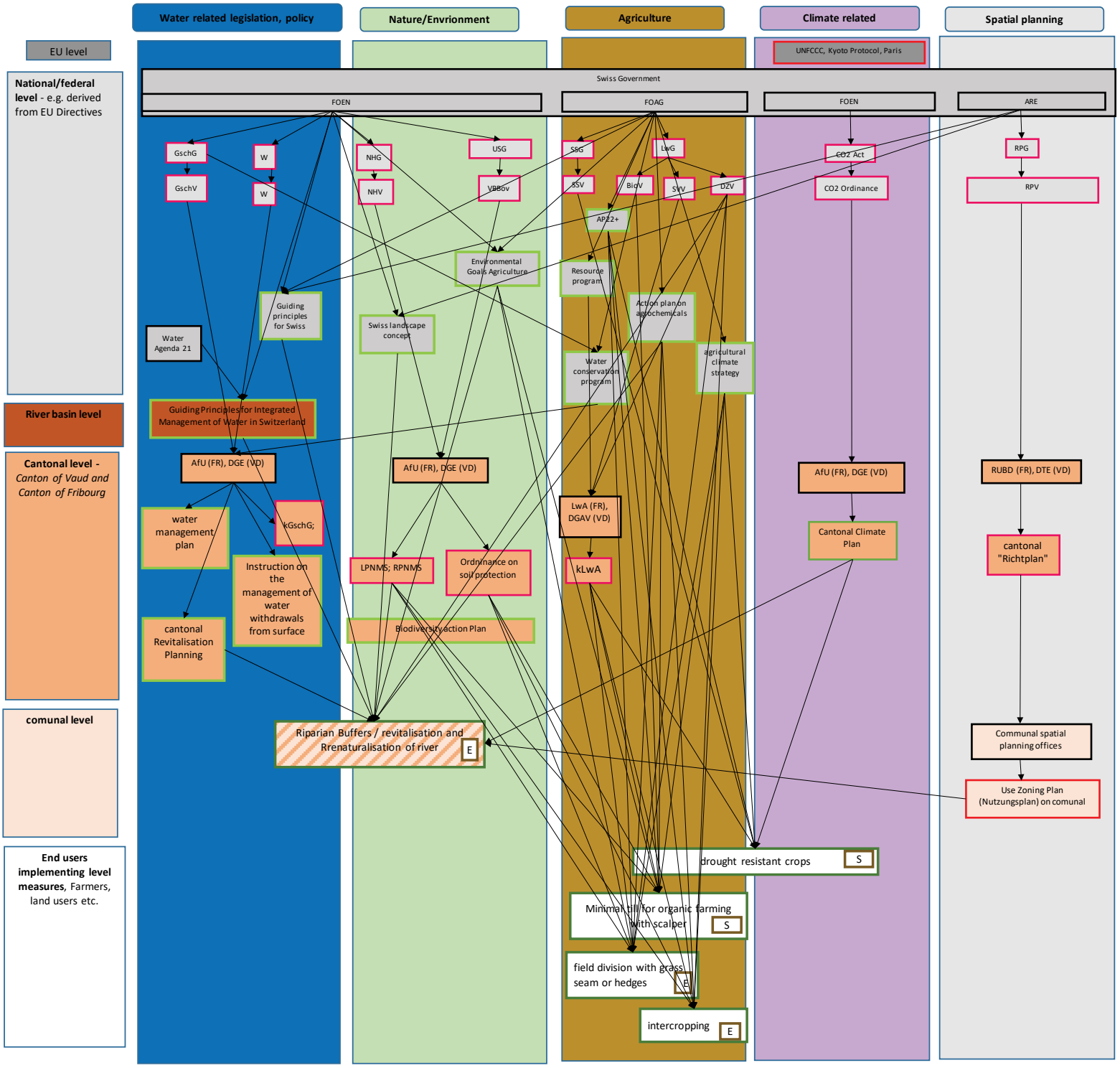

Figure 3. Visual overview of governance structure related to water-agriculture-environment-climate in Switzerland.

2.1 Summary of situation

EU directives and international climate agreements: Switzerland is not part of the

EU, therefore no EU directives are implemented. Related to environment and climate, the Kyoto protocol and the Paris agreement, the UNFCCC are implemented.
Governance: Three political levels have a legislative (law-making) and an executive (government) while decision-making regarding water and agriculture occurs mainly on national and cantonal level. On federal level the, (i) Federal office of environment and Federal office for spatial development that are responsible for water and environmental , (ii) Federal office for Agriculture, (iii) Federal office for spatial planning . Many strategies and programmes are identified, in particular for the agriculture sector.
Platform for coordination: no specific platform for multi-actor coordination and involvement identified.
Measures identified are mainly authorized by agriculture sector legislation. None of the measures are obligatory, some has economic incentives. No measures are identified as relevant for climate.

2.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

Switzerland is not part of the EU and hence does not implement EU directives. Switzerland is a federal constitution; laws are enacted on federal level and competencies are defined. The cantonal (regional) level has sovereignty over certain aspects and can also delegate these to municipalities. All three political levels have a legislative (law-making) and an executive (government). The powers of the Confederation are limited to those areas explicitly entrusted to it by the Federal Constitution. Responsibility for all other matters, such as education, health and policing, fall to the cantons, which enjoy a high degree of policy-making autonomy in these areas. As for the communes, their responsibilities are explicitly granted by either the canton or the Confederation. However, the communes may legislate on matters that are not covered by cantonal legislation.

A federal office is the highest administrative unit of the federal administration of the Swiss Confederation. There are several of them, including:
FOEN: Federal office of environment is responsible to ensure the sustainable use of natural resources including soil, water, air, quietness and forests. It is responsible for the protection against natural hazards, safeguarding the environment and human health against excessive impacts, and conserving biodiversity and landscape quality. It is also responsible for international environmental policy.
FOAG: Federal office for agriculture is the Confederation's competence centre for all core issues relating to the agricultural sector. The FOEN is responible for the lex regarding water, nature and climate, the FOAG for the lex regarding agriculture.
ARE: Federal office for spatial planning is responsible for matters of spatial development, mobility policy, and sustainable development. ARE is responsible for spatial planning.
Cantonal level: Similar to federal offices, there are offices on cantonal level. They have a legislative framework set by the federal laws and can implement it "as they see fit" (depending on the political orientation of the cantons). As the Swiss

OPTAIN Case Study overlaps 2 cantons, there are always at least two cantonal offices listed (1 for Fribourg and 1 for Vaud).
They are under ministries (called Federal Departements). FOEN and ARE are under the Federal Department of the Environment, Transport, Energy and Communications. FOAG is under the Federal Departement for Economic Affairs, Education and Research.
Not only implementation of legislation but they also draft principles and strategies for their sector (e.g. environment, spatial planning, agriculture). They ensure that the political plans that affect their sector are coordinated within the federal government. They are responsible for ensuring that the federal government's activities observe the principles of sustainability. Alongside with the cantons, they have responsibility for the legal supervision of their sector.
Not only implementation of legislation but they also draft principles and strategies for their sector (e.g. environment, spatial planning, agriculture). They ensure that the political plans that affect their sector are coordinated within the federal government. They are responsible for ensuring that the federal government's activities observe the principles of sustainability. Alongside with the cantons, they have responsibility for the legal supervision of their sector.

2.2.1 Water management

The Federal office of environment (FOEN) under the Federal Department of the Environment, Transport, Energy and Communications is responsible for water legislation. The FOEN collaborates with the Federal office for spatial development (ARE) and with the Federal Office for Agriculture (FOAG) to develop cross-sector strategies and principles for the governance of water, nature, agriculture, and climate issues. A river basin level is also identified in Switzerland.

Federal[1] level

Legislation[2]: Waters Protection Act (GschG) and the associated Waters Protection Ordinance; the Water Construction Act and the associated Water Construction Ordinance being the responsibility of the Federal office of environment (FOEN).
Institutions, organizations platforms: The **FOEN** (under the Federal Department of the Environment, Transport, Energy and Communications) is responsible for the above acts and ordinances, and for drafting principles and strategies for their sector (e.g. environment, spatial planning, agriculture). They ensure that the political plans that affect their sector are coordinated within the federal government. They are responsible for ensuring that the federal government's activities observe the principles of sustainability. Alongside with the cantons, they have responsibility for the legal supervision of their sector.
The Water agenda 21, a network for Swiss-wide organizations from all sectors and interests of the Swiss water industry. A working group of Water-Agenda 21 developed a guideline in which principles of watershed management are presented. It serves as an orientation framework for water management actors in cantons, regions and municipalities.
Strategies, programmes: Guiding Principles for Swiss watercourses; cross sector responsibility of FOEN, ARE and FOAG.

[1] In Switzerland, federal level (law/office/…) represents the central government with certain degree autonomy.
[2] Acts specify what should happen, ordinances specify how the Acts should be implemented

River basin and cantonal level

River basin level (strategies / programme): Guiding principles for integrated management of water in Switzerland
Canton legislation: Cantonal Water Protection Acts (kGschG) and the cantonal Water Protection Ordinances (kGschV) being the responsibilities of the Offices for Environment of the Canton of Vaud (DGE) and the Canton of Fribourg (AfU).
Canton institution, organizations, platforms: the Offices for Environment of the Canton of Vaud (DGE) and the Canton of Fribourg (AfU).
Canton strategies, programmes: (i) Water management plan; (ii) Instruction on the management of water withdrawals from surface waters during Drought; (iii) Cantonal revitalisation planning; these strategies are the responsibility of the AfU and the DGE. Both cantons each have a strategy for water management, revitalisation, and water withdrawal.

Local municipal / sub-basin level

Legislation; Institutions, organizations platforms; Strategies, programmes: No relevant information local level identified.
Measures and mechanisms: Riparian Buffers / revitalisation and renaturalisation of river authorized by the national level FC Art.76, WPA, WPO, WCA, WCO As the biotope NSWRM is not included in the case, no measure directly related to water or biodiversity that is regulated on communal level are included. The spatial planning is on commune level, the revitalisation planning on cantonal level.

2.2.2 Agriculture

Federal Office for Agriculture (FOAG) under the Federal Department for Economic Affairs, Education and Research is the primary decision-making for the agriculture sector.

Federal level

Legislation: Agriculture Act (LwG) with (i) the ordinance on direct payments, (ii) structural improvement ordinance, (iii) Ordinance on pressures on soil, and the Plant variety protection act (SSG) with the Plant Variety Protection ordinance; being the responsibility of the FOAG.
Institutions, organizations platforms: Federal Office for Agriculture (FOAG). Swiss Soil Monitoring Network NABO, Swiss Farmers' Union SBV,
Strategies, programmes: (i) AP22+, (ii) Resource program, (iii) Action plan on agrochemicals, (iv) agricultural climate strategy, are the responsibility of the FOAG, (i-v)Water conservation program both the FOEN and the FOAG are responsible, the programme refers to both by water and agriculture legislation.

Regional / canton level

Legislation: Cantonal Agriculture Acts
Institutions, organizations platforms: Office for Agriculture of the Canton of Vaud (DGAV) and of the Canton of Fribourg (LwA)
Strategies, programmes: No relevant agricultural sector programme on canton level identified.

Local level[3]

[3] Federal and Cantonal legislation etc is important for agriculture, communal legislation is not very crucial here, therefore not listed

Legislation; Institutions, organizations platforms; Strategies, programmes: No relevant information local level identified.
Measures and mechanisms:
Drought resistant crops (S) authorized by the Cantonal Agriculture Acts and the federal Plant variety protection act , referred to in Cantonal climate plan.
Minimal till for organic farming with scalper (S) authorized by the, Cantonal Agriculture Act, the federal ordinance on direct payments (Agriculture Act), Cantonal ordinance on soil protection, and the cantonal Law and associated ordinance on the Protection of Nature and Cultural Heritage
Field division with grass seam or hedges (E) authorized by the Cantonal Agriculture Act, the federal ordinance on direct payments (Agriculture Act), Cantonal ordinance on soil protection, and the cantonal Law and associated ordinance on the Protection of Nature and Cultural Heritage
Intercropping (E) authorized by the Cantonal Agriculture Act, the federal ordinance on direct payments (Agriculture Act), Cantonal ordinance on soil protection, and the cantonal Law and associated ordinance on the Protection of Nature and Cultural Heritage
The measures below are referred to by both nature legislation and agriculture (the responsibility of both FOEN and FOAG).

2.2.3 Biodiversty / Nature

Federal level

Legislation : Federal Act on the Protection of Nature and Cultural Heritage (NHG) with the Ordinance on Protection of nature, and heritage; the Environmental Protection Act (USG) with the Ordinance on pressures on soil (VBBo); being the responsibility of the FOEN.
Institutions, organizations platforms: The Federal office of environment (FOEN) under the Federal Department of the Environment, Transport, Energy and Communications is the main responsible for governance of biodiversity and nature.
Strategies, programmes: (i) Environmental goals agriculture both FOAG and FOEN are responsible, (ii) Swiss landscape concept : FOEN and Federal Office for Spatial Development (ARE) are responsible.

Canton level

Legislation : ; kNHG and kNHV (cantonal Law and associated ordinance on the Protection of Nature and Cultural Heritage of the cantons of Vaud and Fribourg,Canonal Ordninance on soil protection
Institutions, organizations platforms: the Office for Land and Environment of the Canton of Vaud (DTE) and Office for Nature and Landscape of the Canton of Fribourg (ALN).
Strategies, programmes: Biodiversity action Plan being the responsibility of the Office for Land and Environment of the Canton of Vaud (DTE) and Office for Nature and Landscape of the Canton of Fribourg (ALN).

Local level

Legislation; Institutions, organizations platforms; Strategies, programmes: No relevant information local level identified.
Measures and mechanisms: As the biotope NSWRM is not included in the case, no measure directly related to water or biodiversity that is regulated on communal level are described here.

2.2.4 Climate

UNFCCC, Kyoto Protocol, Paris agreement

Federal level

Legislation : CO2 Act, CO2 Ordinance
Institutions, organizations platforms: FOEN.
Strategies, programmes: No climate specific strategy are identified on federal level.

Canton level

Legislation: No legislation developed.
Institutions, organizations platforms : the Offices for Environment of the Canton of Vaud (DGE) and the Canton of Fribourg (AfU).
Strategies, programmes: Cantonal Climate Plan being the responsibility of the (AfU /DGE).

Local level

Legislation; Institutions, organizations platforms; Strategies, programmes: No relevant information local level identified.
Measures: The cantonal climate plan refers to drought resistant crops (see agriculture governance).

Spatial planning

Use Zoning Plan (Nutzungsplan) on comunal level.

3. Hungary governance structure

Visual overview

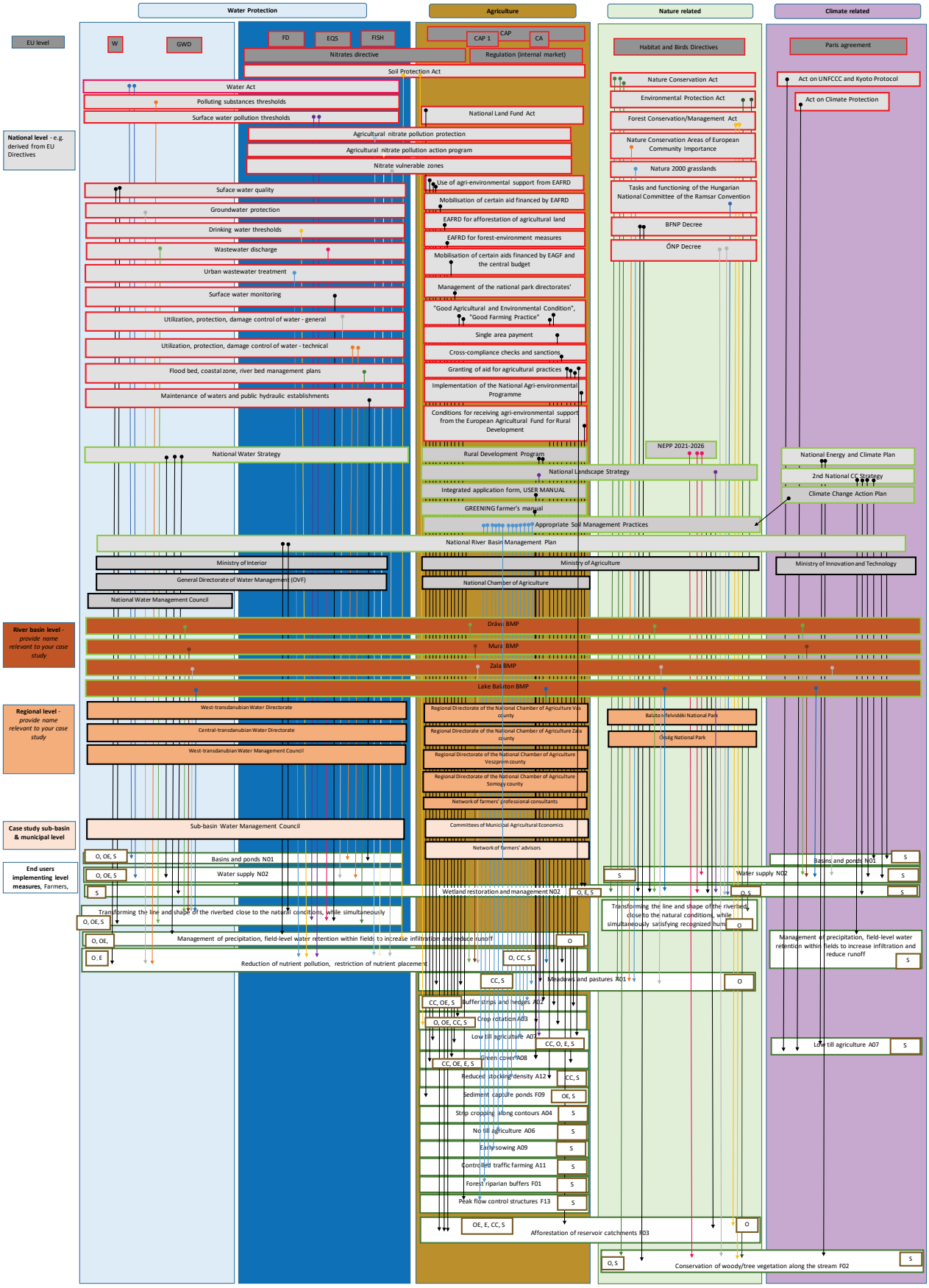

Figure 4. Visual overview of governance structure related to water-agriculture-environment-climate in Hungary.

3.1 Summary of situation

EU directives: Hungary implements WFD, GWD, FD, EQS, FISH, ND, CAP 1 and 2, Habitat D. and Birds D. and the Paris agreement in the context of the water-agriculture domain.
Governance of water and agriculture occurs mainly on national and regional level. On national level, the Ministry of Interior[4] and its sub-governmental directorate the General Directorate of Water Management (GDWM, OVF) are responsible for water management. The Ministry of Agriculture is resonsible for agriculture policy, and for nature and environmental protection legislation and policy. The Ministry for Innovation and Technology is responsible for policy regarding climate change. On regional level there are different directorates for water management and for agriculture, and there is administration for national parks. OVF coordinates the professional activities of the 12 regional Water Directiorates, which have been organized for catchment areas (not for administrative regions). Regional bodies of the Ministry of Agricultural are working in Governmental Offices.
Legislation referred to is adopted on national level. There is also a regulation of Local Construction Processes on municipal level that may authorize measures. No decentralized governance for climate on regional and municipal level.
Platform for coordination across sectors / actors are specified for river basin and sub-basin level with reference to the WFD, taking into account the requirements of the CAP, the ND, the Habitat and birds D. and Paris agreement.
Measures listed are authorised by national level legislation, some are identified in the WFD POM. The majority of the measures are authorized by legislation being the responsibility of the Ministry of agriculture. Also several measures are authorised by legislation being the responsibility of the General Directorate of Water Management and the Ministry of Interior. Several measures have soft incentives only. Some measures are obligatory.

3.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

3.2.1 Water management

The WFD, GWD, FD, EQS, FISH, and the ND are the responsibility of the Ministry of Interior and the General Directorate of Water Management. These EU directives are transposed into national level legislation by three main acts, the Water Act, Polluting substances thresholds; Surface water pollution thresholds. There are associated with the WFD established platforms for coordination of authorities and for involvement of actors on national, and river basin level, and on catchment level (sub-basin).

National level

Legislation: The following acts and regulations are developed by water / environmental authorities: Water Act, Polluting substances thresholds; Surface water pollution thresholds and regulations: Surface water quality; Groundwater

[4] Flood protection is a priority in Hungary as the territory of Hungary lies in the Carpathian Basin and is bordered by and crossed by several rivers, therefor water management is related to the Ministry of Interior. water damage control also includes excess water and water scarcity management.

protection; Drinking water thresholds; Wastewater discharge; Urban wastewater treatment; Surface water monitoring; Utilization, protection, damage control of water, Flood bed, coastal zone, river bed management plans, Maintenance of waters and public hydraulic establishments.
Institutions, organizations platforms: Ministry of Interior and its General Directorate of Water Management are responsible for the above legislation. National Water Management Council (coordinating council national level).
Strategies, programmes to be mentioned: National Water Strategy (responsible General Directorate of Water Management (GDWM); National River Basin Management Plan (responsible Ministry of Interior and GDWM).

Regional level and river basin level

River basin level: River Basin Management Plans are developed for each river basin by the respective Regional Water Directorates.
Legislation: No relevant legislation is developed by the county (regional level).
Institutions, organizations, platforms: Their role in the implementation of legislation and measures is to apply the general principles set out at national level to the practical level, and therefore to set the priority development directions and allocate the processes for implementation by allocating the funding. Also take part professionally in the process of planning and execution of water related construction works, projects.
Regional Water Directorates (of the GDWM, OVF) operating in the area of the CSs

- West-transdanubian Water Directorate
- Central-transdanubian Water Directorate
    - with the responsibility of implementation of legislation concerning water management

Water Management Council

- West-transdanubian Water Management Council
    - forum to review **RBMP**s, ensure public participation in the planning process, foster uniform implementation, coordination.

Strategies, programmes: Regional Water Directorates have development plans, strategies.

Local municipal / sub-basin level

Legislation: Regulation of Local Construction Processes is developed on municipal level and this regulation may specify measures for the protection of water and the environment. Otherwise, no water-environment legislation developed on local level.
Institutions, organizations platforms: Sub-basin Water Management Council
Strategies, programmes to be mentioned: Municipal development plans, Concept plans.
Measures and mechanisms:
Development of basins and ponds (E, , S):

(i) Utilization, protection, damage control of water – technical (EO, O, S); authorised by O.
(ii) (ii) Maintenance of waters and public hydraulic establishments (Water Act Ministry of interior), (N01, also address climate issues)

Overlap with nature: Transforming the line and shape of the riverbed close to the natural conditions, while simultaneously satisfying recognized human needs N05

Cross-cutting: Wetland restoration and management N02; Overlap with agriculture and climate: Management of precipitation, field level ; Overlap with agriculture: Reduction of nutrient pollution.

3.2.2 Agriculture

CAP 1 and 2 and the Regulation (internal market) are the responsibility of the Ministry of Agriculture. The EU polices are implemented by the Soil protection act.

National level

Legislation: The following acts and regulations are developed by the Ministry of Agriculture: the Soil Protection Act; National Land Fund Act; Agricultural nitrate pollution protection, Agricultural nitrate pollution action program; Nitrate vulnerable zones , and
The following regulations authorize measures in the water-agriculture domain : (1) Use of agri-environmental support from EAFRD; (2) Mobilisation of certain aid financed by EAFRD; (3) EAFRD for afforestation of agricultural land, (4) EAFRD for forest-environment measures, (5) Mobilisation of certain aids financed by EAGF and the central budget, (6) Management of the national park directorates' assets, Good Agricultural and Environmental Condition", (7) "Good Farming Practice", (8) Single area payment; (9) Cross-compliance checks and sanctions, (10) Granting of aid for agricultural practices; (11) Granting of aid for agricultural practices, (12) Granting of aid for agricultural practices; (13) Conditions for receiving agri-environmental support from the European Agricultural Fund for Rural Development
Institutions, organizations platforms: The ministry of Agriculture is the overall responsible ministry of agriculture policy making including development of the above acts and regulations. The National Chamber of Agriculture reviews, comments on draft legislation. National Chamber of Agriculture covers the whole domestic food chain, the agricultural production activity and the fields of rural development through its members. As a public body organized at national level with mandatory membership.
Strategies, programmes: Rural Development Program; Integrated application form User manual, Greening farmer's manual, Appropriate soil mang practices.

Regional level

Legislation: No legislation developed on regional level.
Institutions, organizations platforms: Regional directorates of the National Chamber of Agriculture has a role of supporting farmers and associations in the implementation of measures.
Regional Directorate of the National Chamber of Agriculture Vas county; Regional Directorate of the National Chamber of Agriculture Zala county; Regional Directorate of the National Chamber of Agriculture Veszprém county; Regional Directorate of the National Chamber of Agriculture Somogy county; Network of farmers' professional consultants
Strategies, programmes: No important relevant strategies or programs developed by the agricultural sector in the NSWRM (however - involvement in the preparation of such strategies).

Local municipal / sub-basin level

Legislation: No

Institutions, organizations platforms: Committees of Municipal Agricultural Economics, Network of farmers' advisors.
Strategies, programmes: No
Measures and mechanisms:
Wetland restoration and management - Management of precipitation, field-level water retention within fields to increase infiltration and reduce runoff; Reduction of nutrient pollution, restriction of nutrient placement – all obligatory, no economic incentives. (O, E, S) and (OS) authorized by Implementation of the National Agri-environmental Programme; Conditions for receiving agri-environmental support from the European Agricultural Fund for Rural Development; ŐNP Decree, BFNP Decree, Tasks and functioning of the Hungarian National Committee of the Ramsar Convention (N02, also adress water protection and climate issues).
Meadows and pastures A01 (cc, s) and Afforestation of reservoir catchments F03 (OE, E, CC, S) (also address measures overlap with environmental protection Agriculture Buffer strips and hedges A02 (cc, oe, s), Crop rotation A03 (O, OE, CC, S), Low till agriculture A07 (CC, O, E, S), Green cover A08 (CC, OE, E, S), Reduced stocking density A12 (CC, S), Sediment capture ponds F09 (OE, S).
Strip cropping along contours A04, No till agriculture A06, Early sowing A09, Controlled traffic farming A11, Forest riparian buffers F01, Peak flow control structures F13 Voluntary measures / only soft incentives.

3.2.3 Biodiversity / Nature

National level

Legislation: Habitat and Birds Directives is implemented through Nature Conservation Act; Environmental Protection Act; Forest Conservation/Management Act; Nature Conservation Areas of European Community Importance; Natura 2000 grasslands; Tasks and functioning of the Hungarian National Committee of the Ramsar Convention; BFNP Decree; ŐNP Decree.
Institutions, organizations platforms: Ministry of Agriculture
Strategies, programmes: NEPP 2021-2026,
Some overlapping with other topic areas (agriculture, climate): National Landscape Strategy, Appropriate Soil Management Practices, National River Basin Management Plan.

Regional level

Legislation: No
Institutions, organizations platforms: Balaton-felvidéki National Park, Őrség National Park.
Strategies, programmes: Involvement in the preparation of 4 BMPs.

Local level

Legislation: No; **Strategies, programmes:** No
Measures and mechanisms:
Overlap with water protection: Transforming the line and shape of the riverbed close to the natural conditions, while simultaneously satisfying recognized human needs N05 (O).
Cross-cutting: Wetland restoration and management N02 (O, S),

Overlap with climate: Water supply N02 (S) and Conservation of woody/tree vegetation along the stream F02 (o,s)
Overlap with agriculture: Meadows and pastures A01 (o), Afforestation of reservoir catchments F03 (o)

3.2.4 Climate

National level

Legislation Act on UNFCCC and Kyoto Protocol; Act on Climate Protection (responsibility Ministry of Innovation and Technology)
Institutions, organizations platforms : Ministry of Innovation and Technology is responsible for the above legislation. Ministry has defined tasks which are led by State Secretaries. The State Secretary for the Development of the Circular Economy, Energy and Climate Policy is the responsible person for the exact task which is mentioned in the worksheet.
Strategies, programmes: National Energy and Climate Plan; 2nd National CC Strategy; Climate Change Action Plan and National River Basin Management Plan (cuts across all topics).

Regional level

Strategies, programmes: 4 BMPs

Local level

Measures :
No obligatory measures on climate, only soft incentives.
Overlap with water protection: Basins and ponds **N01,**
Overlap with agriculture: Low till agriculture **A07,**
Overlap with water protection and agriculture: Management of precipitation, field-level water retention within fields to increase infiltration and reduce runoff,
Cross-cutting: Wetland restoration and management **N02**
Overlap with environment: Water supply **N02,** Conservation of woody/tree vegetation along the stream **F02**

4. Slovenia (Pesnica) governance structure

Visual overview

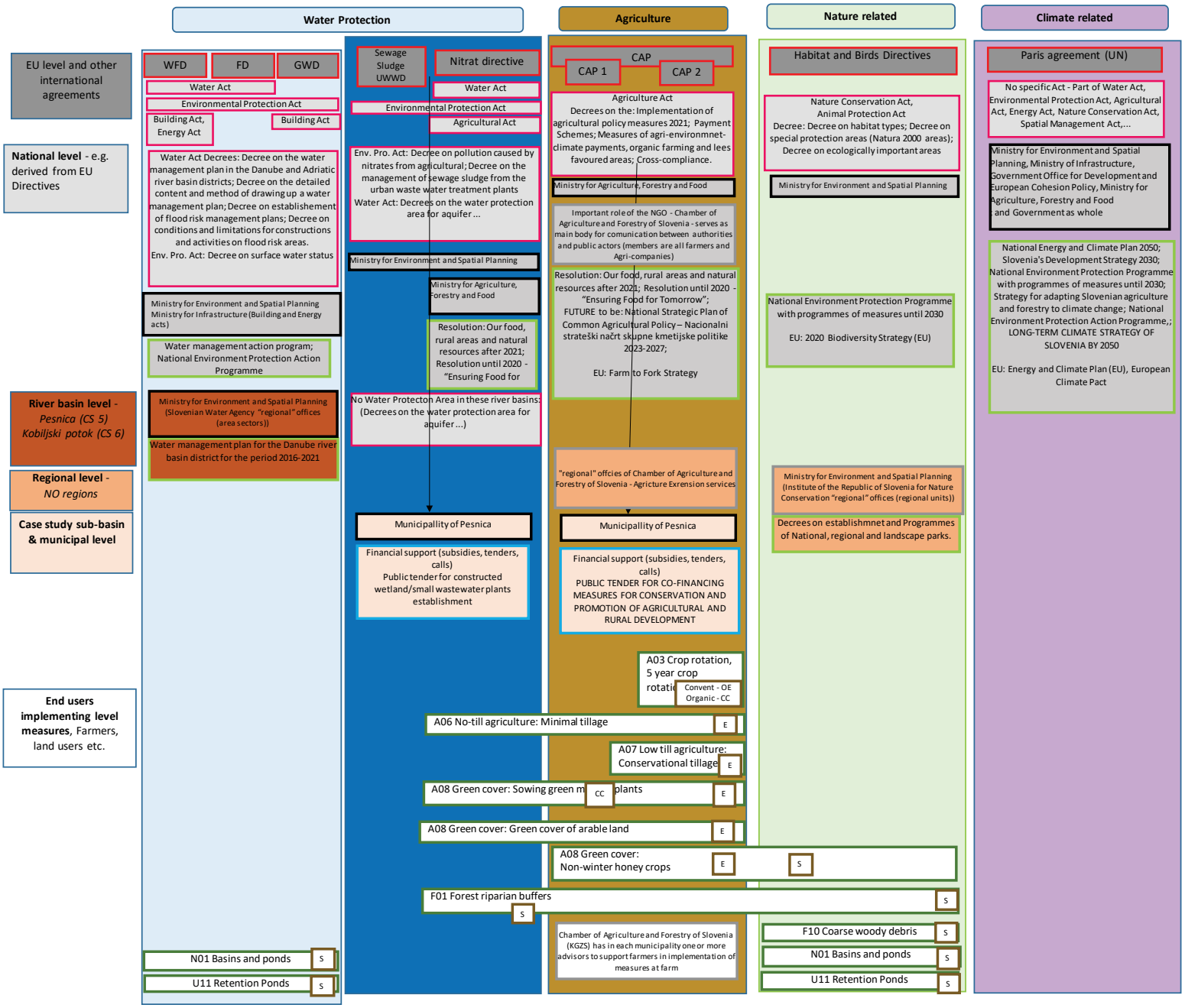

Figure 6. Visual overview of governance structure related to water-agriculture-environment-climate in Slovenia.

4.1 Summary of situation

EU directives and international climate agreements: In the context of the water-agriculture domain context Slovenia implements all EU policies (WFD, FD, GWD, ND, Urban waste water, CAP 1, 2, Habitat and Birds D, and supports UN Paris agreement on climate change. All legislation that has to be implemented based on international agreements has to be agreed at the Governmental level and confirmed in the parliament.

Governance for management of water and agriculture mostly occurs on national level. Ministry for Environment and Spatial Planning (MOP) is responsible for Water and Nature protection legislation (WFD, FD, GWD, partly ND, Habitat and Birds Directive, Urban waste water). Ministry for Agriculture, Forestry and Food (MKGP) is responsible for agricultural legislation (CAP) and for Nitrate directive legislation. It is also responsible to incorporate in agriculture legislation measures to address other environmental directives under MOP jurisdiction.
Legislation: Water Act with decrees implements the WFD, Urban waste water, FD, GWD and partly ND is responsibility of (MOP). The Agriculture Act and Livestock Farming Act with decrees implement the CAP and ND are responsibility of (MKGP). The Environmental Protection Act and Nature Conservation Act with decrees implement Habitat and Birds Directive and are responsibility of MOP.
Platform for coordination: central platform dealing with cross-sectional challenges does not exists. Different ad-hoc platforms are formed as public discussion events (River Basin Management Plans; Rural development Plan). Enthusiastic public servants and NGOs representatives compensate for the lack of initiatives. Central web-hub for information on waters is available.[5]
Measures: Most of the soil management measures is regulated and supported by agriculture governance. Hydrotechnical measures are regulated by environment and spatial planning governance. Most measures are voluntary, and obligatory only if financial support is given. Hydrotechnical measures are often subject to public debate and controversy by environmental NGO or civil society. Climate related topics are spread across different legal documents and managed mostly by Government as whole by support of ministries responsible for Environment, Infrastructure, Agriculture, Development and European Cohesion Policy. Measures have multiple purposes.

4.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

EU directives and international agreements and national level responsible authorities: Slovenia implements all EU legislation (WFD, FD, GWD, ND, Urban waste water, CAP 1, 2, Habitat and birds D) and Paris agreement. There are many associated legal acts; where one is overarching the individually topic of water, environment, agriculture and nature while climate related topics are spread across different acts. For the environmental issues' is responsible one national institution, the Ministry for Environment and Spatial planning (MOP). There is also one national level institution responsible for agriculture, Ministry for agriculture, forestry and food (MKGP).

4.2.1 Water management

The Ministry for Environment and Spatial Planning (MOP) is the national level institution for water, environment and nature. The legislation and national Action Programmes adopted on national level provide frames for planning work on river basin level or in the protection areas. These are implemented by Water Agency and Institute for Nature Conservation. WFD is implemented by means of the Water act and Decree on the water management plan in the Danube and Adriatic river basin districts which are responsibility of the Ministry for

[5] http://www.evode.gov.si/

Environment and Spatial Planning (MOP). River network and water bodies are in jurisdiction of MOP. The ND is implemented by means of the Agriculture act and Decree on the protection of waters against pollution caused by nitrates from agricultural sources which are responsibility of the Ministry for Ministry for Agriculture, Forestry and Food (MKGP). Drainage systems after implementation are in jurisdiction of MKGP. New drainage systems are not allowed.

National level

Legislation: The WFD, FD and ND are implemented mainly in the Water Act and supported in the Building Act, Energy Act, Environment Protection act and Agricultural Act. The GWD and UWWD are supported in the Environment Protection Act. The responsible ministry is the MOP.
The Nitrate directive (Nitrate vulnerable zone covers the entire territory of the country) is govern by Ministry responsible for environment, however agricultural matters (fertilisation, storage) are dealt by Ministry responsible for agriculture.
Institutions, organizations platforms: The main responsible ministry is MOP (it can be noted that agricultural and Infrastructure authorities share part of the responsibility). Coordination of authorities and involvement of actors on national level is done at the stage of public debate about Strategies or Action Programmes.
Platform for coordination: central platform dealing with cross-sectional challenges does not exists. Different ad-hoc platforms are formed as public discussion events (River Basin Management Plans; Rural development Plan). Enthusiastic public servants and NGOs representatives compensate for the lack of initiatives and lack of organised platforms. Central web-hub for information on waters is available.[6]
Strategies, programmes to be mentioned: There are national action programmes. This Water management action program; National Environment Protection Action Programme.

River basin level[7]

Slovenian Water Agency "regional" offices (area sectors) implement national acts in practice at river basin level. The area sectors are geographical branches of the Water Management Office, organised by river basins, sub-basins and areas with the aim of better knowledge and more efficient water management.
River basin level: Water management plan for the Danube river basin district for the period 2016-2021 and 2022-2027, exists responsible body is MOP – Water Agency (corresponds to Pesnica river and Kobiljski potok). The other water management plan is for Adriatic river basin. There is national monitoring programme and maintenance work programme for each river basin that has steady national financing. There is programme of measures, but without solid and permanent financing. Financing is usually project base with finances coming from EU or national funds. Most of the money goes in flood protection.
Institutions, organizations platforms: Slovenian Water Agency "regional" offices (area sectors) for implementing legislation at river basin level.
Strategies, programmes: Water management plan for the Danube river basin district for the period 2016-2021 and 2022-2027.

[6] http://www.evode.gov.si/
[7] Regional level does not exist as formal authorities' structure.

Local level

Legislation: No regulations on municipal, sub-basin or local level.
Institutions, organizations platforms: No Sub-basin district committee and working groups, with responsibility for implementation of regulations or policies.
Strategies, programmes: No particular programme or strategy on local level. of measures for water bodies is developed on municipality level (WFD). Only national level river basin level programme of measure for individual river basin under pressure.
Measures and mechanisms: Basins and ponds (S), retention ponds (S), flood protection.

4.2.2 Agriculture

EU level: CAP 1 and 2, EU: Farm to Fork Strategy
Central web-hub for information on agriculture is available.[8]

National level

The CAP 1, 2 are the EU policy being implemented. In 2023: National Strategic Plan of Common Agricultural Policy – 2023-2027
Legislation: Overarching national act implementing CAP 1 and 2 is Agriculture Act with additional decrees on the: Implementation of agricultural policy measures 2021; Payment Schemes; Measures of agri-environment-climate payments, organic farming and lees favoured areas; Cross-compliance, etc.
Institutions, organizations platforms: Ministry for agriculture, forestry and food (MKGP).
Acts, strategy documents and guidelines adopted on national level provides frames for measure implementation at farm level of areas under protection (nature, less favoured areas, drinking water). Important role plays the NGO - Chamber of Agriculture and Forestry of Slovenia (KGZS https://www.kgzs.si/) – which serves as main body or as platform for communication between authorities and public actors on national, regional, local level or farm level (members are all farmers and Agri-companies in Slovenia).
The KGZS is a professional and political advisory body establish by national act. It also incorporates Agricultural Advisors Extension service for farmers which is 60-80% financed by state (MKGP).
Strategies, programmes: Resolution: Our food, rural areas and natural resources after 2021; Resolution until 2020 - "Ensuring Food for Tomorrow"; Rural Development Program of the Republic of Slovenia for the period 2014–2020 until 2022, after 2022 National Strategic Plan of Common Agricultural Policy (2023-2027).

Regional level

Legislation: No
Institutions, organizations platforms: Chamber of Agriculture and Forestry of Slovenia (KGZS) has "regional" offices of Agricultural Advisory Extension service for farmers to support them in implementing measures.
Strategies, programmes: No

Local level

Legislation: No

[8] https://skp.si/ and https://rkg.gov.si/vstop/

Institutions, organizations platforms: Chamber of Agriculture and Forestry of Slovenia (KGZS) has for each municipality one or more advisors to support farmers in implementation of measures at farm
Certain, more agricultural oriented municipalities (e.g. Pesnica) have special programmes to financial support (20-30% of investment) for certain agricultural activities in addition to subsidy payment under CAP.
Strategies, programmes: No
Measures and mechanisms: Crop rotation (OE, CC), No-till/Min-till (E), Low-till-Conservation tillage (E); Green cover (CC, E), Riparian buffers (S) (*all measures regulated for by national level lex*).

4.2.3 Biodiversity / Nature governance

Habitat and Birds Directives; EU: 2020 Biodiversity Strategy (EU) implemented by Ministry for Environment and Spatial Planning (MOP) in the Environmental Protection Act, Nature Conservation Act and decrees on habitat types, special protection areas (Natura 2000 areas) and ecologically important areas.

National level

Legislation: Overarching: Nature Conservation Act, Animal Protection Act, and decrees: Decree on habitat types; Decree on special protection areas (Natura 2000 areas); Decree on ecologically important areas
Institutions, organizations platforms: Ministry for Environment and Spatial Planning (MOP) - Lex. Institute of the Republic of Slovenia for Nature Conservation – implementation - Institute's key tasks are compliance with the Law on nature protection
Strategies, programmes: National Environment Protection Programme with programmes of measures until 2030, Natura 2000 site management program for the period 2015 - 2020 (prolongation till 2022).

Regional level

Legislation: National level protection on regional or local level by Decrees on establishing National, regional and landscape parks
Institutions, organizations platforms: Institute of the Republic of Slovenia for Nature Conservation "regional" offices (regional units), National, regional and landscape parks management offices.
Strategies, programmes: Programmes of action for National, regional and landscape parks and other protected areas. Protected areas consist of one national park, three regional and 34 landscape parks and 66 nature reservations and over 1200 natural monuments which cover 13% of Slovenian territory.

Local level (municipality, farm, landowner)

Legislation: No
Institutions, organizations platforms: No
Strategies, programmes: No
Measures and mechanisms:
Green cover (S); Coarse woody debris (S), Basins and ponds (S), Retention ponds (S). Regulated by national Lex., associated with Habitat and Bird directive. Measures for agricultural land are financed by CAP and state budget (Ministry for agriculture MKGP). In other land uses (water, forest, nature areas) by state budget (Ministry for Environment – MOP).

4.2.4 Climate mitigation governance (agriculture sector)

Paris agreement, Energy and Climate Plan (EU), European Climate Pact

National level

Legislation No, scattered among many Acts in responsibility of many ministries.
Institutions, organizations platforms: Ministry for Environment and Spatial Planning, Ministry of Infrastructure, Government Office for Development and European Cohesion Policy, Ministry for Agriculture, Forestry and Food; and Government as whole.
Strategies, programmes: Long-term climate strategy of Slovenia by 2050, National Energy and Climate Plan 2050; Slovenia's Development Strategy 2030; National Environment Protection Programme with programmes of measures until 2030; Strategy for adapting Slovenian agriculture and forestry to climate change; National Environment Protection Action Programme.

Regional level

Legislation, Institutions, organizations platforms, Strategies, programmes: No relevant legislation being developed at regional level, institutions or strategies identified for regional level.

Local level

Legislation, Institutions, organizations platforms, Strategies, programmes: No relevant legislation being developed at local level, institutions or strategies identified at local level.
Measures and mechanisms: Current Rural development plan also address climate change: No-till, crop rotation, sustainable agriculture, green cover - greening (catch crops), organic agriculture, harvest residues remaining on land – no burning, maintain permanent grassland on wetland and peatland areas (no ploughing). New National Strategic Plan of Common agriculture policy will implement specific objective 4: contributing to mitigation and adaptation to climate change and sustainable energy, and specific objective 5: to promote sustainable development and efficient management of natural resources such as water, soil and air.

5. Belgium (La Wimbe) governance structure

Visual overview

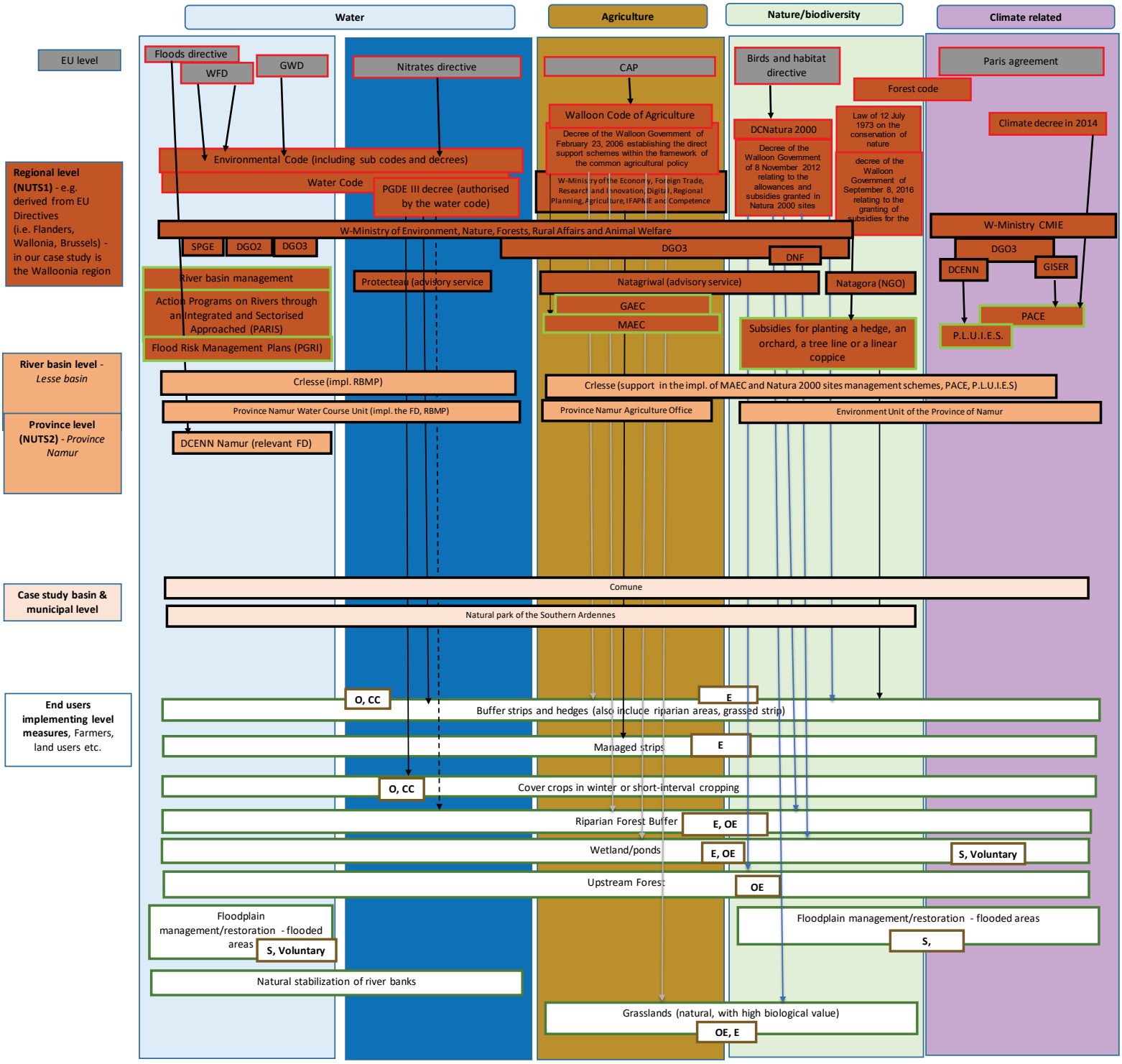

Figure 7. Visual overview governance structure related to water-agriculture-environment-climate in Belgium.

5.1 Summary of situation

EU directives: Belgium implements the WFD, GWD, ND, Urban waste water D., CAP 1, 2, Birds D, Habitat D, ,Paris agreement and flood directive in the context of

the water agriculture domain. The regions in Belgium are autonomous, hence policy arrangements may differ across regions.
Governance: Development of environmental legislations related to freshwater occurs in regions in Belgium, no national level involved. In line with this, water - agriculture policy making occurs mostly on region level, this includes development of the river basin management plan, and the identification of the MAEC and the GAEC. The Ministry Environment, Nature, Forests, Rural Affairs and Animal Welfare (ENRA) is responsible for nature, and water management. The Minister of Economy, Foreign Trade, Research and Innovation, Digital, Land Use Planning, Agriculture (EFSA) is responsible for spatial planning, pricing policy, financial intervention following damage caused by agricultural disasters. The Ministry of Climate, Energy, Mobility and Infrastructure is concerned with greenhouse gas emissions.
Legislation: The Environmental code (Book I and II) being promulgated by eight ministries, including among others EENRA. The Environmental code authorizes among others the water decree and the PDGE law. The water code is the main responsibility of the ENRA. The EFSA is responsible for the CAP and associated legislation. The Ministry of Nature is responsible for the DCNatura 2000, and related measures. No specific climate legislation, but other codes as the Forest code is relevant for climate mitigation and adaptation.
Measures listed are authorized by legislation by the Wallonie region. The majority of the measures are authorized by the DC Natura 2000 being the responsibility of the ENRA. Several measures as buffer strips are and cover crops are authorized both by water / environmental legislation and by the DC Natura 2000. Several measures are either cross compliance or obligatory. Most measures have in addition economic incentives /support. Some soft measures have only soft incentives.

5.2 Water, agriculture and climate: EU directives, and regional legislation, policies and actors

5.2.1 Water management

The WFD, GWD, the FD and the ND are implemented by the Environmental Code and the associated Water code, and the PGDE III.

Regional level

Legislation: The Environmental Code and the two associated legislations, the Water code, and the **Program for the Sustainable Management of Nitrogen in Agriculture** (PGDE III) are the core legislation for water protection and governance in the Wallonie region. The 2014, the current version of the programme is the main responsibility of *both* the Minister for the Environment, Spatial Planning and Mobility and the Minister for Public Works, Agriculture, Rural Affairs, Nature, Forestry and Heritage. The Ministry Environment, Nature, Forests, Rural Affairs and Animal Welfare (ENRA) was responsible for the version from 2009.
Institutions, organizations platforms: The W-Ministry ENRA is responsible for water and environmental governance, *and* agricultural governance. There are several directorates and agencies associated with this ministry.
For water and environmental governance the following are important, Wallonie Service Public (SPW) include the Directorate General for Agriculture, Natural

Resources and Environment (DGO3) and its department Nature and Forests (DNF), and the Directorate General of Mobility and Waterways (DGMVH or DGO2) being responsible for implementation of polices adopted by the ENRA ministry. This directorate is also responsible for administration of subsidizing the measures, and for checking and control.
Coordination of authorities for involvement: There are no platforms for coordination discussion among actors in Wallonie region. See River basin level.

River basin and province level

River basin level: The River Committee, to express their wishes on the quality of their rivers, to hear and take into account the point of view of others and thus establish together priorities in the actions to be programmed.
Crlesse river contract is responsible for the development and the implementation of the river basin management plan. The River Contract consists of bringing all the actors of the valley around the same table, with a view to defining by consensus a program of actions to restore the rivers, their surroundings and the water resources of the basin. Representatives of the political, administrative, teacher, socio-economic, associative, scientific worlds attend this process. Crlesse River Contract responsible for the management of the river basin, including such as monitoring (14 in the Wallonie region, developed in 1993) (each presented at a website). River Contracts are quite visible, these are accessible from websites, and they are visible in their domain river basin. They do also perform educational activities.
Province level:
Legislation: No legislation developed.
Institutions, organizations platforms: Province Namur Water course Unit.
Strategies, programmes: The province contributes to the development programme of measures to be included into the river basin management plan; the province – the water course unit develops and defines the, Mesures Agro Environnementales et Climatiques (MAEC) , and the Good agricultural and environmental practices (General) (GAEC)

Local level[9]

Legislation; Strategies, programmes to be mentioned: No particular identified for the Optain project context.
Institutions, organizations platforms: The Commune, Parc naturel de l'Ardenne Méridionale (Natural park of the southern Ardennes)
Measures (only those regulated by legislation are mentioned):
Buffer strips and hedges including riparian areas, grassed strip (O CC) is regulated by the Program for the Sustainable Management of Nitrogen in Agriculture (PGDE II) under the Environmental code.
Cover crops in winter or short-interval cropping (O, CC) regulated by the PDGE II.

5.2.2 Agriculture

The CAP 1, 2, the HD, the BD is transposed on Wallonie region level by means of the DC Natura 2000 Decree with reference to the conservation of Natura 2000 sites. Subsidies and compensation of MAEC measures related to DC Natura 2000 is under the CAP according to the lex published in 2012.

[9] The commune (in the Wallonia region)

Coordination of different sector and environmental authorities in the context of agriculture of actors on national, regional and local level. The GISER platform has a mission is to improve knowledge of erosive phenomena, issue technical recommendations, to stimulate the sharing of experiences, and to inform on the methods of integrated soil erosion and runoff management. The unit works in partnership with the provincial agricultural, river contracts, agricultural sectors, agri-environmental advisors, numerous agricultural support associations and farmers.

Regional level

Acts, strategy documents and guidelines are adopted by the Wallonia region provides frames for planning work on province level and local level.
Legislation: The CAP 1, 2, the HD, the BD are associated EU policy being implemented HD and BD = DC Natura 2000 Decree to the conservation of Natura 2000 sites.
Institutions, organizations platforms: W-Ministry ENRA; EFSA; sector specific : DGO3 and DNF., Natagriwal (also climate)
Strategies, programmes:
River basin management plan (RBMP), Good agricultural and environmental practices (GAEC); Planting subsidies, MAEC.

Province level

Legislation*:* No particular lex.
Institutions, organizations platforms: The Province agricultural office CrLesse
Strategies, programmes: Good agricultural and environmental practices (GAEC); Planting subsidies, MAEC under the CAP.

Local level

Legislation : No
Institutions, organizations platforms : Commune, Parc naturel de l'Ardenne Méridionale
Strategies, programmes:
Measures and mechanisms:
Buffer strips and hedges, including riparian areas, grassed strip (E) authorised by DC Natura 2000
Managed strips (E; strategy)
Riparian Forest buffer (OE, E) authorised by the DC Natura 2000.
Wetland (OE, E DC) authorised by the DC Natura 2000;
Upstream Forest (OE, DC) authorised by the DC Natura 2000
Grasslands (natural, with high biological value) - subsidy only from MAEC, DCNatura2000, not from planting subsidies

5.2.3 Biodiversity / Nature governance

Wallonie region level

Legislation: No; **Institutions:** No; **organizations platforms:** No;
Strategies, programmes: No

River basin and province level

Legislation: No; **Institutions, organizations platforms:** No; **Strategies, programmes:** No

Local level

Legislation: No; **Strategies, programmes:** No; **Institutions, organizations platforms:** No; **Measures and mechanisms:** No

5.2.4 Climate governance

The Paris agreement is implemented.

Regional level

Legislation: No climate specific legislation being developed. But the Forest Code addresses strategies that are relevant for climate adaptation and mitigation. Plan Air Climat Énergie à l'horizon 2030 (PACE 2030) (Climate Decree in 2014) it addresses flood hazard map.
Institutions, organizations platforms : The Wallonie ministry of Climate, Energy, Infrastructure and Mobility; DGO3; DCENN developed the Flood Risk Management Plans (PGRI) is included, included in the PACE (P.L.U.I.E.S. which was prepared by DCENN, GISER. Natagriwal)
Strategies, programmes: Planting subsidies, P.L.U.I.E.S. , PACE.
Good agricultural and environmental practices (GAEC).

Province level

Legislation: No climate specific legislation developed at this level.
Institutions, organizations platforms: Cross sectoral: Crlesse; Province water course unit, DCENN
Strategies, programmes: PACE, P.L.U.I.E.S.

Local level / case study basin level

Legislation : No
Institutions, organizations platforms: Commune, Parc naturel de l'Ardenne Méridionale.
Strategies, programmes:
Measures and mechanisms: no lex, only strategies.
**Floodplain management/restoration - flooded areas (S, Voluntary). Several of the measures authorised for leg by agric. authorities are specified as strategies for climate.

6. Lithuania (Dotnuvele) governance structure

Visual overview

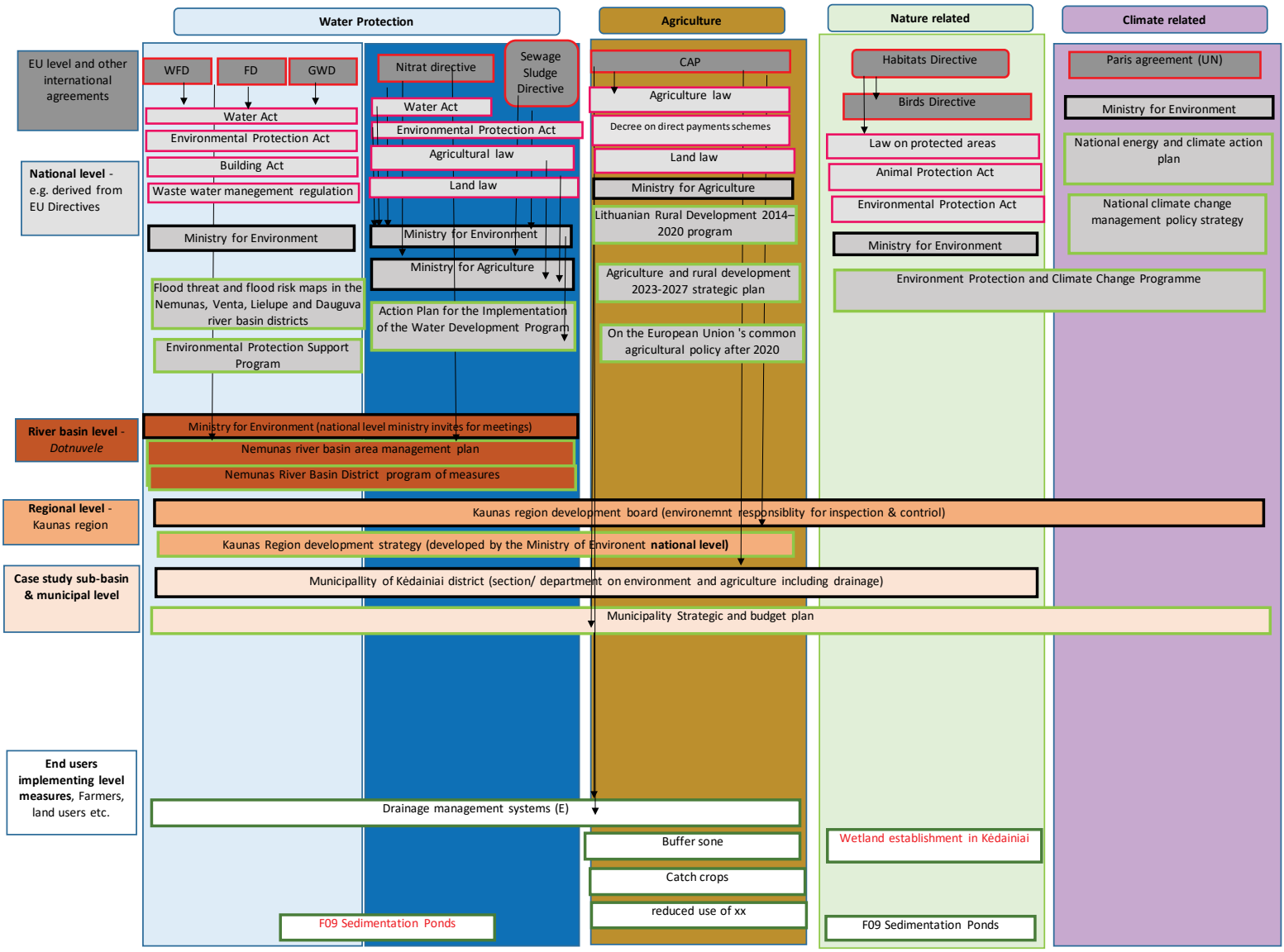

Figure 8. Visual overview governance structure related to water-agriculture-environment-climate in Lithuania.

6.1 Summary of situation

EU directives and international climate agreements: In the water agriculture domain and NSWRM context Lithuania implements WFD, GWD, FD, ND, CAP 1, 2, Habitat and birds D, and the Paris agreement.

Governance of water, nature, agriculture and climate change mitigation occurs primarily on national level in Lithuania. The Ministry of Environment is responsible for governance of water nature, and climate, and for developing the River basin district action program and management plan. The Ministry of Agriculture is responsible for governance of agriculture.

Legislation: Eight national level laws are identified on national level. No relevant regional laws are identified, (one decree municipal level. The ministry of

Environment is responsible for legislation concerning water, environment and nature, the Ministry of Agriculture is responsible for the agricultural law and the land law.
Measures:

- Drainage management systems
- Wetland establishment
- F09 Sedimentation Ponds

6.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

6.2.1 Water management

EU directives and international climate agreements: The WFD, FD, GWD are implemented by means of 3 acts and 1 regulation: the Water act, the Environmental protection act, the Building act, and the Waste water management regulation. The Ministry of Environment is responsible for their implementation. The ND and the SSD are similarly implemented by the Water act, the Environmental protection act, an also the Agricultural law and Land law for which the Ministry for Agriculture is also responsible.

National level

Legislation: The Water act, the Environmental protection act, The Building act, and the Waste water management regulation, these acts and regulations are the responsibility of the Ministry of Environment.
Institutions, organizations platforms: Ministry of Environment that is responsible for their implementation.
Platform for coordination: No platform identified for coordination purposes across national authorities.
Strategies, programmes to be mentioned: (i) Flood threat and flood risk maps in the Nemunas, Venta, Lielupe and Dauguva river basin districts; (ii) Law of the Republic of Lithuania on Environmental Protection Support Program, (iii) Action Plan for the Implementation of the Water Development Program 2017–2023.

Regional level

River basin level: Institution: Ministry of Environment; **Policy, programme**: Nemunas River Basin District action program; Nemunas river basin area management plan
Legislation: No acts or decrees developed on regional level identified.
Institutions, organizations platforms: Kaunas region development board (cross sector institution).
Strategies, programmes: Kaunas Region development strategy.

Local level

Legislation: No acts or decrees developed on municipal level identified.
Institutions, organizations platforms: Municipality of Kėdainiai district;
Strategies, programmes to be mentioned: Municipality Strategic and budget plan (across all sectors)
Measures and mechanisms: Drainage management systems; sedimentation ponds.

6.2.2 Agriculture

The agriculture law implements the CAP, the CAP provides frames for the Kaunas Region development strategy.

National level

Legislation: Agriculture law, Land law. (the responsibility of the Ministry of agriculture).
Institutions, organizations platforms: Ministry of Agriculture responsible for implementation of CAP and laws.
Strategies, programmes: (i) Lithuanian Rural Development 2014–2020 program, (ii) Agriculture and rural development 2023-2027 strategic plan, and (iii) On the European Union 's common agricultural policy after 2020.

Regional level

River basin level: Ministry of environment**;** Nemunas River Basin District action program; Nemunas river basin area management plan.
Legislation*:* No acts or decrees developed on regional level identified.
Institutions, organizations platforms: Kaunas region development board (cross sector institution).
Strategies, programmes: Cross-sector: Kaunas Region development **strategy –** being developed by the Kaunas region development board.

Local level

Legislation : Decree on direct payments schemes
Institutions, organizations platforms : Municipality of Kėdainiai district; Ministry of Environment.
Strategies, programmes: Municipality Strategic and budget plan (cross sectors)
Measures and mechanisms: wetland establishment; Drainage management systems.

6.2.3 Biodiversty / Nature

Habitat and birds directive

National level

Legislation : Law on protected areas; Animal Protection Act; Environmental Protection Act
Institutions, organizations platforms: It is the ministry of environment that is responsible.
Strategies, programmes: Environment Protection and Climate Change Programme (also climate).

Regional level

Legislation : **Institutions, organizations platforms: Strategies, programmes:** The Kaunes region development boards is overall responsible, otherwise no regulations, authorities / platforms, strategies relevant on regional level for management of nature.

Local level

The municipality Municipallity of Kėdainiai district and the municipality strategic and budget plan informs the policy focus. Otherwise no legislation, strategies, programmes.
Measures and mechanisms: Sedimentation ponds.

6.2.4 Climate

Paris agreement

National level

Legislation : No
Institutions, organizations platforms : Ministry of Environment
Strategies, programmes: National energy and climate action plan; National climate change management policy strategy , Environment Protection and Climate Change Programme (also environment).

Regional level

Legislation: No
Institution: cross-sector Kaunas region development board

Local level

Legislation; Institutions, organizations platforms: No relevant information local level identified. **Measures:** No particular identified.
Strategy : Municipality Strategic and budget plan.

7. Italy (Cherio) governance structure

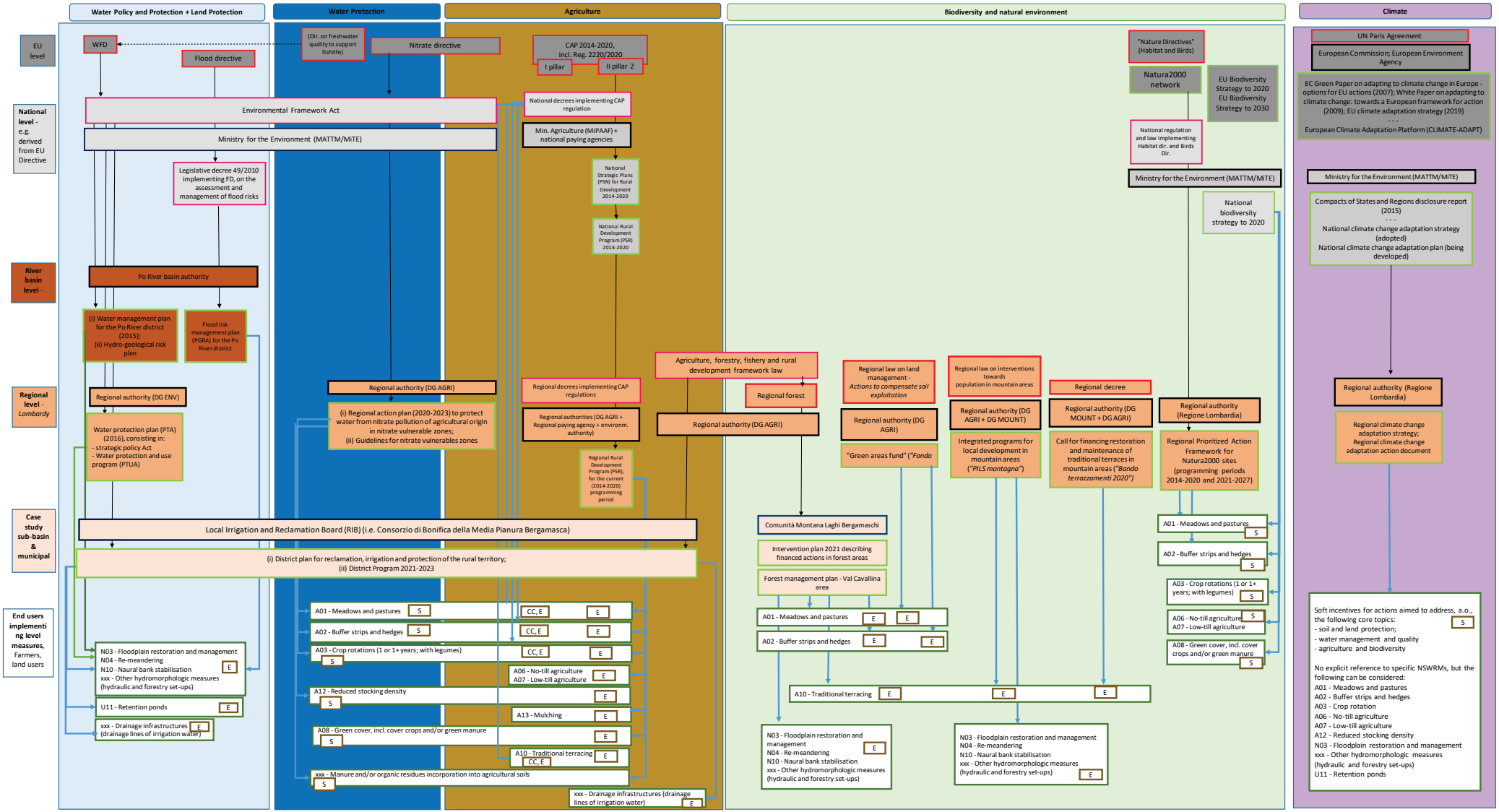

Figure 9. Visual overview of governance structure related to water-agriculture-environment-climate in Italy.

7.1 Summary of situation

EU directives and international climate agreements: Italy implements WFD, FD, ND, CAP, Habitats and birds directive, EU biodiversity strategy and the UN Paris agreement.
Governance: On national level the Ministry of environment is responsible for implementing EU directives and strategies for the protection and preservation of natural resources and the environment, as well as water protection and the national laws for water protection and management, and biodiversity strategies, and climate change adaptation strategies. The Ministry of Agriculture is responsible for the CAP and the agricultural decrees. On regional level, regional authority (DG Environment, DG Agriculture, DG territory) for water and agricultural legislation.
Legislation: There is a regional law towards population in mountain areas (developed by DG Env) and Regional forest regulations (NFR). No legislation on municipal level.
Measures: Only soft incentives for measures regulated for by water protection legislation, being the responsibility of env. authorities. Economic incentives for measures regulated for by agricul. legislation being the responsibility of agric. authorities. Also economic incentives for biodiv. (regulated by own regional regulations and calls not depending on national ones. No obligatory measures.

7.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

7.2.1 Water management

National level

Legislation: The WFD is implemented by the Environment framework decree (Legislative Decree 152/2006) issued by the Ministry for the Environment, which also transposes the GD and the ND, and repeals Directive 44/2006 on freshwater quality to support fishlife.
The FD is implemented by Legislative decree 49/2010; The Water quality standards directive is implemented by the Legislative decree 219/2010.
Institutions, organizations platforms: The Ministry of Environment is responsible for the decrees implementing directives mentioned above.
Strategies, programmes to be mentioned: No relevant strategies on national level mentioned.

Regional level[10]

River basin level: Po River basin authority
Strategies: Flood risk management plan for the Po River district; Water management plan for the Po River district (2015); Hydro-geological risk plan.
Regional level:
Legislation: In general, not issued at regional level, only application (also by specific strategies) of national regulation acts.
Institutions, organizations platforms: Regional authority, DG environment and Agriculture are responsible for the implementation of actions and strategies complying with the (inter)national legislation.

[10] Lombardy region and river basin Oglio/Po

Strategies, programmes: Water protection plan (latest update 2016) in compliance with WFD; regional actions plan to protect water against nitrates of agricultural origin and guidelines to identify nitrate vulnerable zones, to comply with requirements stated in ND.

Local level

Legislation: No.
Institutions, organizations platforms: Local Reclamation and Irrigation Board (RIB)is responsible for the implementation of actions and strategies complying with the (inter)national legislation
Strategies, programmes to be mentioned: District plan for reclamation, irrigation and protection of the rural territory; District program 2021-2023, both issued by the RIB.
Measures and mechanisms: N03
Economic subsidies: N03 - Floodplain restoration and management; N04 - Re-meandering; N10 - Natural bank stabilisation; Other hydro-morphologic measures (hydraulic and forestry set-ups); U11 - Retention ponds; Drainage infrastructures (drainage lines of irrigation water).

7.2.2 Agriculture

(Nitrate directive on water protection form pollutants of agricultural origin); Common Agricultural Policy.

National level

Legislation: National decrees implementing CAP regulation, issued and managed by Ministry for Agriculture and the national paying agency
Institutions, organizations platforms: The Ministry for Agriculture is responsible for the implementation of the CAP and the related regulations. The ministry shares the responsibility with the ministries of environment and health for the action plan on pesticides.
Strategies, programmes: National action plan on pesticides, national rural development plan and proposals for the next CAP programming period (tbd).

Regional level

Legislation:

- Regional decrees implementing CAP regulations elaborated by regional authority (DG Agriculture)
- Cross -sector law (agriculture+environment) on agriculture, forestry, fishery and rural development framework law

Institutions, organizations platforms: Regional authority (DG AGRI), together with regional paying agency, is responsible for development, management, application of the CAP legislation and others above.
Strategies, programmes: Regional Rural Development Plan (CAP II pillar) elaborated by regional authority (DG Agriculture):

Local (municipal / sub-basin) level:

Legislation: No
Institutions, organizations platforms: Local Reclamation and Irrigation Board.
Strategies, programmes: District plan for reclamation, irrigation and protection of rural territory; District program 2021-2023 are cross-sector strategies (indirectly affecting agricultural activities through the management of irrigation water).

Measures and mechanisms: RDP subsidies through economic incentives (included cross-compliance) multiple agricultural measures: Meadows and pastures; crop rotations; no-till agriculture; low-till agriculture; reduces stocking density; green cover (including cover crops and/or green manure); manure and/or organic residues incorporation into agricultural soils. These measures are all incentivised by economic compensation.

7.2.3 Biodiversty / Nature

"Nature" directives (habitats and birds dir.) + Natura 2000 network

National level

Legislation: The habitats directive is implemented through national regulations by Ministry for the Environment
Institutions, organizations platforms: The Ministry for the Environment implements the biodiversity strategies.
Strategies, programmes: EU Biodiversity Strategy for 2020 and EU Biodiversity Strategy for 2030 are implemented through the National biodiversity strategy for 2020. There is also a greening scheme and RDP measures related to the National rural development plan (agriculture).

Regional level

Legislation : Cross-sector: Agriculture, forestry, fishery and rural development framework law; Regional forest regulations (NFR); regional law on land management; Integrated programs for local development on mountain areas; call for financing traditional terracing; Regional actions for Natura 2000 sites
Institutions, organizations platforms: Regional authorities (DG Environment, DG agriculture, DG Mountain)
Strategies, programmes: Conservation measures for Special Protecton Areas; Action plans for species of community interest; Greening scheme and RDP measures; Multi-year program for interventions in local protected areas ; "Fondo aree verdi" ("Green areas fund"); Integrated programs for local development in mountain areas ("PILS montagna"); Call for financing traditional terraces (restoration and maintenance) in mountain areas ("Bando terrazzamenti 2020")

Local level

Legislation: No
Institutions, organizations platforms: Comunità Montana Laghi Bergamaschi
Strategies, programmes: Intervention plan 2021 describing financed actions in forest areas; Forest management plan - Val Cavallina area
Measures and mechanisms:
Economic incentives for:
A01 - Meadows and pastures; A02 - Buffer strips and hedges; A10 - Traditional terracing; Soft incentives for: N03 - Floodplain restoration and management; N04 - Re-meandering; N10 – Natural bank stabilisation; Other hydromorphologic measures (hydraulic and forestry set-ups)
Soft incentives for:
A01 - Meadows and pastures; A02 - Buffer strips and hedges; A03 – Crop rotation; A06 – No till; A07 – Low-till; A08 – Green cover

7.2.4 Climate

EC Green Paper on adapting to climate change in Europe - options for EU actions (2007); White Paper on apdapting to climate change: towards a European framework for action (2009); EU climate adaptation strategy (2019); European Climate Adaptation Platform (CLIMATE-ADAPT).

National level

Legislation: No
Institutions, organizations platforms : Ministry for the Environment
Strategies, programmes: Compacts of States and Regions disclosure report (2015)
National climate change adaptation strategy (adopted)
National climate change adaptation plan (being developed)
RDP measures, e.g. agro-climatic-environmental payments
Greening scheme and , a.o., agro-climatic-environmental payments.

Region level

Legislation: No
Institutions, organizations platforms : Regional authority (DG Environment)
Strategies: Regional climate change adaptation strategy; Regional climate change adaptation action document.

Local level

Nothing on local level.
Measures and mechanisms:
Soft incentives for actions addressing: soil and land protection, water management and quality, agriculture and biodiversity, without explicit reference to specific measures.

8. Norway (Hobøl) governance structure

Visual overview

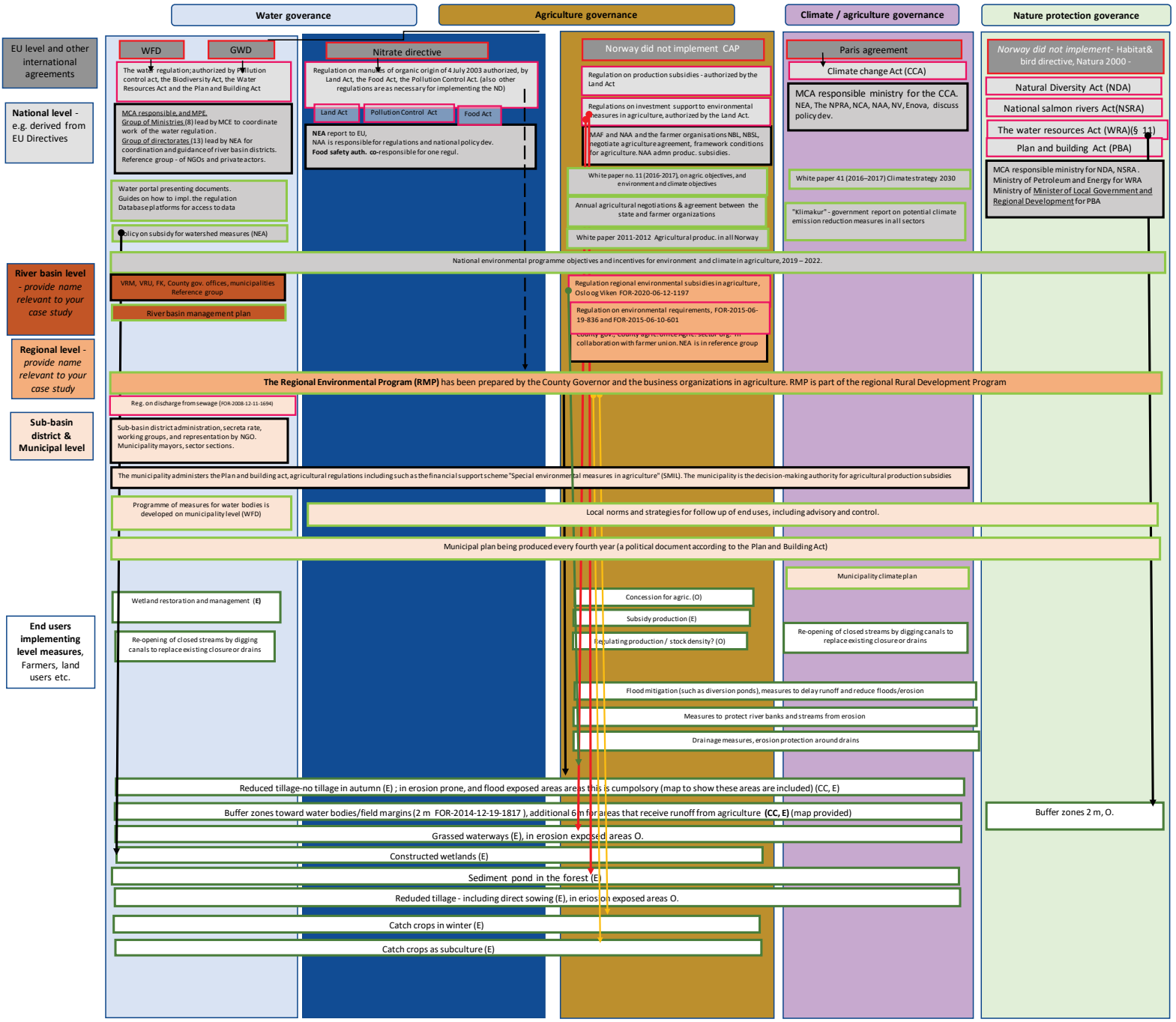

Figure 10. Visual overview governance structure related to water-agriculture-environment-climate in Norway.

8.1 Summary of situation

Norway implements the WFD, GWD, ND within the context of the agriculture-water- environment domain[11]. The Paris agreement is implemented. The

[11] Norway as an EFTA member state implements only a selected number of the EU directives.

agriculture policy CAP, the Birds and Habitat directive and the Natura 2000 are not implemented in Norway.
Governance of agriculture, water, and nature protection occurs in Norway on national, regional and local level. Governance on decentralized levels is within frames determined by national level authorities. The *Ministry of climate and environment* (MCE) is the ministry responsible for implementation of the EU directives referred to above, and for the Paris agreement. A number of other ministries, have shared responsibilities for implementation of Norwegian regulations transposing the EU directives; an example is t*he Ministry of food and agriculture (MFA) that is* responsible for regulations implementing the ND.
Legislation for implementing the EU directives are adopted on national, and on regional level. The water regulation for implementing the WFD is adopted on national level. The regulation the river basin management processes and responsibilities. Agricultural legislation are developed on national and county (regional) level by agricultural authorities (legislation on county level within frames determined by national level agricultural authorities).
Platform for coordination across sectors and for involvement on non-gov stakeholders occurs as part of the WFD, on national level, river basin and sub-basin level.
Measures listed are authorized by national and regional level legislation. The majority of the measures listed are authorized by regional level legislation, being the responsibility of county governor agricultural office. All measures listed have economic incentives, a few are obligatory. Most measures are implemented on farm level, some are implemented by the municipality.

8.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

8.2.1 Water governance:

The Ministry of climate and environment (MCE) is responsible for implementing the WFD, GWD, the ND, SSD and the Paris agreement. The MCE is responsible for the water regulation implementing the WFD and the GWD; while the Ministry of Agriculture is responsible for legislations, regulations implementing the ND and the SSD (see 2.2 on agriculture). Acts, strategy documents and guidelines adopted on national level provides frames for policy development on regional and local level.

National level

Legislation: The WFD is implemented by means of the water regulation being authorized by four acts, (i) Plan and Building Act (PBL); responsibility of the Ministry of local Government and Regional Development (KDD), (ii) Natural Diversity Act; responsibility the MCE, (iii) Pollution act; responsibility the MCE, and (iv) water resources act; responsibility the Ministry of petroleum and energy (OED). Regarding legislation implementing the ND, see section on agriculture.
Institutions responsible for the above legislation are, the MCE, Ministry of Petroleum and Energy (MPE), Ministry of Local Government and Regional Development (MLGRD) (it can be noted that agricultural authorities are not mentioned among these).
Platform for coordination: Associated with implementation of the WFD, there are platforms for coordination of authorities and for involvement of actors on

national. There is a group of Ministries (8) lead by MCE to coordinate work related to implementing the water regulation (The Ministry of Food and Agriculture is included here). The group of directorates (13) lead by NEA is established for coordination and guidance regarding the water regulation, this group is also important for the work river basin districts. There is also a platform for non-governmental stakeholders.
Strategies, programmes to be mentioned: Water portal presenting documents, database for access to data. Guidelines on how to implement the water regulation.

River basin and regional level

Legislation: No particular legislation for water governance developed on regional level by water and environmental authorities.
River basin level institutions: The river basin district committee is responsible for development of the river basin management plan. The river basin reference group is the non-governmental stakeholder group.
Institutions, organizations platforms: County governor water and environmental office, and the agricultural office. The county government and administration.
Strategies, programmes: The river basin management plan. There are several strategies and programmes, but the river basin management is core on river basin and regional level regarding agri-water governance.

Sub-basin and local, municipal level

Legislation: In the case study area the municipality has adopted a regulation on discharge from sewage (FOR-2008-12-).
Institutions, organizations platforms: There is the sub-basin district committee with working groups. On local level there are municipality agricultural experts /advisors.
Strategies, programmes to be mentioned: The programme of measures for water bodies (WFD) is developed on municipality level.
Measures: Wetland restoration and management (E); strategy ; Re-opening of closed streams by digging canals to replace existing closure or drains (E) strategy; Buffer zones 2m (O) authorised by the water resources act.

8.2.2 Agricultural governance

The CAP is not implemented. The ND is implemented (responsibility MCE by reference to nine regulations. These regulations are authorized by the Land Act and the Land act is the responsibility of the Agricultural authorities. In Norway Acts, strategy documents and guidelines adopted on national level provides frames for planning work on regional and local level. There is no platform for coordination of cross sector authorities and for multi-actor involvement with reference to agriculture; coordination occurs between agricultural authorities and farmer organizations.

National level

Legislation: The Land act with regulations. The Land Act authorizes about 44 different regulations. Among these, the following are central for implementing the ND: Regulation on producer , Forskrift om spesielle miljøtiltak i jordbruket; Forskrift om organisk gjødsel, Forskrift om gjødslingsplanlegging, Forskrift om organisk gjødsel, Forskrift om gjødslingsplanlegging.

Institutions, organizations, platforms: The Ministry of food and agriculture, the Norwegian Agriculture Agency, and two farmer union organizations.
Strategies, programmes: White papers, and the National environmental Programme; Annual agricultural negotiations & agreement between the state and farmer organizations.

Regional level

Legislation: Regional environmental subsidies in agriculture, Oslo and Viken FOR-2020-06-12-1197: Regulation on environmental requirements (Glomma FOR-2015-06-19-836 and FOR-2015-06-10-601.
Institutions, organizations platforms: County governor (State reg. agricultural office) , County municipality agriculture office.
Strategies, programmes: Regional environmental programme is developed by the County governor agricultural office within the frames of the National environmental programme. This is for the case study an important programme specifying economic incentives for environmental measures for the farmer and landowners with reference to catchment level legislation. The programme is being revised every fourth year.

Local level[12]

Legislation: No agriculture specific legislation adopted by the municipalities in the case area
Institutions, organizations platforms : The municipality agricultural office.
Strategies, programmes: Local SMIL – local municipal strategy; Local norms and strategies for follow up of end uses, including advisory and control; Municipal plan being produced every fourth year (a political document according to the Plan and Building Act).
Measures and mechanisms:
Production support (E); authorised by a regulation under the land act.
Flood mitigation (such as diversion ponds),
Measures to delay runoff; (E); authorised by regional regulation under the land act
Measures to protect river banks and streams from erosion;
Drainage measures, erosion protection around drains;
reduced tillage-no tillage in autumn (E) ; in erosion prone, and flood exposed areas this is compulsory (map to show these areas are included) (E C);),
additional 6m for areas that receive runoff from agriculture (C E) (map provided);
grassed waterways (E);
sediment pond in the forest (E) ;
constructed wetlands (E; Catch crops in winter)
sediment pond in the forest (E) ;
Catch crops as subculture.

8.2.3 Nature protection governance

The Birds and Habitat directive and the Natura 2000 are not implemented in Norway.

[12] municipality

National level

Legislation: The Natural diversity act, the Water Resources Act, the Plan and building Act.
Institutions, organizations platforms : MCA responsible ministry for implementing Natural diversity Act, and the policy dev.
Strategies, programmes: White paper 41 (2016–2017) Climate strategy 2030; "Klimakur" - government report on potential climate emission reduction measures in all sectors.

Regional level

Legislation: No specific legislation for nature protection.
Institutions, organizations platforms: County municipality environmental office, County governor environmental office. **Strategies, programmes:** The county municipality has typically developed strategies to address biodiversity.

Local level

Legislation: No specific legislation for nature protection developed on local level.

8.2.4 Climate

The Paris agreement is implemented, with reference to the Climate change act.

National level

Legislation: Climate change Act being the responsibility of the MCA. The act does not specify rules for incentives for climate change adaptation or mitigation. Measures for reduction of greenhouse gas emission in agriculture is mainly specified in the reginal environmental programme under water governance.
Institutions, organizations platforms : MCA responsible ministry for the Act. NEA, NPRA, NCA, NAA, NVE, Enova discuss policy development.
Strategies, programmes: White paper 41 (2016–2017) Climate strategy 2030; "Klimakur" - government report on potential climate emission reduction measures in all sectors.

Regional level

Legislation: No climate specific legislation developed on regional level.
Institutions, organizations platforms: Climate adaptation and mitigation are discussed cross sectors in the county municipality. The environmental office is responsible for development of a reginal climate and energy plan.
Strategies, programmes: A regional climate and energy plan is developed.

Local level

Legislation: No climate specific legislation developed on local level.
Institutions, organizations platforms: Climate adaptation and mitigation are discussed cross sectors. the responsibly for developing the municipal strategy varies among municipalities.
Strategies, programmes: Municipality climate strategy is being developed by the municipality.

9. Czechia (Cechticky) governance structure

Visual overview

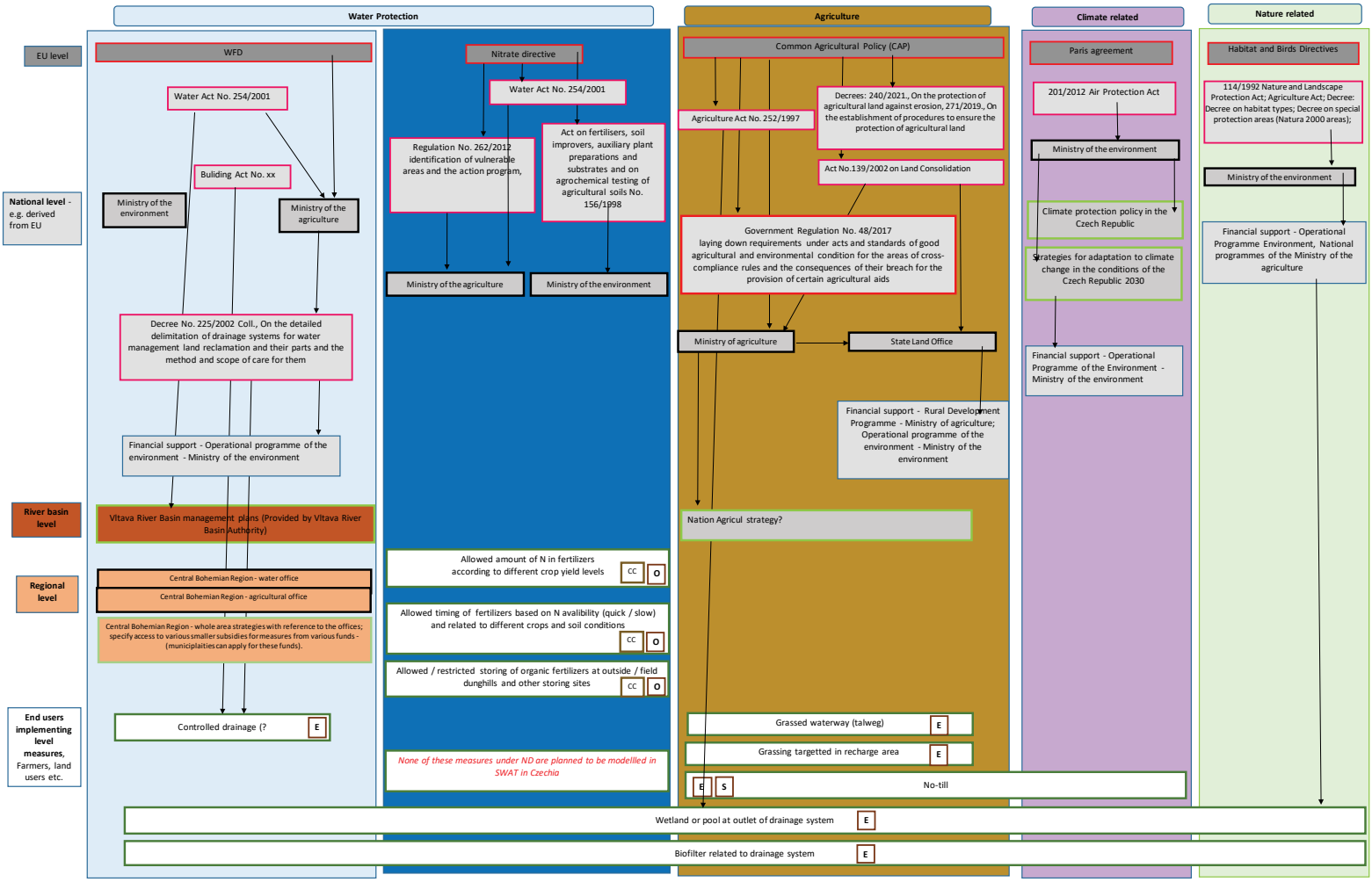

Figure 11. Visual overview of governance structure related to water-agriculture-environment-climate in Czechia.

9.1 Summary of situation

EU directives and international climate agreements: In the water agriculture domain and within the NSWRM context, the Czech Republic implements WFD, ND, CAP 1, 2, Habitat and birds D, and the Paris agreement.
Governance for management of water and agriculture mostly occurs on national level. Ministry of Agriculture (MoA) is responsible for the implementation of the WFD, ND[13] and the CAP; the governance water quality and sewage issues, and agriculture. The State land office is an administrative office of the MoA. The Ministry of Environment is responsible for implementation of the Habitat and the birds directive, and the governance of floods and drought and climate issues. On river basin level, there is the basin authority and the RBMP. On regional level,

[13] ND MoA reports to EU Commission; ND Action Programmes. These measures prevauilingly fall under Fertilizer management and Crop Rotation

there are water offices and agricultural offices being responsible for implementation.
Legislation: The Water Act with decrees implements the WFD and the ND, the Agriculture Act with Decrees implement the CAP both being the responsibility of the MoA. The Air protection Act and Nature and Landscape protection Act are the responsibility of the MoE.
Platform for coordination A web portal[14] was launched February 2022 for cross sector information and coordination.
Measures: The measures listed are authorized by national level legislation, some measures are associated with strategies on regional level. Most of the the measures listed are authorised by legislations under the responsibility of the MoA. All measures listed have economic incentives, cross compliance or subsidies, some are obligatory.

9.2 Water, agriculture and climate: EU directives, and national legislation, policies and actors

9.2.1 Water and environmental governance

WFD is implemented by means of the Water act. The Ministry of Agriculture is responsible for the Water Act. The Ministry of the Environment is the central water authority in matters of water protection and flood protection. Ministry of Agriculture and Ministry of the Environment are both responsible for National river basin management plans. There is also a decree, On the detailed delimitation of drainage systems for water management land reclamation and their parts and the method and scope of care for them (authorized by Water Act); the Ministry of Agriculture are responsible for this decree.
The ND is implemented by the Water Act and two regulations: (i) Regulation No. 277/2020 identification of vulnerable areas and the action program (Ministry of Agriculture is responsible); and (ii) Act on fertilisers, soil improvers, etc. (Ministry of the Environment) .

National level

Legislation: Main identified (i) Water Act No. 254/2001, (ii) the decree, On the detailed delimitation of drainage systems for water management land reclamation, and (iii) the Regulation No. 262/2012 identification of vulnerable areas and the action program; Ministry of Agriculture is responsible.
Act on fertilisers, soil improvers, etc. No. 156/1998; Ministry of the Environment is responsible.
Institutions, organizations platforms: The Ministry of Agriculture and the subordinate State land office. The Ministry of Environment and subordinate Czech Inspection of the Environment.
Platform for coordination: A web portal[15] was launched February 2022 for cross sector information and coordination.
Strategies, programmes to be mentioned: Financial support - Operational Programme of the Environment – responsibility Ministry of the Environment

[14] https://voda.gov.cz/
[15] https://voda.gov.cz/

Regional level

River basin level: Vltava River Basin management plans developed by the Vltava River Basin Authority.
Region level, legislation: No acts or decrees developed on regional level identified. All the cadastral units within the CZ catchment (Čechtický) fall into Nitrate Directive (ND) vulnerable areas.
Institutions, organizations platforms: Central Bohemian Region water office (Čechtický stream catchment).
Strategies, programmes: Central Bohemian Region area strategies; region offices specify access to various smaller subsidies for measures (municipalities can apply for these funds).

Local level

Legislation; Institutions, organizations platforms; Strategies, programmes: No relevant information local level identified.
Measures and mechanisms[16]:

- Controlled drainage (E) – authorized by the Water Act No. 254/2001 and Decree No. 225/2002 Coll. On the detailed delimitation of drainage systems for water management land reclamation and their parts and the method and scope of care for them (responsibility Ministry of Agriculture).
- Allowed amount of N in fertilizers according to different crop yield levels (CC, O) correct to place this here?
- Allowed timing of fertilizers based on N availability (quick / slow) and related to different crops and soil conditions (CC, O)
- Allowed / restricted storing of organic fertilizers at outside / field dunghills and other storing sites (CC, O).

9.2.2 Agriculture

EU level: CAP 1 and 2.

National level

Legislation: CAP is implemented by Ministry of agriculture and it is implemented by 4 acts and decrees: (i) Agriculture Act No. 252/1997; (ii) Decree 240/2021 On the protection of agricultural land against erosion, Decree 271/2019 On the establishment of procedures to ensure the protection of agricultural land, (iii) Act No.139/2002 on Land Consolidation (iv) Government Regulation No. 48/2017 laying down requirements under acts and standards of good agricultural and environmental condition for the areas of cross-compliance rules and the consequences of their breach for the provision of certain agricultural aids.
Institutions, organizations platforms: Ministry of Agriculture and the subordinate administrative State land office.
Strategies, programmes: Financial support - Rural Development Programme - Ministry of Agriculture; Operational Programme of the Environment - Ministry of the Environment. State Land Office also helps to finance land consolidation projects from the above-mentioned programs.

Regional level

Legislation: No legislation identified on regional level.

[16] None of these measures under ND are planned to be modellled in SWAT in Czechia.

Institutions, organizations platforms: Central Bohemian Region agricultural office (for Čechtický stream catchment).
Strategies, programmes: No particular strategy document identified.

Local level

Legislation: No legislation developed on local municipality level identified.
Strategies, programmes: No relevant strategies or programmes identified.
Measures and mechanisms:
Grassed waterway (talweg) (E).
Grassing targeted in recharge area) (E).
No-till (E, S) - contribute to climate change management.
Wetland or pool at outlet of drainage system, (E).
Biofilter related to drainage system (E) (E). Contribute to the management of: water, agriculture, nature and climate issues.

9.2.3 Biodiversity / Nature

EU Habitat and birds directive is implemented by Ministry of Environment and the acts : 114/1992 Nature and Landscape Protection Act; Agriculture Act; Decree: Decree on habitat types; Decree on special protection areas (Natura 2000 areas).

National level

Legislation : 114/1992 Nature and Landscape Protection Act; Agriculture Act; Decree on habitat types; Decree on special protection areas (Natura 2000 areas) being the responsibility of the Ministry of Environment.
Institutions, organizations platforms: Ministry of environment.
Strategies, programmes: Financial support - Operational Programme Environment, National programmes of the Ministry of the agriculture.

Regional level

Legislation: No legislation developed on regional level.
Institutions, organizations platforms: Central Bohemian Region environmental office.
Strategies, programmes: No particular strategy document identified.

Local level

Legislation, strategies, programmes: No legislation or strategy document identified for local level.
Measures and mechanisms: Wetland or pool at outlet of drainage system: E; Biofilter related to drainage system: E - from the national level: Financial support - Operational Programme of the Environment, National programmes of the Ministry of the Agriculture

9.2.4 Climate

EU level: Paris agreement

National level

Legislation: 201/2012 Air Protection Act
Institutions, organizations platforms : Ministry of the Environment
Strategies, programmes: Three strategies identified: (i) Climate protection policy in the Czech Republic, (ii) Strategies for adaptation to climate change in the

conditions of the Czech Republic 2030, (iii) Financial support - Operational Programme of the Environment; the Ministry of the Environment is responsible (measures selected in the Čechtický case study is eligible for subsides from the Ministry of Environment with reference to these strategies).

Regional level

Legislation, Institutions, organizations platforms, Strategies, programmes: No relevant legislation being developed at regional level, institutions or strategies identified for regional level.

Local level

Legislation, Institutions, organizations platforms, Strategies, programmes: No relevant legislation being developed at regional level, institutions or strategies identified for regional level.

Measures and mechanisms: Several measures authorized by the Agriculture Act also address climate change: (i) No-till, (ii) Wetland or pool at outlet of drainage system, (iii) Biofilter related to drainage system. These measures will be eligible for subsidy according from the MoE according to the national level climate strategies.

Annex C - The Survey Questionnaire

WP 6 – Synthesis and policy recommendation

Task 6.2 – Analysis of policy arrangements and developments of legislative recommendations for future harmonisation of water and agricultural policy.

1. The Survey

1.1 Aim

The survey aims to obtain key stakeholders view on challenges and solutions in legislation and governance arrangements that impact water-use efficiency, use of tools and techniques for the water and nutrient management, and economic sustainability of technologies at the farm and small agricultural catchment level. Survey will analyse the inclusion of relevant environmental concerns, such as water quality (nutrient recovery, plant uptake) and quantity (managing excess and shortage, soil water retention) and climate change, with stakeholders responsible for the policy and decision-making process (environmental mainstreaming) based on the identification of tools and techniques for integrating environmental objectives into policy and practice (Runhaar, 2016), such as the FAO Sustainable Land Management Mainstreaming Tool (Bastidas Fegan, 2019) or ProVention's guidance note series tools (Benson, 2007).

1.2 Key Knowledgeable Stakeholders

CSS leaders should try to cover all different groups of stakeholders (sector, governance level, type, expertise) (Table 2). Our primary goal is to cover as-much-as-possible authorities from policy-making to policy implementation on different levels of governance organisations.

All selected key informants must be familiar with policies/legislation that affects their work and impacts their decisions.

Table 2: Stakeholder to be included in the survey

1	Sector	→	public		private			
2	Governance level of work	→	National (NUTS0 – State)		Regional (NUTS1-3, administrative units below state)		Local (LAU, CSS Municipalities)	
3	Type of stakeholder	→	Authorities		Experts (Agri advisor, Water manager, Environmental managers, Consultants)	Research and Science (Experts - Researchers dealing with topic professionally)	NGO	Other
			Policy-making (Governmental ministry, region, local representative)	Policy implementation (regulatory agencies, inspector, public agencies, monitoring agencies)				
4	Type of expertise	→	agriculture	water management	Environment and nature	spatial planning	climate change	

The name of the participant and institution must not be added to the questionnaire.

Respondent answers should be from a personal/expert view. How they will answer, or personally/or in the institution's name is their personal decision you can not influence much. However, ask them if they feel comfortable sharing their personal perspective.

We aim to get 18 responses from each participating CSS (Table 3).

Each CSS leader has to obtain views of a minimum of 9 persons working as authorities. Out of which 4 should be national level (2 in agriculture and 2 in water/environment/nature-related), 3 regional and 2 local level authorities. Exemptions are Hungary and Slovenia with multiple CSS where stakeholders on a national level can be contacted only once.

The remaining 9 stakeholders should be from experts (4), research (3) and NGO (2) groups from different levels of work.

There is a bit of flexibility in the number of stakeholders. So please, before you make any decision, contact us to explain why deviations from the plan are needed.

Table 3: Number of stakeholders from each of the groups to be surveyed per CSS

Level of governance	**Total No.**	**Groups to be included in the survey**			
		Authorities	**Experts, advisors, consultants (agriculture, environment, water, spatial planning, climate)**	**Research and Science**	**NGO/other**
National (government, administration, offices) (NUTS 0)	6	min. 4 2 agri 2 water/envi/nat			
Regional (offices, administrative units) (NUTS 1-3)	6	min. 3			
Local municipal (LAU)	6	min. 2			
Total	**18**	**min. 9**	**~ 4**	**~ 3**	**~ 2**

1.3 How to execute the survey

A questionnaire was prepared. How will you proceed with the execution of interviews in your CSS is your decision. You know the stakeholder and their way of working and communication. Select what fits your stakeholders the best. You can choose different strategies for different stakeholders. We advise a one-on-one personal interview (in person or online). This will allow explaining and asking sub-questions to get more info.

Actors should give answers related to policies in their field of work/expertise. If they feel qualified, they can also answer for other policies (they might have to navigate multiple policies at work). However, if they do not feel qualified are not obligated to answer.

If the stakeholder agrees, we propose recording (audio) the interview to sum up the actor's thoughts later – especially when examples are needed. Delate recordings after completion of the questionnaire.

Filled out questionnaires will have to be uploaded (as pdf) to UFZ Cloud.

2. Questionnaire

Answers should concentrate on specific environmental concerns/measures from stakeholder expert work (agriculture, hydro-morphic, management measures, structural measures). Participants give answers from their expert perspective!

2.1 A - General info

CSS number [06]:	
CSS name [Pesnica):	
Stakeholder number [01]:	

1. Type of stakeholder as key informant familiar with the legislation

Answers:

Sex	Female	Male	other			
Year of birth	enter age					
Education	high school	BSc degree	MSc degree	PhD	other	
Job type	private sector	public sector	a non-governmental organisation (NGO)	other:_		
Type of organisation	Authorities - policy-making (Governmental ministry, region, local representative)	Authorities - policy implementation (regulatory agencies, inspector, public agencies, monitoring agencies)	Experts (Agri advisor, Water managers, Environmental managers, Consultants)	Research/ Science (Experts - Researchers dealing with topic professionally)	NGO	other
Level of organisation operation	National level (government, adminstration/offices (NUTS 0))	Regional level (government, offices, administrative units (NUTS 1-3))	Local municipal (LAU)			
Type of main expertise	Agriculture	water management	environment/nature	spatial planning	climate change	

2.2 B – Basic knowledge of NSWRM

2. Which of the following environmental challenges have you already addressed at your work? How important are to your expert work on a scale from 1 to 7?

	I do not know (x)	No	Yes - rate						
water quantity - excess water management – flood protection		0	1	2	3	4	5	6	7
water quantity – water scarcity - shortage – drought - irrigation		0	1	2	3	4	5	6	7
water quantity – in-field water retention measures		0	1	2	3	4	5	6	7
water quality – in-field nutrient retention measures		0	1	2	3	4	5	6	7
water quality - nutrients recovery from streams		0	1	2	3	4	5	6	7
climate change – mitigation/adaptation		0	1	2	3	4	5	6	7
nature conservation		0	1	2	3	4	5	6	7
	I do not know	not addressed	low		intermediate			high	

3. Have you already dealt with any of the following agri-hydro-environmental measures at your work? How often do you deal with them in terms of quantity (number of cases, frequency) on a scale from 1 (rare) to 7 (regular)?
(Explanation of measures is listed at http://nwrm.eu/measures-catalogue)

	No	Yes - rate						
Green cover (cover crop/catch-crop) (agri)	0	1	2	3	4	5	6	7
Meadows and pastures (agri)	0	1	2	3	4	5	6	7
Buffer strips and hedges (agri)	0	1	2	3	4	5	6	7
Crop rotation (agri)	0	1	2	3	4	5	6	7
Strip cropping along contours (agri)	0	1	2	3	4	5	6	7
Intercropping (agri)	0	1	2	3	4	5	6	7
No-till agriculture (agri)	0	1	2	3	4	5	6	7
Low till agriculture (agri)	0	1	2	3	4	5	6	7
Early sowing (agri)	0	1	2	3	4	5	6	7
Traditional terracing (agri)	0	1	2	3	4	5	6	7
Controlled traffic (agri)	0	1	2	3	4	5	6	7
Reduced stocking density (agri)	0	1	2	3	4	5	6	7
Mulching (agri)	0	1	2	3	4	5	6	7
Other agriculture measure:	0	1	2	3	4	5	6	7
Basins and ponds (hydro)	0	1	2	3	4	5	6	7
Wetland restoration and management (hydro)	0	1	2	3	4	5	6	7
Floodplain restoration and management (hydro)	0	1	2	3	4	5	6	7
Re-meandering (hydro)	0	1	2	3	4	5	6	7
Stream bed re-naturalization (hydro)	0	1	2	3	4	5	6	7
Restoration and reconnection of seasonal streams (hydro)	0	1	2	3	4	5	6	7
Reconnection of oxbow lakes and similar features (hydro)	0	1	2	3	4	5	6	7
Riverbed material re-naturalization (hydro)	0	1	2	3	4	5	6	7
Removal of dams and other longitudinal barriers (hydro)	0	1	2	3	4	5	6	7
Natural bank stabilisation (hydro)	0	1	2	3	4	5	6	7
Elimination of riverbank protection (hydro)	0	1	2	3	4	5	6	7
Lake restoration (hydro)	0	1	2	3	4	5	6	7
Restoration of natural infiltration to groundwater (hydro)	0	1	2	3	4	5	6	7
Re-naturalisation of polder areas (hydro)	0	1	2	3	4	5	6	7
Nutrient recovery from streams	0	1	2	3	4	5	6	7
Other hydro-morphological measure:	0	1	2	3	4	5	6	7
	Never	rarely		moderately			regularly	

2.3 C - Basic and advanced knowledge about policy

4. Select your central field of expertise and rate the level of knowledge on policies (legislation/regulation/strategies/programmes) for all presented fields of expertise (rate 1-7)

	No	Yes – rate							Additional comments (more precise expertise)
Agriculture	0	1	2	3	4	5	6	7	
Water management	0	1	2	3	4	5	6	7	
Environmental/Nature management	0	1	2	3	4	5	6	7	
Spatial planning	0	1	2	3	4	5	6	7	
Climate change	0	1	2	3	4	5	6	7	
	no knowledge	low		intermediate			High		

5. Name one document (act, regulation, decree, strategy, programme) that has, by your knowledge, the most significant impact on NSWRM (agriculture or hydro-physical) implementation in your CS/Region/State?.

Name document (title):	*National language*		*English translation*				
Level of governance:	National-1	Regional-2	Local3-	other (describe):			
Sector:	Agriculture 1	water management2	environment/nature3	spatial planning4	other (describe):5		
Type of impact/promotion of measure:	legal obligation - no subsidy	legal obligation + economic subsidy	voluntary + economic subsidy	voluntary - no subsidy	other (describe):		
The magnitude of the impact on end-users (willingness to change)							
Rate	1	2	3	4	5	6	7
	low		intermediate			high	
Explain the impact (three sentences max):	*Text:*						

6. Are, by your knowledge, listed environmental concerns included in legislation from your field of expertise and to what extent? Assess the degree of incorporation of these topics into legislation by rating 1-7. Are included directly mentioned in the text (direct effect) or indirectly (side effect of some other policy purpose)?

	I do not know (x)	No	Yes - rate							Directly mentioned (X)	Indirect as a side effect of other policy (x)
water quantity - managing excess (flood protection)		0	1	2	3	4	5	6	7		
water quantity - shortages of water (drought-irrigation)		0	1	2	3	4	5	6	7		
water quantity – in-field water retention measures in agri-production		0	1	2	3	4	5	6	7		
water quality - nutrients recovery from streams		0	1	2	3	4	5	6	7		
water quality – in-field nutrient retention measures		0	1	2	3	4	5	6	7		
sustainable agriculture production		0	1	2	3	4	5	6	7		
climate change – mitigation (Carbon management)		0	1	2	3	4	5	6	7		
nature conservation		0	1	2	3	4	5	6	7		
	I don't know (x)	not included	low		intermediate			high		*Direct (x)*	*Indirect (x)*

2.4 D - General differences among national policy arrangements

7. Are national policies on water, agriculture, spatial planning, nature conservation and climate change compatible in terms of water quantity and quality? Rate the compatibility (1-7).

Policy on	*I do not know*	No	Yes						
water quantity - excess water management - flood		0	1	2	3	4	5	6	7
water quantity - scarcity - shortage - drought		0	1	2	3	4	5	6	7
water quantity – in-field water retention measures		0	1	2	3	4	5	6	7
water quality - nutrients recovery from streams		0	1	2	3	4	5	6	7
water quality – in-field nutrient retention measures		0	1	2	3	4	5	6	7
	I do not know (x)	not included	low compatibility of water, agriculture, spatial planning and climate change policy		intermediate			high compatibility of water, agriculture, spatial planning and climate change policy	
General comment on compatibility issue from your expert perspective:	*Text:*								

8. Which are the main general differences/issues of compatibility between the policies you observe (agriculture-water-environment-nature-spatial planning-climate)?
   State 1-3 compatibility issues.

	Comment compatibility issues with examples (comment on those you are familiar with/expert in).
Incompatibilities	*Text:*

9. How can/could we enhance the synergies between policies in terms of water quantity, water quality, nature conservation and climate changes? State 1-3 proposals.

	Comment possible synergies with examples (comment those you are familiar with)
Synergies Synchronisations	*Text:*

10. Why is in your country some legislation at National and some at Regional/Local-scale? Only applicable if subdivision exists (Region, Bundeslander, Canton, Department). Mark your system (x).

water quantity	Select/Circle:	(a) only national	(b) national/regional	(c) nat/reg/local	(d) other:_____
	Comment:	Give a practical example of these differences (3-5 sentences)			
	text				
water quality	Select/Circle:	(a) only national	(b) national/regional	(c) nat/reg/local	(d) other:_____
	Comment:	Give a practical example of these differences (3-5 sentences)			
	text				
climate change	Select/Circle:	(a) only national	(b) national/regional	(c) nat/reg/local	(d) other:_____
	Comment:	Give a practical example of these differences (3-5 sentences)			
	text				

If option (b), (c), or (d) describe the system and reason for sub-national division in terms of water quantity, water quality, and climate change if known and if you are familiar with the expert field.

2.5 E - Specific governance practices at farm and catchment level (CSS/local)

11. Does policies cover/address presented matters/problems related to water quantity, water quality, nature conservation and climate changes at the CSS/local level? Rate the coverage (1-7).

Answer: **Policy**	*Problem*	*I do not know (x)*	No	Yes						
Agriculture	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Water management	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Nature management	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Spatial planning	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Climate change	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
		I do not know (x)	not included	low coverage		intermediate			high coverage	

12. Do you observe in policies any gaps in the inclusion of relevant environmental concerns (water quantity, water quality, nature conservation and climate changes) that are present at the CSS/local level? Give at least one example.

Answer:	I do not know (x)	No gaps (x)	Gaps (text)
Agriculture			Examples – text
Water management			Examples – text
Nature management			Examples – text
Spatial planning			Examples – text
Climate change			Examples - text

13. How are policies communicated to the end-user at the CSS/local level? Rate communication (comm.) strategy (1-7).

	I don't know	No comm. (x)	Individual comm. on request (x)	Active comm. from authorities (x)	Rate effectiveness of communication strategy							**Comment current situation**
Agriculture					1	2	3	4	5	6	7	
Water management					1	2	3	4	5	6	7	Examples (text)
Nature management					1	2	3	4	5	6	7	Examples (text)
Spatial planning					1	2	3	4	5	6	7	Examples (text)
Climate change					1	2	3	4	5	6	7	Examples (text)
	I don't know	No (x)	Indvidual (x)	Active (x)	low efficiency			intermediate			high efficiency	

14. Comment: How could communication of policies be more effective at the CCS/local level to improve the implementation of measures? Give 1-3 examples from your field of expertise.

Answer:	*I do not know (x)*	**Comment possible improvement of communication strategy with examples** (Please, give 1-3 examples of how to improve the communication effectiveness of mentioned policies at the CSS/local level)
Agriculture		Examples - text
Water management		Examples - text
Environmental/Nature management		Examples - text
Spatial planning		Examples - text
Climate change		Examples - text

2.6 F - Views on specific legislation/governance - originating from EU (barriers, opportunities, impact, effectiveness)

15. Which are the main barriers/issues in legislation that prevent better uptake of the water and nutrient retention management measures (water-use efficiency/use of tools and techniques for water and nutrient management/economic sustainability of technologies at farm and catchment level)? State 1-3 barries/issues.

Policy	Barriers (Comment if needed)	Legal act (name/level)	Rate the magnitude of barrier						
Agriculture	Barrier	text	1	2	3	4	5	6	7
Water management	Barrier	text	1	2	3	4	5	6	7
Environmental/ Nature management	Barrier	text	1	2	3	4	5	6	7
Spatial planning	Barrier	text	1	2	3	4	5	6	7
Climate change	Barrier	text	1	2	3	4	5	6	7
			low barrier		intermediate			high barrier	

16. In your expert opinion, where is the origin of the barriers? Rate the importance of each reason of barrier (1-7).

Answer:	No	Yes							**Comment**
EU legislation/regulation	0	1	2	3	4	5	6	7	
National legislation/plans/programmes	0	1	2	3	4	5	6	7	
Regional legislation/plans/programmes	0	1	2	3	4	5	6	7	
Local legislation/plans/programmes	0	1	2	3	4	5	6	7	
Policy transfer from EU/Transnational to National	0	1	2	3	4	5	6	7	
Policy implementation/Regulatory agencies/Control	0	1	2	3	4	5	6	7	
Water managers	0	1	2	3	4	5	6	7	
Agricultural advisers	0	1	2	3	4	5	6	7	
Landowners	0	1	2	3	4	5	6	7	
Farmers	0	1	2	3	4	5	6	7	
other: _____	0	1	2	3	4	5	6	7	
	not important	low importance		intermediate			high importance		

17. What are, in general, the reasons for the weak implementation of soil management and structural measures* by end-users?

Answer:	No	Soil management measures - rate impact								No	Structural measures – rate impact						
Complicated implementation in real life - execution	0	1	2	3	4	5	6	7	Complicated implementation in real-life - execution		1	2	3	4	5	6	7
Low cost-benefit	0	1	2	0	4	5	6	7	Low cost-benefit		1	2	3	4	5	6	7
Administrative barriers (paperwork, time)	0	1	2	0	4	5	6	7	Administrative barriers (paperwork, time)		1	2	3	4	5	6	7
Communication aspects (lack of info)	0	1	2	0	4	5	6	7	Communication aspects (lack of info)		1	2	3	4	5	6	7
Voluntary measure	0	1	2	0	4	5	6	7	Voluntary measure		1	2	3	4	5	6	7
Control/inspection system	0	1	2	3	4	5	6	7	Control/inspection system		1	2	3	4	5	6	7
Land ownership	0	1	2	3	4	5	6	7	Land ownership		1	2	3	4	5	6	7
other:_____	0	1	2	0	4	5	6	7	other:_____		1	2	3	4	5	6	7
	No impact	low impact		intermediate			high impact			No impact	low impact		intermediate			high impact	

*soil management measures: the way that land/fields/soils are managed to have an impact at field scale – no-till, cover crops, crop rotation, mulching, strip cropping,
*structural measure: the way the landscape is managed to change the processes and have an impact beyond the field scale (neighbouring fields, sub-catchment, catchment) – buffer strips, hedges, grassed waterways, terracing, wetland restoration, re-meandering

18. Is policy/legislation successful in accomplishing practical acceptance and implementation of measures by landowners/farmers through the use of tools and techniques for water and nutrient retention management?

Answer:	*I do not know (x)*	No	Yes (rate the success in acceptance)						
Water retention		0	1	2	3	4	5	6	7
Nutrient retention		0	1	2	3	4	5	6	7
		not	low		intermediate			high	
Give a successful example of measure implementation from your field of expertise	*Text*								

*Tools: A tool is **any instrument or a simple piece of equipment you hold in your hands and use to do a particular work**. For example, spades, hammers, and knives are all tools. You can refer to anything that you use for a particular purpose as a particular type of tool.
*Techniques and technologies: A technique is **a particular method of doing an activity**, usually involving practical skills. The technology of farming, the system of practices followed in crop growing. The object of agricultural technique is to assure high crop yield with minimal investment of labour and capital per unit of realised product.

19. Is by your knowledge the economic sustainability of technologies on farms and small agricultural catchment level supported by promotion in the policy/legislation? Rate the importance of promotion types (1-7).

Answer:	*I do not know (x)*	No	Yes - Rate the importance of each promotion type						
Financial support/subsidies		0	1	2	3	4	5	6	7
Penalties		0	1	2	3	4	5	6	7
Legal framework support in non. financial way		0	1	2	3	4	5	6	7
Expects voluntary action no legal or financial support		0	1	2	3	4	5	6	7
other:_____		0	1	2	3	4	5	6	7
		not	low		intermediate			high	
Give an example from your field of expertise	*Text*								

20. Is the economic or environmental sustainability of technologies recorded/monitored at the farm or small catchment level?

Answer:	*I do not know (x)*	No	Yes (rate the quality of data)						
Economic – farm level		0	1	2	3	4	5	6	7
Economic – catchment level		0	1	2	3	4	5	6	7
Environmental – farm level		0	1	2	3	4	5	6	7
Environmental – catchment level		0	1	2	3	4	5	6	7
		not	low		intermediate			high	
Give an example from your field of expertise	*Text*								

21. Is, by your knowledge, water/nutrient use efficiency supported in your national policy/legislation?

Answer:	*I do not know (x)*	No	Yes – (rate the level of support)						
Water efficiency		0	1	2	3	4	5	6	7
Nutrient efficiency		0	1	2	3	4	5	6	7
		not	low support		intermediate			high support	
Give a practical example from your field of expertise	*Text*								

22. Is water/nutrient use efficiency effectively promoted among end-users?

Answer:	*I do not know (x)*	No	Yes (rate the effectiveness of promotion)						
Water efficiency		0	1	2	3	4x	5	6	7
Nutrient efficiency		0	1	2	3	4x	5	6	7
		not	low		intermediate			high	
Give an example from your field of expertise	*Text*								

2.7 G – Solutions and new features

23. How should be the policy/legislation (in general) upgraded to improve uptake/implementation of water and nutrient retention measures? If any?

Type of support	No	Yes (rate the contribution to better uptake/implementation)						
financial support	0	1	2	3	4	5	6	7
de-bureaucratization of administration	0	1	2	3	4	5	6	7
control/inspection	0	1	2	3	4	5	6	7
licensing/permits	0	1	2	3	4	5	6	7
product quality brands (e.g. Global GAP)	0	1	2	3	4	5	6	7
formal education	0	1	2	3	4	5	6	7
informal education (practical demonstration/workshops)	0	1	2	3	4	5	6	7
digital information sharing (web, app)	0	1	2	3	4	5	6	7
other:_____	0	1	2	3	4	5	6	7
	No	low		intermediate			high	

24. How should the implementation of measures addressing environmental concerns be supported in policy/legislation by decision-policy makers in your country (Environmental mainstreaming)?
Options: financial support to landowners, education of policy makers-students-farmers-general population, governmental strategy etc

	I do not know (x)	Current support is not adequate (x)	Current support is adequate (x)	**Comment and Propose support type**
water quantity - managing excess (flood protection)				Text
water quantity - shortages of water (drought-irrigation)				Text
water quantity – in-field water retention measures				Text
water quality – in-field nutrient retention measures				Text
water quality - nutrients recovery from streams				Text
climate change – mitigation/adaptation measures				Text
nature conservation				Text

25. Give examples of tools* or techniques* for presented environmental concerns if you are aware of their use in country/region/CSS. Rate the level of its support in solving presented environmental concerns.

	I do not know (x)	NO tool/tech.	Rate the support							Give examples from your field of expertise
water quantity - excess water management – flood protection			1	2	3	4	5	6	7	*Text*
water quantity – water scarcity - shortage – drought - irrigation			1	2	3	4	5	6	7	*Text*
water quantity – in-field water retention measures			1	2	3	4	5	6	7	*Text*
water quality – in-field nutrient retention measures			1	2	3	4	5	6	7	*Text*
water quality - nutrients recovery from streams			1	2	3	4	5	6	7	*Text*
climate change – mitigation/adaptation			1	2	3	4	5	6	7	*Text*
nature conservation			1	2	3	4	5	6	7	*Text*
	I do not know (x)	NO	low		intermediate			high		

*__Tools__: A tool is any instrument or a simple piece of equipment you hold in your hands and use to do a particular work. For example, spades, hammers, and knives are all tools and also computer programs and apps. You can refer to anything that you use for a particular purpose as a particular type of tool.

*__Techniques and technologies__: A technique is a particular method of doing an activity, usually involving practical skills. The technology of farming, the system of practices followed in crop growing. The object of agricultural technique is to assure high crop yield with minimal investment of labour and capital per unit of realised

Annex D: Survey results statistics tables

```
** Encoding: UTF-8.
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DEFINE uredi_descriptives()
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/tablecells select = [position(6) ] selectdimension = columns format = 'f3.3'.
!ENDDEFINE.

DEFINE uredi_freq()
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SELECT='Valid Percent', 'Cumulative Percent', 'Valid'
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!ENDDEFINE.

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output modify
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PROCESS = ALL HIDE=TRUE
/STYLES  APPLYTO=DATACELLS.


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```
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PROCESS = ALL HIDE=TRUE
/STYLES  APPLYTO=DATACELLS.
!ENDDEFINE.

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Country
 sex1F2M3OTHER
year_birthnanoentry
ageZ
education1High2BSc3MSc4PhD5other
job_type1private2public3NGO4other
type_of_organisation1p.making2p.implementation3experts4research
level_of_organisation1national2regional3local.
```

Frequencies

Statistics

		Country	Sex	Year of birth /age?	Age	Education	Job type
N	Valid	144	139	107	107	142	140
	Missing	0	5	37	37	2	4

Statistics

		Type of organisation	Level of organisation operation
N	Valid	142	142
	Missing	2	2

Frequency Table

Country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	B	6	4,2	4,2	4,2
	CH	11	7,6	7,6	11,8
	CZ	18	12,5	12,5	24,3
	GER	7	4,9	4,9	29,2
	HUN	23	16,0	16,0	45,1
	ITA	5	3,5	3,5	48,6
	LAT	11	7,6	7,6	56,3
	LIT	5	3,5	3,5	59,7
	NOR	13	9,0	9,0	68,8
	POL	23	16,0	16,0	84,7
	SLO	17	11,8	11,8	96,5
	SWE	5	3,5	3,5	100,0
	Total	144	100,0	100,0	

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	58	40,3	41,7	41,7
	Male	81	56,3	58,3	100,0
	Total	139	96,5	100,0	
Missing	-9	5	3,5		
Total		144	100,0		

Year of birth /age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1950	1	,7	,9	,9
	1952	1	,7	,9	1,9
	1954	1	,7	,9	2,8
	1955	3	2,1	2,8	5,6
	1956	2	1,4	1,9	7,5
	1957	3	2,1	2,8	10,3
	1958	1	,7	,9	11,2

	1960	1	,7	,9	12,1
	1961	4	2,8	3,7	15,9
	1962	1	,7	,9	16,8
	1963	1	,7	,9	17,8
	1964	2	1,4	1,9	19,6
	1965	3	2,1	2,8	22,4
	1966	1	,7	,9	23,4
	1969	1	,7	,9	24,3
	1970	2	1,4	1,9	26,2
	1971	7	4,9	6,5	32,7
	1972	1	,7	,9	33,6
	1973	3	2,1	2,8	36,4
	1974	4	2,8	3,7	40,2
	1975	4	2,8	3,7	43,9
	1976	5	3,5	4,7	48,6
	1977	4	2,8	3,7	52,3
	1978	4	2,8	3,7	56,1
	1979	1	,7	,9	57,0
	1980	3	2,1	2,8	59,8
	1981	5	3,5	4,7	64,5
	1982	3	2,1	2,8	67,3
	1983	1	,7	,9	68,2
	1984	4	2,8	3,7	72,0
	1985	2	1,4	1,9	73,8
	1986	2	1,4	1,9	75,7
	1987	3	2,1	2,8	78,5
	1988	7	4,9	6,5	85,0
	1989	4	2,8	3,7	88,8
	1990	1	,7	,9	89,7
	1991	2	1,4	1,9	91,6
	1992	4	2,8	3,7	95,3
	1993	1	,7	,9	96,3
	1994	2	1,4	1,9	98,1
	1995	1	,7	,9	99,1
	1997	1	,7	,9	100,0
	Total	107	74,3	100,0	
Missing	-9	37	25,7		
Total		144	100,0		

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25 - 35 years	26	18,1	24,3	24,3
	36 - 45 years	29	20,1	27,1	51,4
	46 - 55 years	27	18,8	25,2	76,6
	56 - 65 years	17	11,8	15,9	92,5
	66 years and older	8	5,6	7,5	100,0
	Total	107	74,3	100,0	
Missing	System	37	25,7		
Total		144	100,0		

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	high school	6	4,2	4,2	4,2
	BSc degree	21	14,6	14,8	19,0
	MSc degree	79	54,9	55,6	74,6
	PhD	36	25,0	25,4	100,0
	Total	142	98,6	100,0	
Missing	-9	2	1,4		
Total		144	100,0		

Job type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	private sector	20	13,9	14,3	14,3
	public sector	108	75,0	77,1	91,4
	a non-governmental organisation (NGO)	12	8,3	8,6	100,0
	Total	140	97,2	100,0	
Missing	-9	4	2,8		
Total		144	100,0		

Type of organisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Authorities - policy-making (Governmental ministry, region, local representative)	36	25,0	25,4	25,4
	Authorities - policy implementation (regulatory agencies, inspector, public agencies, monitoring agencies)	37	25,7	26,1	51,4
	Experts (Agri advisor, Water managers, Environmental managers, Consultants)	36	25,0	25,4	76,8
	Research/ Science (Experts - Researchers dealing with topic professionally)	25	17,4	17,6	94,4
	NGO	6	4,2	4,2	98,6
	other	2	1,4	1,4	100,0
	Total	142	98,6	100,0	
Missing	-9	2	1,4		
Total		144	100,0		

Level of organisation operation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	National level (government, adminstration/offices (NUTS 0))	69	47,9	48,6	48,6
	Regional level (government, offices, administrative units (NUTS 1-3))	49	34,0	34,5	83,1
	Local municipal (LAU)	24	16,7	16,9	100,0
	Total	142	98,6	100,0	
Missing	-9	2	1,4		
Total		144	100,0		

```
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VAR00005
VAR00006
VAR00007
(1))
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```

Multiple Response

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$usposabljanje[a]	144	100,0%	0	0,0%	144	100,0%

a. Dichotomy group tabulated at value 1.

$usposabljanje Frequencies

		Responses		Percent of Cases
		N	Percent	
Type of main expertise[a]	Agriculture	59	27,4%	41,0%
	Water management	70	32,6%	48,6%
	Environment/nature	57	26,5%	39,6%
	Spatial planning	16	7,4%	11,1%
	Climate change	13	6,0%	9,0%
Total		215	100,0%	149,3%

a. Dichotomy group tabulated at value 1.

```
FREQUENCIES region.
```

Frequencies

Statistics

Biogeographical region

N	Valid	144
	Missing	0

Biogeographical region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pannonian	23	16,0	16,0	16,0
	Boreal	34	23,6	23,6	39,6
	Continental	87	60,4	60,4	100,0
	Total	144	100,0	100,0	

```
SORT CASES  BY region.
SPLIT FILE SEPARATE BY region.
MULT RESPONSE
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VAR00003
VAR00004
VAR00005
VAR00006
VAR00007
(1))
 /FREQUENCIES=$usposabljanje.
```

Multiple Response

Biogeographical region = Pannonian

Case Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$usposabljanje[b]	23	100,0%	0	0,0%	23	100,0%

a. Biogeographical region = Pannonian

b. Dichotomy group tabulated at value 1.

$usposabljanje Frequencies[a]

		Responses		Percent of Cases
		N	Percent	
Type of main expertise[b]	Agriculture	13	39,4%	56,5%
	Water management	8	24,2%	34,8%
	Environment/nature	6	18,2%	26,1%
	Spatial planning	4	12,1%	17,4%
	Climate change	2	6,1%	8,7%
Total		33	100,0%	143,5%

a. Biogeographical region = Pannonian

b. Dichotomy group tabulated at value 1.

Biogeographical region = Boreal

Case Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$usposabljanje[b]	34	100,0%	0	0,0%	34	100,0%

a. Biogeographical region = Boreal

b. Dichotomy group tabulated at value 1.

$usposabljanje Frequencies[a]

		Responses		
		N	Percent	Percent of Cases
Type of main expertise[b]	Agriculture	17	27,0%	50,0%
	Water management	17	27,0%	50,0%
	Environment/nature	22	34,9%	64,7%
	Spatial planning	2	3,2%	5,9%
	Climate change	5	7,9%	14,7%
Total		63	100,0%	185,3%

a. Biogeographical region = Boreal

b. Dichotomy group tabulated at value 1.

Biogeographical region = Continental

Case Summary[a]

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$usposabljanje[b]	87	100,0%	0	0,0%	87	100,0%

a. Biogeographical region = Continental

b. Dichotomy group tabulated at value 1.

$usposabljanje Frequencies[a]

		Responses		
		N	Percent	Percent of Cases
Type of main expertise[b]	Agriculture	29	24,4%	33,3%
	Water management	45	37,8%	51,7%
	Environment/nature	29	24,4%	33,3%
	Spatial planning	10	8,4%	11,5%
	Climate change	6	5,0%	6,9%
Total		119	100,0%	136,8%

a. Biogeographical region = Continental

b. Dichotomy group tabulated at value 1.

```
SPLIT FILE OFF.

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VAR00031
VAR00032
VAR00033
VAR00034
VAR00035.
```

Frequencies

Statistics

		2. ORIGINAL (0 - 7) ########## water quantity - excess water management – flood protection	water quantity – water scarcity - shortage – drought - irrigation	water quantity – in-field water retention measures	water quality – in-field nutrient retention measures	water quality - nutrients recovery from streams
N	Valid	123	127	126	116	95
	Missing	21	17	18	28	49

Statistics

		climate change – mitigation/adaptation	nature conservation
N	Valid	127	137
	Missing	17	7

Frequency Table

2. ORIGINAL (0 - 7) ########## water quantity - excess water management – flood protection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	6,9	8,1	8,1
	2	11	7,6	8,9	17,1
	3	10	6,9	8,1	25,2
	4	18	12,5	14,6	39,8
	5	16	11,1	13,0	52,8

	6	20	13,9	16,3	69,1
	7	38	26,4	30,9	100,0
	Total	123	85,4	100,0	
Missing	-9	3	2,1		
	-7	1	,7		
	0	17	11,8		
	Total	21	14,6		
Total		144	100,0		

water quantity – water scarcity - shortage – drought - irrigation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	8,3	9,4	9,4
	2	12	8,3	9,4	18,9
	3	10	6,9	7,9	26,8
	4	12	8,3	9,4	36,2
	5	17	11,8	13,4	49,6
	6	27	18,8	21,3	70,9
	7	37	25,7	29,1	100,0
	Total	127	88,2	100,0	
Missing	-9	2	1,4		
	-7	1	,7		
	0	14	9,7		
	Total	17	11,8		
Total		144	100,0		

water quantity – in-field water retention measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	7,6	8,7	8,7
	2	8	5,6	6,3	15,1
	3	20	13,9	15,9	31,0
	4	22	15,3	17,5	48,4
	5	22	15,3	17,5	65,9
	6	24	16,7	19,0	84,9
	7	19	13,2	15,1	100,0
	Total	126	87,5	100,0	

Missing	-9	4	2,8		
	-7	2	1,4		
	0	12	8,3		
	Total	18	12,5		
Total		144	100,0		

water quality – in-field nutrient retention measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	6,9	6,9
	2	10	6,9	8,6	15,5
	3	20	13,9	17,2	32,8
	4	12	8,3	10,3	43,1
	5	22	15,3	19,0	62,1
	6	21	14,6	18,1	80,2
	7	23	16,0	19,8	100,0
	Total	116	80,6	100,0	
Missing	-9	6	4,2		
	-7	2	1,4		
	0	20	13,9		
	Total	28	19,4		
Total		144	100,0		

water quality - nutrients recovery from streams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	14	9,7	14,7	14,7
	2	18	12,5	18,9	33,7
	3	19	13,2	20,0	53,7
	4	3	2,1	3,2	56,8
	5	15	10,4	15,8	72,6
	6	15	10,4	15,8	88,4
	7	11	7,6	11,6	100,0
	Total	95	66,0	100,0	
Missing	-9	6	4,2		
	-7	5	3,5		
	0	38	26,4		

	Total	49	34,0		
Total		144	100,0		

climate change – mitigation/adaptation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	3,9	3,9
	2	7	4,9	5,5	9,4
	3	11	7,6	8,7	18,1
	4	24	16,7	18,9	37,0
	5	21	14,6	16,5	53,5
	6	29	20,1	22,8	76,4
	7	30	20,8	23,6	100,0
	Total	127	88,2	100,0	
Missing	-9	4	2,8		
	0	13	9,0		
	Total	17	11,8		
Total		144	100,0		

nature conservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	2,9	2,9
	2	8	5,6	5,8	8,8
	3	15	10,4	10,9	19,7
	4	23	16,0	16,8	36,5
	5	19	13,2	13,9	50,4
	6	29	20,1	21,2	71,5
	7	39	27,1	28,5	100,0
	Total	137	95,1	100,0	
Missing	-9	3	2,1		
	0	4	2,8		
	Total	7	4,9		
Total		144	100,0		

```
DESCRIPTIVES VAR00029
VAR00030
VAR00031
VAR00032
VAR00033
VAR00034
VAR00035.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
2. ORIGINAL (0 - 7) ########## water quantity - excess water management – flood protection	123	1	7	4,88	1,998
water quantity – water scarcity - shortage – drought - irrigation	127	1	7	4,88	2,042
water quantity – in-field water retention measures	126	1	7	4,46	1,818
water quality – in-field nutrient retention measures	116	1	7	4,59	1,874
water quality - nutrients recovery from streams	95	1	7	3,80	2,030
climate change – mitigation/adaptation	127	1	7	5,02	1,690
nature conservation	137	1	7	5,10	1,720
Valid N (listwise)	76				

```
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VAR00101
VAR00102
VAR00103
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VAR00108
VAR00109
VAR00110
VAR00111
VAR00112
VAR00113
VAR00114
VAR00115
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VAR00116
VAR00117
VAR00118
VAR00119
VAR00120
VAR00121
VAR00122
VAR00123
VAR00124
VAR00125
VAR00126
VAR00127
VAR00128.
```

Frequencies

Statistics

		############ 3. ORIGINAL ######## Green cover (cover crop/catch-crop) (agri)	Meadows and pastures (agri)	Buffer strips and hedges (agri)	Crop rotation (agri)	Strip cropping along contours (agri)
N	Valid	97	100	107	93	68
	Missing	47	44	37	51	76

Statistics

		Intercropping (agri)	No-till agriculture (agri)	Low till agriculture (agri)	Early sowing (agri)	Traditional terracing (agri)
N	Valid	67	82	88	78	61
	Missing	77	62	56	66	83

Statistics

		Controlled traffic (agri)	Reduced stocking density (agri)	Mulching (agri)	Other agriculture measure:	#########HYDRO ######### Basins and ponds (hydro)
N	Valid	68	80	73	34	109
	Missing	76	64	71	110	35

Statistics

		Wetland restoration and management (hydro)	Floodplain restoration and management (hydro)	Re-meandering (hydro)	Stream bed re-naturalization (hydro)	Restoration and reconnection of seasonal streams (hydro)
N	Valid	114	99	85	95	80
	Missing	30	45	59	49	64

Statistics

		Reconnection of oxbow lakes and similar features (hydro)	Riverbed material re-naturalization (hydro)	Removal of dams and other longitudinal barriers (hydro)	Natural bank stabilisation (hydro)	Elimination of riverbank protection (hydro)
N	Valid	75	79	84	93	73
	Missing	69	65	60	51	71

Statistics

		Lake restoration (hydro)	Restoration of natural infiltration to groundwater (hydro)	Re-naturalisation of polder areas (hydro)	Nutrient recovery from streams	Other hydro-morphological measure:
N	Valid	71	83	58	61	38
	Missing	73	61	86	83	106

Frequency Table

###############3. ORIGINAL ######## Green cover (cover crop/catch-crop) (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	7,6	11,3	11,3
	2	5	3,5	5,2	16,5
	3	12	8,3	12,4	28,9
	4	8	5,6	8,2	37,1

	5	13	9,0	13,4	50,5
	6	19	13,2	19,6	70,1
	7	29	20,1	29,9	100,0
	Total	97	67,4	100,0	
Missing	-9	3	2,1		
	0	44	30,6		
	Total	47	32,6		
Total		144	100,0		

Meadows and pastures (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	8,3	12,0	12,0
	2	7	4,9	7,0	19,0
	3	11	7,6	11,0	30,0
	4	16	11,1	16,0	46,0
	5	16	11,1	16,0	62,0
	6	19	13,2	19,0	81,0
	7	19	13,2	19,0	100,0
	Total	100	69,4	100,0	
Missing	-9	2	1,4		
	0	42	29,2		
	Total	44	30,6		
Total		144	100,0		

Buffer strips and hedges (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	5,6	5,6
	2	9	6,3	8,4	14,0
	3	11	7,6	10,3	24,3
	4	7	4,9	6,5	30,8
	5	21	14,6	19,6	50,5
	6	28	19,4	26,2	76,6
	7	25	17,4	23,4	100,0
	Total	107	74,3	100,0	
Missing	-9	2	1,4		

	0	35	24,3		
	Total	37	25,7		
Total		144	100,0		

Crop rotation (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	9,7	9,7
	2	8	5,6	8,6	18,3
	3	10	6,9	10,8	29,0
	4	8	5,6	8,6	37,6
	5	18	12,5	19,4	57,0
	6	18	12,5	19,4	76,3
	7	22	15,3	23,7	100,0
	Total	93	64,6	100,0	
Missing	-9	3	2,1		
	0	48	33,3		
	Total	51	35,4		
Total		144	100,0		

Strip cropping along contours (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	7,6	16,2	16,2
	2	14	9,7	20,6	36,8
	3	11	7,6	16,2	52,9
	4	9	6,3	13,2	66,2
	5	8	5,6	11,8	77,9
	6	9	6,3	13,2	91,2
	7	6	4,2	8,8	100,0
	Total	68	47,2	100,0	
Missing	-9	16	11,1		
	0	60	41,7		
	Total	76	52,8		
Total		144	100,0		

Intercropping (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	13,4	13,4
	2	10	6,9	14,9	28,4
	3	14	9,7	20,9	49,3
	4	4	2,8	6,0	55,2
	5	11	7,6	16,4	71,6
	6	12	8,3	17,9	89,6
	7	7	4,9	10,4	100,0
	Total	67	46,5	100,0	
Missing	-9	15	10,4		
	0	62	43,1		
	Total	77	53,5		
Total		144	100,0		

No-till agriculture (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	14	9,7	17,1	17,1
	2	7	4,9	8,5	25,6
	3	11	7,6	13,4	39,0
	4	11	7,6	13,4	52,4
	5	13	9,0	15,9	68,3
	6	12	8,3	14,6	82,9
	7	14	9,7	17,1	100,0
	Total	82	56,9	100,0	
Missing	-9	4	2,8		
	0	58	40,3		
	Total	62	43,1		
Total		144	100,0		

Low till agriculture (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	9,1	9,1
	2	4	2,8	4,5	13,6

	3	13	9,0	14,8	28,4
	4	11	7,6	12,5	40,9
	5	13	9,0	14,8	55,7
	6	17	11,8	19,3	75,0
	7	22	15,3	25,0	100,0
	Total	88	61,1	100,0	
Missing	-9	4	2,8		
	0	52	36,1		
	Total	56	38,9		
Total		144	100,0		

Early sowing (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	18	12,5	23,1	23,1
	2	7	4,9	9,0	32,1
	3	10	6,9	12,8	44,9
	4	10	6,9	12,8	57,7
	5	22	15,3	28,2	85,9
	6	6	4,2	7,7	93,6
	7	5	3,5	6,4	100,0
	Total	78	54,2	100,0	
Missing	-9	3	2,1		
	0	63	43,8		
	Total	66	45,8		
Total		144	100,0		

Traditional terracing (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	18	12,5	29,5	29,5
	2	13	9,0	21,3	50,8
	3	11	7,6	18,0	68,9
	4	3	2,1	4,9	73,8
	5	6	4,2	9,8	83,6
	6	5	3,5	8,2	91,8
	7	5	3,5	8,2	100,0

	Total	61	42,4	100,0	
Missing	-9	16	11,1		
	0	67	46,5		
	Total	83	57,6		
Total		144	100,0		

Controlled traffic (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	13,2	13,2
	2	10	6,9	14,7	27,9
	3	14	9,7	20,6	48,5
	4	10	6,9	14,7	63,2
	5	9	6,3	13,2	76,5
	6	8	5,6	11,8	88,2
	7	8	5,6	11,8	100,0
	Total	68	47,2	100,0	
Missing	-9	4	2,8		
	0	72	50,0		
	Total	76	52,8		
Total		144	100,0		

Reduced stocking density (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	8,3	15,0	15,0
	2	11	7,6	13,8	28,7
	3	14	9,7	17,5	46,3
	4	12	8,3	15,0	61,3
	5	13	9,0	16,3	77,5
	6	12	8,3	15,0	92,5
	7	6	4,2	7,5	100,0
	Total	80	55,6	100,0	
Missing	-9	3	2,1		
	0	61	42,4		
	Total	64	44,4		
Total		144	100,0		

Mulching (agri)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	6,9	13,7	13,7
	2	9	6,3	12,3	26,0
	3	10	6,9	13,7	39,7
	4	11	7,6	15,1	54,8
	5	18	12,5	24,7	79,5
	6	6	4,2	8,2	87,7
	7	9	6,3	12,3	100,0
	Total	73	50,7	100,0	
Missing	-9	3	2,1		
	0	68	47,2		
	Total	71	49,3		
Total		144	100,0		

Other agriculture measure:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	11,8	11,8
	2	1	,7	2,9	14,7
	3	3	2,1	8,8	23,5
	4	7	4,9	20,6	44,1
	5	3	2,1	8,8	52,9
	6	8	5,6	23,5	76,5
	7	8	5,6	23,5	100,0
	Total	34	23,6	100,0	
Missing	-9	65	45,1		
	0	45	31,3		
	Total	110	76,4		
Total		144	100,0		

#########HYDRO ######### Basins and ponds (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	5,5	5,5
	2	2	1,4	1,8	7,3
	3	16	11,1	14,7	22,0
	4	22	15,3	20,2	42,2
	5	20	13,9	18,3	60,6
	6	17	11,8	15,6	76,1
	7	26	18,1	23,9	100,0
	Total	109	75,7	100,0	
Missing	-9	2	1,4		
	0	33	22,9		
	Total	35	24,3		
Total		144	100,0		

Wetland restoration and management (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	14	9,7	12,3	12,3
	2	10	6,9	8,8	21,1
	3	13	9,0	11,4	32,5
	4	12	8,3	10,5	43,0
	5	16	11,1	14,0	57,0
	6	18	12,5	15,8	72,8
	7	31	21,5	27,2	100,0
	Total	114	79,2	100,0	
Missing	-9	1	,7		
	0	29	20,1		
	Total	30	20,8		
Total		144	100,0		

Floodplain restoration and management (hydro)

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	1	15	10,4	15,2	15,2
	2	11	7,6	11,1	26,3
	3	7	4,9	7,1	33,3
	4	13	9,0	13,1	46,5
	5	17	11,8	17,2	63,6
	6	10	6,9	10,1	73,7
	7	26	18,1	26,3	100,0
	Total	99	68,8	100,0	
Missing	-9	3	2,1		
	-7	1	,7		
	0	41	28,5		
	Total	45	31,3		
Total		144	100,0		

Re-meandering (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	9,4	9,4
	2	16	11,1	18,8	28,2
	3	6	4,2	7,1	35,3
	4	15	10,4	17,6	52,9
	5	12	8,3	14,1	67,1
	6	8	5,6	9,4	76,5
	7	20	13,9	23,5	100,0
	Total	85	59,0	100,0	
Missing	-9	3	2,1		
	0	56	38,9		
	Total	59	41,0		
Total		144	100,0		

Stream bed re-naturalization (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	7,4	7,4
	2	18	12,5	18,9	26,3

	3	8	5,6	8,4	34,7
	4	6	4,2	6,3	41,1
	5	17	11,8	17,9	58,9
	6	17	11,8	17,9	76,8
	7	22	15,3	23,2	100,0
	Total	95	66,0	100,0	
Missing	-9	1	,7		
	0	48	33,3		
	Total	49	34,0		
Total		144	100,0		

Restoration and reconnection of seasonal streams (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	15	10,4	18,8	18,8
	2	15	10,4	18,8	37,5
	3	8	5,6	10,0	47,5
	4	8	5,6	10,0	57,5
	5	10	6,9	12,5	70,0
	6	7	4,9	8,8	78,8
	7	17	11,8	21,3	100,0
	Total	80	55,6	100,0	
Missing	-9	1	,7		
	-7	1	,7		
	0	62	43,1		
	Total	64	44,4		
Total		144	100,0		

Reconnection of oxbow lakes and similar features (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	16	11,1	21,3	21,3
	2	10	6,9	13,3	34,7
	3	4	2,8	5,3	40,0
	4	6	4,2	8,0	48,0

	5	15	10,4	20,0	68,0
	6	8	5,6	10,7	78,7
	7	16	11,1	21,3	100,0
	Total	75	52,1	100,0	
Missing	-9	3	2,1		
	-7	1	,7		
	0	65	45,1		
	Total	69	47,9		
Total		144	100,0		

Riverbed material re-naturalization (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	15	10,4	19,0	19,0
	2	9	6,3	11,4	30,4
	3	6	4,2	7,6	38,0
	4	12	8,3	15,2	53,2
	5	19	13,2	24,1	77,2
	6	7	4,9	8,9	86,1
	7	11	7,6	13,9	100,0
	Total	79	54,9	100,0	
Missing	-9	4	2,8		
	-7	1	,7		
	0	60	41,7		
	Total	65	45,1		
Total		144	100,0		

Removal of dams and other longitudinal barriers (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	17	11,8	20,2	20,2
	2	10	6,9	11,9	32,1
	3	9	6,3	10,7	42,9
	4	9	6,3	10,7	53,6
	5	10	6,9	11,9	65,5

	6	10	6,9	11,9	77,4
	7	19	13,2	22,6	100,0
	Total	84	58,3	100,0	
Missing	-9	3	2,1		
	0	57	39,6		
	Total	60	41,7		
Total		144	100,0		

Natural bank stabilisation (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	8,3	12,9	12,9
	2	12	8,3	12,9	25,8
	3	8	5,6	8,6	34,4
	4	12	8,3	12,9	47,3
	5	16	11,1	17,2	64,5
	6	13	9,0	14,0	78,5
	7	20	13,9	21,5	100,0
	Total	93	64,6	100,0	
Missing	-9	4	2,8		
	0	47	32,6		
	Total	51	35,4		
Total		144	100,0		

Elimination of riverbank protection (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	15	10,4	20,5	20,5
	2	10	6,9	13,7	34,2
	3	4	2,8	5,5	39,7
	4	8	5,6	11,0	50,7
	5	10	6,9	13,7	64,4
	6	12	8,3	16,4	80,8
	7	14	9,7	19,2	100,0
	Total	73	50,7	100,0	

Missing	-9	4	2,8		
	0	67	46,5		
	Total	71	49,3		
Total		144	100,0		

Lake restoration (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	12,7	12,7
	2	9	6,3	12,7	25,4
	3	5	3,5	7,0	32,4
	4	16	11,1	22,5	54,9
	5	10	6,9	14,1	69,0
	6	8	5,6	11,3	80,3
	7	14	9,7	19,7	100,0
	Total	71	49,3	100,0	
Missing	-9	4	2,8		
	0	69	47,9		
	Total	73	50,7		
Total		144	100,0		

Restoration of natural infiltration to groundwater (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	8,3	14,5	14,5
	2	9	6,3	10,8	25,3
	3	10	6,9	12,0	37,3
	4	7	4,9	8,4	45,8
	5	15	10,4	18,1	63,9
	6	13	9,0	15,7	79,5
	7	17	11,8	20,5	100,0
	Total	83	57,6	100,0	
Missing	-9	4	2,8		
	0	57	39,6		
	Total	61	42,4		

Total		144	100,0		

Re-naturalisation of polder areas (hydro)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	6,9	17,2	17,2
	2	5	3,5	8,6	25,9
	3	8	5,6	13,8	39,7
	4	7	4,9	12,1	51,7
	5	11	7,6	19,0	70,7
	6	8	5,6	13,8	84,5
	7	9	6,3	15,5	100,0
	Total	58	40,3	100,0	
Missing	-9	4	2,8		
	0	82	56,9		
	Total	86	59,7		
Total		144	100,0		

Nutrient recovery from streams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	15	10,4	24,6	24,6
	2	7	4,9	11,5	36,1
	3	6	4,2	9,8	45,9
	4	7	4,9	11,5	57,4
	5	11	7,6	18,0	75,4
	6	7	4,9	11,5	86,9
	7	8	5,6	13,1	100,0
	Total	61	42,4	100,0	
Missing	-9	17	11,8		
	0	66	45,8		
	Total	83	57,6		
Total		144	100,0		

Other hydro-morphological measure:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	15,8	15,8
	2	2	1,4	5,3	21,1
	3	4	2,8	10,5	31,6
	4	5	3,5	13,2	44,7
	5	6	4,2	15,8	60,5
	6	7	4,9	18,4	78,9
	7	8	5,6	21,1	100,0
	Total	38	26,4	100,0	
Missing	-9	64	44,4		
	0	42	29,2		
	Total	106	73,6		
Total		144	100,0		

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DESCRIPTIVES VAR00099
VAR00100
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Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
##############3. ORIGINAL ######## Green cover (cover crop/catch-crop) (agri)	97	1	7	4,86	2,067
Meadows and pastures (agri)	100	1	7	4,50	1,972
Buffer strips and hedges (agri)	107	1	7	4,98	1,833
Crop rotation (agri)	93	1	7	4,72	1,986
Strip cropping along contours (agri)	68	1	7	3,59	1,941
Intercropping (agri)	67	1	7	3,93	1,972
No-till agriculture (agri)	82	1	7	4,15	2,079
Low till agriculture (agri)	88	1	7	4,77	1,940
Early sowing (agri)	78	1	7	3,63	1,908
Traditional terracing (agri)	61	1	7	3,02	1,987
Controlled traffic (agri)	68	1	7	3,82	1,916
Reduced stocking density (agri)	80	1	7	3,79	1,874
Mulching (agri)	73	1	7	3,99	1,897
Other agriculture measure:	34	1	7	4,76	1,986
#########HYDRO ######### Basins and ponds (hydro)	109	1	7	4,86	1,718
Wetland restoration and management (hydro)	114	1	7	4,61	2,110
Floodplain restoration and management (hydro)	99	1	7	4,41	2,167
Re-meandering (hydro)	85	1	7	4,31	2,065
Stream bed re-naturalization (hydro)	95	1	7	4,55	2,056
Restoration and reconnection of seasonal streams (hydro)	80	1	7	3,90	2,231
Reconnection of oxbow lakes and similar features (hydro)	75	1	7	4,09	2,261

Riverbed material re-naturalization (hydro)	79	1	7	3,96	2,035
Removal of dams and other longitudinal barriers (hydro)	84	1	7	4,08	2,256
Natural bank stabilisation (hydro)	93	1	7	4,37	2,084
Elimination of riverbank protection (hydro)	73	1	7	4,10	2,243
Lake restoration (hydro)	71	1	7	4,25	2,019
Restoration of natural infiltration to groundwater (hydro)	83	1	7	4,34	2,109
Re-naturalisation of polder areas (hydro)	58	1	7	4,10	2,058
Nutrient recovery from streams	61	1	7	3,74	2,144
Other hydro-morphological measure:	38	1	7	4,47	2,102
Valid N (listwise)	5				

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FREQUENCIES VAR00139
VAR00140
VAR00141
VAR00142
VAR00042.
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Frequencies

Statistics

		########### 4. ORIGINAL ###### Rate the level of knowledge on policies (legislation/regulation/strategies/programmes) for all presented fields of expertise Agriculture	Water management	Environmental/Nature management	Spatial planning	Climate change
N	Valid	126	134	133	118	120
	Missing	18	10	11	26	24

Frequency Table

########### 4. ORIGINAL ###### Rate the level of knowledge on policies (legislation/regulation/strategies/programmes) for all presented fields of expertise Agriculture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	14	9,7	11,1	11,1
	2	11	7,6	8,7	19,8
	3	13	9,0	10,3	30,2
	4	17	11,8	13,5	43,7
	5	22	15,3	17,5	61,1
	6	30	20,8	23,8	84,9
	7	19	13,2	15,1	100,0
	Total	126	87,5	100,0	

Missing	-9	1	,7		
	0	17	11,8		
	Total	18	12,5		
Total		144	100,0		

Water management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	4,5	4,5
	2	10	6,9	7,5	11,9
	3	17	11,8	12,7	24,6
	4	16	11,1	11,9	36,6
	5	25	17,4	18,7	55,2
	6	30	20,8	22,4	77,6
	7	30	20,8	22,4	100,0
	Total	134	93,1	100,0	
Missing	0	10	6,9		
Total		144	100,0		

Environmental/Nature management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	3,8	3,8
	2	9	6,3	6,8	10,5
	3	18	12,5	13,5	24,1
	4	31	21,5	23,3	47,4
	5	21	14,6	15,8	63,2
	6	30	20,8	22,6	85,7
	7	19	13,2	14,3	100,0
	Total	133	92,4	100,0	
Missing	-9	1	,7		
	-7	1	,7		
	0	9	6,3		
	Total	11	7,6		
Total		144	100,0		

Spatial planning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	14	9,7	11,9	11,9
	2	22	15,3	18,6	30,5
	3	26	18,1	22,0	52,5
	4	19	13,2	16,1	68,6
	5	20	13,9	16,9	85,6
	6	12	8,3	10,2	95,8
	7	5	3,5	4,2	100,0
	Total	118	81,9	100,0	
Missing	-9	1	,7		
	-7	1	,7		
	0	24	16,7		
	Total	26	18,1		
Total		144	100,0		

Climate change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	5,0	5,0
	2	8	5,6	6,7	11,7
	3	28	19,4	23,3	35,0
	4	28	19,4	23,3	58,3
	5	20	13,9	16,7	75,0
	6	19	13,2	15,8	90,8
	7	11	7,6	9,2	100,0
	Total	120	83,3	100,0	
Missing	-9	1	,7		
	-7	1	,7		
	0	22	15,3		
	Total	24	16,7		
Total		144	100,0		

```
DESCRIPTIVES VAR00139
VAR00140
VAR00141
VAR00142
VAR00042.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
########## 4. ORIGINAL ###### Rate the level of knowledge on policies (legislation/regulation/strategies /programmes) for all presented fields of expertise Agriculture	126	1	7	4,49	1,930
Water management	134	1	7	4,90	1,774
Environmental/Nature management	133	1	7	4,65	1,638
Spatial planning	118	1	7	3,55	1,677
Climate change	120	1	7	4,24	1,593
Valid N (listwise)	105				

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FREQUENCIES  VAR00165
VAR00166
VAR00167
VAR00168
VAR00169
VAR00170
VAR00171
VAR00172.
```

Frequencies

Statistics

		########6. ORIGINAL water quantity - managing excess (flood protection)	water quantity - shortages of water (drought-irrigation)	water quantity – in-field water retention measures in agri-production	water quality - nutrients recovery from streams	water quality – in-field nutrient retention measures
N	Valid	112	113	99	81	93
	Missing	32	31	45	63	51

Statistics

		sustainable agriculture production	climate change – mitigation (Carbon management)	nature conservation
N	Valid	98	105	135
	Missing	46	39	9

Frequency Table

########6. ORIGINAL water quantity - managing excess (flood protection)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	5,4	5,4
	2	4	2,8	3,6	8,9
	3	11	7,6	9,8	18,8
	4	15	10,4	13,4	32,1
	5	13	9,0	11,6	43,8
	6	35	24,3	31,3	75,0
	7	28	19,4	25,0	100,0
	Total	112	77,8	100,0	
Missing	-9	6	4,2		
	-7	15	10,4		
	0	11	7,6		
	Total	32	22,2		
Total		144	100,0		

water quantity - shortages of water (drought-irrigation)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	8,0	8,0
	2	13	9,0	11,5	19,5
	3	17	11,8	15,0	34,5
	4	21	14,6	18,6	53,1
	5	19	13,2	16,8	69,9
	6	15	10,4	13,3	83,2
	7	19	13,2	16,8	100,0
	Total	113	78,5	100,0	
Missing	-9	3	2,1		
	-7	20	13,9		
	0	8	5,6		
	Total	31	21,5		
Total		144	100,0		

water quantity – in-field water retention measures in agri-production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	8,1	8,1
	2	26	18,1	26,3	34,3
	3	20	13,9	20,2	54,5
	4	12	8,3	12,1	66,7
	5	16	11,1	16,2	82,8
	6	11	7,6	11,1	93,9
	7	6	4,2	6,1	100,0
	Total	99	68,8	100,0	
Missing	-9	4	2,8		
	-7	27	18,8		
	0	14	9,7		
	Total	45	31,3		
Total		144	100,0		

water quality - nutrients recovery from streams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	16	11,1	19,8	19,8
	2	10	6,9	12,3	32,1
	3	15	10,4	18,5	50,6
	4	9	6,3	11,1	61,7
	5	6	4,2	7,4	69,1
	6	11	7,6	13,6	82,7
	7	14	9,7	17,3	100,0
	Total	81	56,3	100,0	
Missing	-9	5	3,5		
	-7	32	22,2		
	0	26	18,1		
	Total	63	43,8		
Total		144	100,0		

water quality – in-field nutrient retention measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	15	10,4	16,1	16,1
	2	7	4,9	7,5	23,7
	3	10	6,9	10,8	34,4
	4	19	13,2	20,4	54,8
	5	11	7,6	11,8	66,7
	6	18	12,5	19,4	86,0
	7	13	9,0	14,0	100,0
	Total	93	64,6	100,0	
Missing	-9	6	4,2		
	-7	24	16,7		
	0	21	14,6		
	Total	51	35,4		
Total		144	100,0		

sustainable agriculture production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	9,2	9,2
	2	11	7,6	11,2	20,4
	3	10	6,9	10,2	30,6
	4	16	11,1	16,3	46,9
	5	11	7,6	11,2	58,2
	6	20	13,9	20,4	78,6
	7	21	14,6	21,4	100,0
	Total	98	68,1	100,0	
Missing	-9	5	3,5		
	-7	28	19,4		
	0	13	9,0		
	Total	46	31,9		
Total		144	100,0		

climate change – mitigation (Carbon management)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	7,6	7,6
	2	17	11,8	16,2	23,8
	3	20	13,9	19,0	42,9
	4	19	13,2	18,1	61,0
	5	15	10,4	14,3	75,2
	6	12	8,3	11,4	86,7
	7	14	9,7	13,3	100,0
	Total	105	72,9	100,0	
Missing	-9	9	6,3		
	-7	19	13,2		
	0	11	7,6		
	Total	39	27,1		
Total		144	100,0		

nature conservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	3,7	3,7
	2	5	3,5	3,7	7,4
	3	12	8,3	8,9	16,3
	4	21	14,6	15,6	31,9
	5	20	13,9	14,8	46,7
	6	43	29,9	31,9	78,5
	7	29	20,1	21,5	100,0
	Total	135	93,8	100,0	
Missing	-9	3	2,1		
	-7	5	3,5		
	0	1	,7		
	Total	9	6,3		
Total		144	100,0		

```
DESCRIPTIVES VAR00165
VAR00166
VAR00167
VAR00168
VAR00169
VAR00170
VAR00171
VAR00172.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
########6. ORIGINAL water quantity - managing excess (flood protection)	112	1	7	5,16	1,738
water quantity - shortages of water (drought-irrigation)	113	1	7	4,32	1,863
water quantity – in-field water retention measures in agri-production	99	1	7	3,60	1,732

water quality - nutrients recovery from streams	81	1	7	3,84	2,159
water quality – in-field nutrient retention measures	93	1	7	4,18	2,005
sustainable agriculture production	98	1	7	4,56	1,990
climate change – mitigation (Carbon management)	105	1	7	4,03	1,832
nature conservation	135	1	7	5,16	1,616
Valid N (listwise)	35				

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FREQUENCIES
VAR00188
VAR00189
VAR00190
VAR00191
VAR00192.
```

Frequencies

Statistics

		######### 7. ORIGINAL water quantity - excess water management - flood	water quantity - scarcity - shortage - drought	water quantity – in-field water retention measures	water quality - nutrients recovery from streams	water quality – in-field nutrient retention measures
N	Valid	102	99	96	78	93
	Missing	42	45	48	66	51

Frequency Table

######### 7. ORIGINAL water quantity - excess water management - flood

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	6,9	6,9
	2	16	11,1	15,7	22,5

	3	20	13,9	19,6	42,2
	4	19	13,2	18,6	60,8
	5	20	13,9	19,6	80,4
	6	15	10,4	14,7	95,1
	7	5	3,5	4,9	100,0
	Total	102	70,8	100,0	
Missing	-9	3	2,1		
	-7	25	17,4		
	0	14	9,7		
	Total	42	29,2		
Total		144	100,0		

water quantity - scarcity - shortage - drought

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	6,9	10,1	10,1
	2	21	14,6	21,2	31,3
	3	21	14,6	21,2	52,5
	4	20	13,9	20,2	72,7
	5	18	12,5	18,2	90,9
	6	5	3,5	5,1	96,0
	7	4	2,8	4,0	100,0
	Total	99	68,8	100,0	
Missing	-9	2	1,4		
	-7	31	21,5		
	0	12	8,3		
	Total	45	31,3		
Total		144	100,0		

water quantity – in-field water retention measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	13	9,0	13,5	13,5
	2	22	15,3	22,9	36,5
	3	19	13,2	19,8	56,3

	4	16	11,1	16,7	72,9
	5	15	10,4	15,6	88,5
	6	7	4,9	7,3	95,8
	7	4	2,8	4,2	100,0
	Total	96	66,7	100,0	
Missing	-9	2	1,4		
	-7	34	23,6		
	0	12	8,3		
	Total	48	33,3		
Total		144	100,0		

water quality - nutrients recovery from streams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	10,3	10,3
	2	15	10,4	19,2	29,5
	3	22	15,3	28,2	57,7
	4	15	10,4	19,2	76,9
	5	8	5,6	10,3	87,2
	6	6	4,2	7,7	94,9
	7	4	2,8	5,1	100,0
	Total	78	54,2	100,0	
Missing	-9	2	1,4		
	-7	48	33,3		
	0	16	11,1		
	Total	66	45,8		
Total		144	100,0		

water quality – in-field nutrient retention measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	6,9	10,8	10,8
	2	13	9,0	14,0	24,7
	3	26	18,1	28,0	52,7
	4	12	8,3	12,9	65,6

	5	16	11,1	17,2	82,8
	6	12	8,3	12,9	95,7
	7	4	2,8	4,3	100,0
	Total	93	64,6	100,0	
Missing	-9	1	,7		
	-7	38	26,4		
	0	12	8,3		
	Total	51	35,4		
Total		144	100,0		

```
DESCRIPTIVES VAR00188
VAR00189
VAR00190
VAR00191
VAR00192.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
######### 7. ORIGINAL water quantity - excess water management - flood	102	1	7	3,92	1,639
water quantity - scarcity - shortage - drought	99	1	7	3,46	1,567
water quantity – in-field water retention measures	96	1	7	3,36	1,668
water quality - nutrients recovery from streams	78	1	7	3,44	1,600
water quality – in-field nutrient retention measures	93	1	7	3,68	1,676
Valid N (listwise)	55				

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FREQUENCIES  VAR00207
VAR00208
VAR00209
VAR00210
VAR00215
VAR00216
VAR00217
VAR00218
```

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VAR00223
VAR00224
VAR00226
VAR00231
VAR00232
VAR00233
VAR00234
VAR00239
VAR00240
VAR00241.
```

Frequencies

Statistics

		####11. AGRICULTURE ORIGINAL Water quantity	Water quality	Nature conservation	Climate change	####11. Water management ORIGINAL Water quantity
N	Valid	102	103	105	95	111
	Missing	42	41	39	49	33

Statistics

		Water quality	Nature conservation	Climate change	####11. Nature management ORIGINAL Water quantity	Water quality
N	Valid	111	115	99	95	99
	Missing	33	29	45	49	45

Statistics

		Climate change	####11. Spatial planning ORIGINAL Water quantity	Water quality	Nature conservation	Climate change
N	Valid	93	84	77	86	73
	Missing	51	60	67	58	71

Statistics

		####11. Climate changeORIGINAL Water quantity	Water quality	Nature conservation
N	Valid	85	83	84

	Missing	59	61	60

Frequency Table

####11. AGRICULTURE ORIGINAL Water quantity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	8,8	8,8
	2	16	11,1	15,7	24,5
	3	19	13,2	18,6	43,1
	4	17	11,8	16,7	59,8
	5	23	16,0	22,5	82,4
	6	12	8,3	11,8	94,1
	7	6	4,2	5,9	100,0
	Total	102	70,8	100,0	
Missing	-9	6	4,2		
	-7	31	21,5		
	0	5	3,5		
	Total	42	29,2		
Total		144	100,0		

Water quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	4,9	4,9
	2	8	5,6	7,8	12,6
	3	25	17,4	24,3	36,9
	4	17	11,8	16,5	53,4
	5	19	13,2	18,4	71,8
	6	22	15,3	21,4	93,2
	7	7	4,9	6,8	100,0
	Total	103	71,5	100,0	
Missing	-9	6	4,2		
	-7	27	18,8		
	0	8	5,6		
	Total	41	28,5		

Total		144	100,0		

Nature conservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	8,6	8,6
	2	8	5,6	7,6	16,2
	3	22	15,3	21,0	37,1
	4	25	17,4	23,8	61,0
	5	19	13,2	18,1	79,0
	6	19	13,2	18,1	97,1
	7	3	2,1	2,9	100,0
	Total	105	72,9	100,0	
Missing	-9	7	4,9		
	-7	26	18,1		
	0	6	4,2		
	Total	39	27,1		
Total		144	100,0		

Climate change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	9,5	9,5
	2	17	11,8	17,9	27,4
	3	23	16,0	24,2	51,6
	4	15	10,4	15,8	67,4
	5	21	14,6	22,1	89,5
	6	6	4,2	6,3	95,8
	7	4	2,8	4,2	100,0
	Total	95	66,0	100,0	
Missing	-9	6	4,2		
	-7	34	23,6		
	0	9	6,3		
	Total	49	34,0		
Total		144	100,0		

####11. Water management ORIGINAL Water quantity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	4,5	4,5
	2	5	3,5	4,5	9,0
	3	12	8,3	10,8	19,8
	4	14	9,7	12,6	32,4
	5	19	13,2	17,1	49,5
	6	33	22,9	29,7	79,3
	7	23	16,0	20,7	100,0
	Total	111	77,1	100,0	
Missing	-9	7	4,9		
	-7	23	16,0		
	0	3	2,1		
	Total	33	22,9		
Total		144	100,0		

Water quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	4,5	4,5
	2	7	4,9	6,3	10,8
	3	14	9,7	12,6	23,4
	4	23	16,0	20,7	44,1
	5	20	13,9	18,0	62,2
	6	25	17,4	22,5	84,7
	7	17	11,8	15,3	100,0
	Total	111	77,1	100,0	
Missing	-9	7	4,9		
	-7	23	16,0		
	0	3	2,1		
	Total	33	22,9		
Total		144	100,0		

Nature conservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	2,6	2,6
	2	8	5,6	7,0	9,6
	3	29	20,1	25,2	34,8
	4	23	16,0	20,0	54,8
	5	22	15,3	19,1	73,9
	6	25	17,4	21,7	95,7
	7	5	3,5	4,3	100,0
	Total	115	79,9	100,0	
Missing	-9	7	4,9		
	-7	20	13,9		
	0	2	1,4		
	Total	29	20,1		
Total		144	100,0		

Climate change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	7,1	7,1
	2	13	9,0	13,1	20,2
	3	28	19,4	28,3	48,5
	4	17	11,8	17,2	65,7
	5	12	8,3	12,1	77,8
	6	15	10,4	15,2	92,9
	7	7	4,9	7,1	100,0
	Total	99	68,8	100,0	
Missing	-9	7	4,9		
	-7	30	20,8		
	0	8	5,6		
	Total	45	31,3		
Total		144	100,0		

####11. Nature management ORIGINAL Water quantity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	5,3	5,3
	2	8	5,6	8,4	13,7
	3	22	15,3	23,2	36,8
	4	24	16,7	25,3	62,1
	5	15	10,4	15,8	77,9
	6	17	11,8	17,9	95,8
	7	4	2,8	4,2	100,0
	Total	95	66,0	100,0	
Missing	-9	8	5,6		
	-7	33	22,9		
	0	8	5,6		
	Total	49	34,0		
Total		144	100,0		

Water quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	7,1	7,1
	2	7	4,9	7,1	14,1
	3	18	12,5	18,2	32,3
	4	25	17,4	25,3	57,6
	5	17	11,8	17,2	74,7
	6	19	13,2	19,2	93,9
	7	6	4,2	6,1	100,0
	Total	99	68,8	100,0	
Missing	-9	9	6,3		
	-7	29	20,1		
	0	7	4,9		
	Total	45	31,3		
Total		144	100,0		

Climate change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	5,4	5,4
	2	13	9,0	14,0	19,4
	3	17	11,8	18,3	37,6
	4	23	16,0	24,7	62,4
	5	22	15,3	23,7	86,0
	6	7	4,9	7,5	93,5
	7	6	4,2	6,5	100,0
	Total	93	64,6	100,0	
Missing	-9	9	6,3		
	-7	33	22,9		
	0	9	6,3		
	Total	51	35,4		
Total		144	100,0		

####11. Spatial planning ORIGINAL Water quantity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	6,9	11,9	11,9
	2	8	5,6	9,5	21,4
	3	16	11,1	19,0	40,5
	4	16	11,1	19,0	59,5
	5	16	11,1	19,0	78,6
	6	15	10,4	17,9	96,4
	7	3	2,1	3,6	100,0
	Total	84	58,3	100,0	
Missing	-9	8	5,6		
	-7	45	31,3		
	0	7	4,9		
	Total	60	41,7		
Total		144	100,0		

Water quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	7,6	14,3	14,3
	2	13	9,0	16,9	31,2
	3	15	10,4	19,5	50,6
	4	15	10,4	19,5	70,1
	5	14	9,7	18,2	88,3
	6	7	4,9	9,1	97,4
	7	2	1,4	2,6	100,0
	Total	77	53,5	100,0	
Missing	-9	8	5,6		
	-7	45	31,3		
	0	14	9,7		
	Total	67	46,5		
Total		144	100,0		

Nature conservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	4,7	4,7
	2	15	10,4	17,4	22,1
	3	16	11,1	18,6	40,7
	4	20	13,9	23,3	64,0
	5	14	9,7	16,3	80,2
	6	13	9,0	15,1	95,3
	7	4	2,8	4,7	100,0
	Total	86	59,7	100,0	
Missing	-9	8	5,6		
	-7	45	31,3		
	0	5	3,5		
	Total	58	40,3		
Total		144	100,0		

Climate change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	6,9	13,7	13,7
	2	16	11,1	21,9	35,6
	3	14	9,7	19,2	54,8
	4	17	11,8	23,3	78,1
	5	9	6,3	12,3	90,4
	6	5	3,5	6,8	97,3
	7	2	1,4	2,7	100,0
	Total	73	50,7	100,0	
Missing	-9	9	6,3		
	-7	52	36,1		
	0	10	6,9		
	Total	71	49,3		
Total		144	100,0		

####11. Climate changeORIGINAL Water quantity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	8,2	8,2
	2	5	3,5	5,9	14,1
	3	17	11,8	20,0	34,1
	4	18	12,5	21,2	55,3
	5	17	11,8	20,0	75,3
	6	16	11,1	18,8	94,1
	7	5	3,5	5,9	100,0
	Total	85	59,0	100,0	
Missing	-9	9	6,3		
	-7	41	28,5		
	0	9	6,3		
	Total	59	41,0		
Total		144	100,0		

Water quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	9,6	9,6
	2	13	9,0	15,7	25,3
	3	18	12,5	21,7	47,0
	4	16	11,1	19,3	66,3
	5	16	11,1	19,3	85,5
	6	8	5,6	9,6	95,2
	7	4	2,8	4,8	100,0
	Total	83	57,6	100,0	
Missing	-9	10	6,9		
	-7	40	27,8		
	0	11	7,6		
	Total	61	42,4		
Total		144	100,0		

Nature conservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	8,3	14,3	14,3
	2	6	4,2	7,1	21,4
	3	18	12,5	21,4	42,9
	4	18	12,5	21,4	64,3
	5	16	11,1	19,0	83,3
	6	11	7,6	13,1	96,4
	7	3	2,1	3,6	100,0
	Total	84	58,3	100,0	
Missing	-9	10	6,9		
	-7	42	29,2		
	0	8	5,6		
	Total	60	41,7		
Total		144	100,0		

```
DESCRIPTIVES VAR00207
VAR00208
VAR00209
```

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VAR00210
VAR00215
VAR00216
VAR00217
VAR00218
VAR00223
VAR00224
VAR00226
VAR00231
VAR00232
VAR00233
VAR00234
VAR00239
VAR00240
VAR00241.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
####11. AGRICULTURE ORIGINAL Water quantity	102	1	7	3,87	1,687
Water quality	103	1	7	4,27	1,610
Nature conservation	105	1	7	4,01	1,572
Climate change	95	1	7	3,59	1,588
####11. Water management ORIGINAL Water quantity	111	1	7	5,05	1,683
Water quality	111	1	7	4,70	1,666
Nature conservation	115	1	7	4,29	1,468
Climate change	99	1	7	3,88	1,680
####11. Nature management ORIGINAL Water quantity	95	1	7	4,08	1,521
Water quality	99	1	7	4,20	1,603
Climate change	93	1	7	3,96	1,539
####11. Spatial planning ORIGINAL Water quantity	84	1	7	3,92	1,702
Water quality	77	1	7	3,48	1,643
Nature conservation	86	1	7	3,93	1,585
Climate change	73	1	7	3,30	1,578
####11. Climate changeORIGINAL Water quantity	85	1	7	4,19	1,629
Water quality	83	1	7	3,71	1,634

Nature conservation	84	1	7	3,77	1,674
Valid N (listwise)	41				

```
FREQUENCIES V2 V5 V7 V9 V11.
```

Frequencies

Statistics

		###### 13 Agriculture communcation effectivness	Water management communcation effectivness	Nature management communcation effectivness	Spatial planning communcation effectivness	Climate change communcation effectivness
N	Valid	87	94	87	63	71
	Missing	57	50	57	81	73

Frequency Table

13 Agriculture communcation effectivness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	3,4	3,4
	2	13	9,0	14,9	18,4
	3	18	12,5	20,7	39,1
	4	9	6,3	10,3	49,4
	5	20	13,9	23,0	72,4
	6	16	11,1	18,4	90,8
	7	8	5,6	9,2	100,0
	Total	87	60,4	100,0	
Missing	-9	12	8,3		
	-8	6	4,2		
	-7	39	27,1		
	Total	57	39,6		
Total		144	100,0		

Water management communcation effectivness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	2,1	2,1
	2	16	11,1	17,0	19,1
	3	24	16,7	25,5	44,7
	4	23	16,0	24,5	69,1
	5	14	9,7	14,9	84,0
	6	9	6,3	9,6	93,6
	7	6	4,2	6,4	100,0
	Total	94	65,3	100,0	
Missing	-9	12	8,3		
	-8	8	5,6		
	-7	30	20,8		
	Total	50	34,7		
Total		144	100,0		

Nature management communcation effectivness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	6,9	6,9
	2	11	7,6	12,6	19,5
	3	24	16,7	27,6	47,1
	4	17	11,8	19,5	66,7
	5	16	11,1	18,4	85,1
	6	11	7,6	12,6	97,7
	7	2	1,4	2,3	100,0
	Total	87	60,4	100,0	
Missing	-9	15	10,4		
	-8	4	2,8		
	-7	38	26,4		
	Total	57	39,6		
Total		144	100,0		

Spatial planning communcation effectivness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	4,8	4,8
	2	12	8,3	19,0	23,8
	3	20	13,9	31,7	55,6
	4	11	7,6	17,5	73,0
	5	9	6,3	14,3	87,3
	6	7	4,9	11,1	98,4
	7	1	,7	1,6	100,0
	Total	63	43,8	100,0	
Missing	-9	10	6,9		
	-8	12	8,3		
	-7	59	41,0		
	Total	81	56,3		
Total		144	100,0		

Climate change communcation effectivness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	5,6	5,6
	2	13	9,0	18,3	23,9
	3	19	13,2	26,8	50,7
	4	16	11,1	22,5	73,2
	5	8	5,6	11,3	84,5
	6	6	4,2	8,5	93,0
	7	5	3,5	7,0	100,0
	Total	71	49,3	100,0	
Missing	-9	10	6,9		
	-8	13	9,0		
	-7	50	34,7		
	Total	73	50,7		
Total		144	100,0		

```
DESCRIPTIVES V2 V5 V7 V9 V11.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
###### 13 Agriculture communcation effectivness	87	1	7	4,26	1,694
Water management communcation effectivness	94	1	7	3,87	1,497
Nature management communcation effectivness	87	1	7	3,77	1,507
Spatial planning communcation effectivness	63	1	7	3,57	1,445
Climate change communcation effectivness	71	1	7	3,69	1,591
Valid N (listwise)	49				

```
FREQUENCIES
VAR00271
VAR00274
VAR00277
VAR00286
VAR00289.
```

Frequencies

Statistics

		######## 15. Agriculture barier(s) rate	Water management - bariers rate	Environmental/ Nature management barriers rate	Spatial planning - barrier(s) rate	Climate change - barriers rate
N	Valid	63	71	47	45	37
	Missing	81	73	97	99	107

Frequency Table

######## 15. Agriculture barier(s) rate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	4,8	4,8
	2	1	,7	1,6	6,3
	3	6	4,2	9,5	15,9
	4	7	4,9	11,1	27,0
	5	15	10,4	23,8	50,8
	6	14	9,7	22,2	73,0
	7	17	11,8	27,0	100,0
	Total	63	43,8	100,0	
Missing	-9	78	54,2		
	-7	3	2,1		
	Total	81	56,3		
Total		144	100,0		

Water management - bariers rate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	4,2	4,2
	2	3	2,1	4,2	8,5
	3	8	5,6	11,3	19,7
	4	13	9,0	18,3	38,0
	5	15	10,4	21,1	59,2
	6	16	11,1	22,5	81,7
	7	13	9,0	18,3	100,0
	Total	71	49,3	100,0	
Missing	-9	69	47,9		
	-7	4	2,8		
	Total	73	50,7		
Total		144	100,0		

Environmental/ Nature management barriers rate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	,7	2,1	2,1
	2	2	1,4	4,3	6,4
	3	10	6,9	21,3	27,7
	4	9	6,3	19,1	46,8
	5	10	6,9	21,3	68,1
	6	5	3,5	10,6	78,7
	7	10	6,9	21,3	100,0
	Total	47	32,6	100,0	
Missing	-9	93	64,6		
	-7	4	2,8		
	Total	97	67,4		
Total		144	100,0		

Spatial planning - barrier(s) rate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	4,4	4,4
	2	1	,7	2,2	6,7
	3	4	2,8	8,9	15,6
	4	11	7,6	24,4	40,0
	5	6	4,2	13,3	53,3
	6	9	6,3	20,0	73,3
	7	12	8,3	26,7	100,0
	Total	45	31,3	100,0	
Missing	-9	95	66,0		
	-7	4	2,8		
	Total	99	68,8		
Total		144	100,0		

Climate change - barriers rate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	8,1	8,1
	2	1	,7	2,7	10,8
	3	6	4,2	16,2	27,0
	4	10	6,9	27,0	54,1
	5	6	4,2	16,2	70,3
	6	3	2,1	8,1	78,4
	7	8	5,6	21,6	100,0
	Total	37	25,7	100,0	
Missing	-9	104	72,2		
	-7	3	2,1		
	Total	107	74,3		
Total		144	100,0		

```
DESCRIPTIVES
VAR00271
VAR00274
VAR00277
VAR00286
VAR00289.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
######## 15. Agriculture barier(s) rate	63	1	7	5,22	1,641
Water management - bariers rate	71	1	7	4,89	1,635
Environmental/ Nature management barriers rate	47	1	7	4,70	1,641
Spatial planning - barrier(s) rate	45	1	7	5,07	1,684
Climate change - barriers rate	37	1	7	4,51	1,805
Valid N (listwise)	28				

```
FREQUENCIES VAR00307
VAR00308
VAR00309
VAR00310
VAR00311
VAR00312
VAR00313
VAR00314
VAR00315
VAR00316
VAR00318.
```

Frequencies

Statistics

		####### 16.ORIGINAL EU legislation/regulation	National legislation/plans/ programmes	Regional legislation/plans/ programmes	Local legislation/plans/ programmes	Policy transfer from EU/Transnational to National
N	Valid	68	91	66	74	80
	Missing	76	53	78	70	64

Statistics

		Policy implementation/ Regulatory agencies/Control	Water managers	Agricultural advisers	Landowners	Farmers	other:
N	Valid	85	76	76	95	95	12
	Missing	59	68	68	49	49	132

Frequency Table

####### 16.ORIGINAL EU legislation/regulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	7,6	16,2	16,2
	2	11	7,6	16,2	32,4
	3	6	4,2	8,8	41,2
	4	13	9,0	19,1	60,3
	5	13	9,0	19,1	79,4

	6	6	4,2	8,8	88,2
	7	8	5,6	11,8	100,0
	Total	68	47,2	100,0	
Missing	-9	39	27,1		
	-7	8	5,6		
	0	29	20,1		
	Total	76	52,8		
Total		144	100,0		

National legislation/plans/programmes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	5,5	5,5
	2	8	5,6	8,8	14,3
	3	15	10,4	16,5	30,8
	4	15	10,4	16,5	47,3
	5	20	13,9	22,0	69,2
	6	16	11,1	17,6	86,8
	7	12	8,3	13,2	100,0
	Total	91	63,2	100,0	
Missing	-9	39	27,1		
	-7	6	4,2		
	0	8	5,6		
	Total	53	36,8		
Total		144	100,0		

Regional legislation/plans/programmes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	6,1	6,1
	2	8	5,6	12,1	18,2
	3	13	9,0	19,7	37,9
	4	18	12,5	27,3	65,2
	5	13	9,0	19,7	84,8
	6	6	4,2	9,1	93,9

	7	4	2,8	6,1	100,0
	Total	66	45,8	100,0	
Missing	-9	43	29,9		
	-7	8	5,6		
	0	27	18,8		
	Total	78	54,2		
Total		144	100,0		

Local legislation/plans/programmes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	6,8	6,8
	2	10	6,9	13,5	20,3
	3	14	9,7	18,9	39,2
	4	19	13,2	25,7	64,9
	5	13	9,0	17,6	82,4
	6	10	6,9	13,5	95,9
	7	3	2,1	4,1	100,0
	Total	74	51,4	100,0	
Missing	-9	42	29,2		
	-7	8	5,6		
	0	20	13,9		
	Total	70	48,6		
Total		144	100,0		

Policy transfer from EU/Transnational to National

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	8,8	8,8
	2	8	5,6	10,0	18,8
	3	10	6,9	12,5	31,3
	4	18	12,5	22,5	53,8
	5	17	11,8	21,3	75,0
	6	14	9,7	17,5	92,5
	7	6	4,2	7,5	100,0

	Total	80	55,6	100,0	
Missing	-9	40	27,8		
	-7	9	6,3		
	0	15	10,4		
	Total	64	44,4		
Total		144	100,0		

Policy implementation/Regulatory agencies/Control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	,7	1,2	1,2
	2	3	2,1	3,5	4,7
	3	12	8,3	14,1	18,8
	4	27	18,8	31,8	50,6
	5	13	9,0	15,3	65,9
	6	16	11,1	18,8	84,7
	7	13	9,0	15,3	100,0
	Total	85	59,0	100,0	
Missing	-9	41	28,5		
	-7	6	4,2		
	0	12	8,3		
	Total	59	41,0		
Total		144	100,0		

Water managers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	5,3	5,3
	2	6	4,2	7,9	13,2
	3	11	7,6	14,5	27,6
	4	19	13,2	25,0	52,6
	5	19	13,2	25,0	77,6
	6	12	8,3	15,8	93,4
	7	5	3,5	6,6	100,0
	Total	76	52,8	100,0	

Missing	-9	43	29,9		
	-7	6	4,2		
	0	19	13,2		
	Total	68	47,2		
Total		144	100,0		

Agricultural advisers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	10,5	10,5
	2	7	4,9	9,2	19,7
	3	12	8,3	15,8	35,5
	4	21	14,6	27,6	63,2
	5	12	8,3	15,8	78,9
	6	10	6,9	13,2	92,1
	7	6	4,2	7,9	100,0
	Total	76	52,8	100,0	
Missing	-9	44	30,6		
	-7	7	4,9		
	0	17	11,8		
	Total	68	47,2		
Total		144	100,0		

Landowners

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	2,1	2,1
	2	4	2,8	4,2	6,3
	3	15	10,4	15,8	22,1
	4	13	9,0	13,7	35,8
	5	21	14,6	22,1	57,9
	6	27	18,8	28,4	86,3
	7	13	9,0	13,7	100,0
	Total	95	66,0	100,0	
Missing	-9	35	24,3		

	-7	6	4,2		
	0	8	5,6		
	Total	49	34,0		
Total		144	100,0		

Farmers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	4,2	4,2
	2	3	2,1	3,2	7,4
	3	11	7,6	11,6	18,9
	4	19	13,2	20,0	38,9
	5	27	18,8	28,4	67,4
	6	19	13,2	20,0	87,4
	7	12	8,3	12,6	100,0
	Total	95	66,0	100,0	
Missing	-9	36	25,0		
	-7	6	4,2		
	0	7	4,9		
	Total	49	34,0		
Total		144	100,0		

other:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	1	,7	8,3	8,3
	5	1	,7	8,3	16,7
	6	3	2,1	25,0	41,7
	7	7	4,9	58,3	100,0
	Total	12	8,3	100,0	
Missing	-9	122	84,7		
	-7	6	4,2		
	0	4	2,8		
	Total	132	91,7		
Total		144	100,0		

```
DESCRIPTIVES VAR00307
VAR00308
VAR00309
VAR00310
VAR00311
VAR00312
VAR00313
VAR00314
VAR00315
VAR00316
VAR00318.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
####### 16.ORIGINAL EU legislation/regulation	68	1	7	3,82	1,954
National legislation/plans/programmes	91	1	7	4,46	1,715
Regional legislation/plans/programmes	66	1	7	3,94	1,538
Local legislation/plans/programmes	74	1	7	3,91	1,563
Policy transfer from EU/Transnational to National	80	1	7	4,20	1,702
Policy implementation/Regulatory agencies/Control	85	1	7	4,74	1,465
Water managers	76	1	7	4,30	1,532
Agricultural advisers	76	1	7	4,00	1,705
Landowners	95	1	7	4,89	1,526
Farmers	95	1	7	4,76	1,514
other:	12	4	7	6,33	,985
Valid N (listwise)	5				

```
####Q17

Error # 1.  Command name: ####Q17
The first word in the line is not recognized as an SPSS Statistics command.
```

```
Execution of this command stops.

FREQUENCIES
VAR00346
VAR00347
VAR00348
VAR00349
VAR00350
VAR00351
VAR00352
VAR00353
VAR00365
VAR00366
VAR00367
VAR00368
VAR00369
VAR00370
VAR00371
VAR00372.
```

Frequencies

Statistics

		####### 17.1.ORIGINAL Soil management measures Complicated implementation in real life - execution	Low cost-benefit	Administrative barriers (paperwork, time)	Communication aspects (lack of info)	Voluntary measure
N	Valid	102	104	100	104	99
	Missing	42	40	44	40	45

Statistics

		Control/inspection system	Land ownership	other	####### 17.2 ORIGINAL Structural measures Complicated implementation in real life - execution	Low cost-benefit
N	Valid	98	92	11	105	106

	Missing	46	52	133	39	38

Statistics

		Administrative barriers (paperwork, time)	Communication aspects (lack of info)	Voluntary measure	Control/inspection system	Land ownership
N	Valid	105	102	99	93	99
	Missing	39	42	45	51	45

Statistics

		other
N	Valid	11
	Missing	133

Frequency Table

####### 17.1.ORIGINAL Soil management measures Complicated implementation in real life - execution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	3,9	3,9
	2	15	10,4	14,7	18,6
	3	27	18,8	26,5	45,1
	4	18	12,5	17,6	62,7
	5	15	10,4	14,7	77,5
	6	17	11,8	16,7	94,1
	7	6	4,2	5,9	100,0
	Total	102	70,8	100,0	
Missing	-9	34	23,6		
	0	8	5,6		
	Total	42	29,2		
Total		144	100,0		

Low cost-benefit

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	1	2	1,4	1,9	1,9
	2	8	5,6	7,7	9,6
	3	17	11,8	16,3	26,0
	4	17	11,8	16,3	42,3
	5	19	13,2	18,3	60,6
	6	26	18,1	25,0	85,6
	7	15	10,4	14,4	100,0
	Total	104	72,2	100,0	
Missing	-9	33	22,9		
	0	7	4,9		
	Total	40	27,8		
Total		144	100,0		

Administrative barriers (paperwork, time)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	8,0	8,0
	2	9	6,3	9,0	17,0
	3	9	6,3	9,0	26,0
	4	17	11,8	17,0	43,0
	5	24	16,7	24,0	67,0
	6	19	13,2	19,0	86,0
	7	14	9,7	14,0	100,0
	Total	100	69,4	100,0	
Missing	-9	33	22,9		
	0	11	7,6		
	Total	44	30,6		
Total		144	100,0		

Communication aspects (lack of info)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	3,8	3,8
	2	10	6,9	9,6	13,5
	3	18	12,5	17,3	30,8

	4	20	13,9	19,2	50,0
	5	20	13,9	19,2	69,2
	6	21	14,6	20,2	89,4
	7	11	7,6	10,6	100,0
	Total	104	72,2	100,0	
Missing	-9	34	23,6		
	0	6	4,2		
	Total	40	27,8		
Total		144	100,0		

Voluntary measure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	7,6	11,1	11,1
	2	6	4,2	6,1	17,2
	3	12	8,3	12,1	29,3
	4	18	12,5	18,2	47,5
	5	21	14,6	21,2	68,7
	6	14	9,7	14,1	82,8
	7	17	11,8	17,2	100,0
	Total	99	68,8	100,0	
Missing	-9	34	23,6		
	0	11	7,6		
	Total	45	31,3		
Total		144	100,0		

Control/inspection system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	9,2	9,2
	2	11	7,6	11,2	20,4
	3	14	9,7	14,3	34,7
	4	24	16,7	24,5	59,2
	5	15	10,4	15,3	74,5
	6	17	11,8	17,3	91,8

	7	8	5,6	8,2	100,0
	Total	98	68,1	100,0	
Missing	-9	35	24,3		
	0	11	7,6		
	Total	46	31,9		
Total		144	100,0		

Land ownership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	5,4	5,4
	2	9	6,3	9,8	15,2
	3	11	7,6	12,0	27,2
	4	13	9,0	14,1	41,3
	5	20	13,9	21,7	63,0
	6	18	12,5	19,6	82,6
	7	16	11,1	17,4	100,0
	Total	92	63,9	100,0	
Missing	-9	41	28,5		
	0	11	7,6		
	Total	52	36,1		
Total		144	100,0		

other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	,7	9,1	9,1
	2	2	1,4	18,2	27,3
	5	3	2,1	27,3	54,5
	6	3	2,1	27,3	81,8
	7	2	1,4	18,2	100,0
	Total	11	7,6	100,0	
Missing	-9	130	90,3		
	0	3	2,1		
	Total	133	92,4		

Total	144	100,0		

####### 17.2 ORIGINAL Structural measures Complicated implementation in real life - execution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	2,9	2,9
	2	6	4,2	5,7	8,6
	3	13	9,0	12,4	21,0
	4	14	9,7	13,3	34,3
	5	28	19,4	26,7	61,0
	6	23	16,0	21,9	82,9
	7	18	12,5	17,1	100,0
	Total	105	72,9	100,0	
Missing	-9	35	24,3		
	0	4	2,8		
	Total	39	27,1		
Total		144	100,0		

Low cost-benefit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	1,9	1,9
	2	8	5,6	7,5	9,4
	3	10	6,9	9,4	18,9
	4	19	13,2	17,9	36,8
	5	23	16,0	21,7	58,5
	6	21	14,6	19,8	78,3
	7	23	16,0	21,7	100,0
	Total	106	73,6	100,0	
Missing	-9	35	24,3		
	0	3	2,1		
	Total	38	26,4		
Total		144	100,0		

Administrative barriers (paperwork, time)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	1,9	1,9
	2	9	6,3	8,6	10,5
	3	6	4,2	5,7	16,2
	4	19	13,2	18,1	34,3
	5	26	18,1	24,8	59,0
	6	23	16,0	21,9	81,0
	7	20	13,9	19,0	100,0
	Total	105	72,9	100,0	
Missing	-9	33	22,9		
	0	6	4,2		
	Total	39	27,1		
Total		144	100,0		

Communication aspects (lack of info)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	7,8	7,8
	2	10	6,9	9,8	17,6
	3	17	11,8	16,7	34,3
	4	11	7,6	10,8	45,1
	5	24	16,7	23,5	68,6
	6	26	18,1	25,5	94,1
	7	6	4,2	5,9	100,0
	Total	102	70,8	100,0	
Missing	-9	33	22,9		
	0	9	6,3		
	Total	42	29,2		
Total		144	100,0		

Voluntary measure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	9,1	9,1
	2	6	4,2	6,1	15,2
	3	14	9,7	14,1	29,3
	4	18	12,5	18,2	47,5
	5	16	11,1	16,2	63,6
	6	22	15,3	22,2	85,9
	7	14	9,7	14,1	100,0
	Total	99	68,8	100,0	
Missing	-9	36	25,0		
	0	9	6,3		
	Total	45	31,3		
Total		144	100,0		

Control/inspection system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	15	10,4	16,1	16,1
	2	8	5,6	8,6	24,7
	3	10	6,9	10,8	35,5
	4	17	11,8	18,3	53,8
	5	15	10,4	16,1	69,9
	6	19	13,2	20,4	90,3
	7	9	6,3	9,7	100,0
	Total	93	64,6	100,0	
Missing	-9	36	25,0		
	0	15	10,4		
	Total	51	35,4		
Total		144	100,0		

Land ownership

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	1	4	2,8	4,0	4,0
	2	7	4,9	7,1	11,1
	3	15	10,4	15,2	26,3
	4	10	6,9	10,1	36,4
	5	15	10,4	15,2	51,5
	6	21	14,6	21,2	72,7
	7	27	18,8	27,3	100,0
	Total	99	68,8	100,0	
Missing	-9	39	27,1		
	0	6	4,2		
	Total	45	31,3		
Total		144	100,0		

other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	1,4	18,2	18,2
	5	3	2,1	27,3	45,5
	6	3	2,1	27,3	72,7
	7	3	2,1	27,3	100,0
	Total	11	7,6	100,0	
Missing	-9	130	90,3		
	0	3	2,1		
	Total	133	92,4		
Total		144	100,0		

```
DESCRIPTIVES VAR00346
VAR00347
VAR00348
VAR00349
VAR00350
VAR00351
VAR00352
VAR00353
VAR00365
VAR00366
VAR00367
VAR00368
VAR00369
```

```
VAR00370
VAR00371
VAR00372.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
####### 17.1.ORIGINAL Soil management measures Complicated implementation in real life - execution	102	1	7	3,98	1,604
Low cost-benefit	104	1	7	4,74	1,613
Administrative barriers (paperwork, time)	100	1	7	4,53	1,784
Communication aspects (lack of info)	104	1	7	4,43	1,641
Voluntary measure	99	1	7	4,43	1,880
Control/inspection system	98	1	7	4,10	1,738
Land ownership	92	1	7	4,65	1,782
other	11	1	7	4,73	2,102
####### 17.2 ORIGINAL Structural measures Complicated implementation in real life - execution	105	1	7	4,90	1,587
Low cost-benefit	106	1	7	4,96	1,621
Administrative barriers (paperwork, time)	105	1	7	4,97	1,578
Communication aspects (lack of info)	102	1	7	4,32	1,724
Voluntary measure	99	1	7	4,49	1,820
Control/inspection system	93	1	7	4,10	1,945
Land ownership	99	1	7	4,98	1,824
other	11	2	7	5,27	1,794
Valid N (listwise)	5				

```
FREQUENCIES
VAR00376
```

VAR00377.

Frequencies

Statistics

		###### 18. original #### Water retention	Nutrient retention
N	Valid	89	87
	Missing	55	57

Frequency Table

18. original #### Water retention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	4,5	4,5
	2	21	14,6	23,6	28,1
	3	26	18,1	29,2	57,3
	4	18	12,5	20,2	77,5
	5	11	7,6	12,4	89,9
	6	6	4,2	6,7	96,6
	7	3	2,1	3,4	100,0
	Total	89	61,8	100,0	
Missing	-9	4	2,8		
	-7	36	25,0		
	0	15	10,4		
	Total	55	38,2		
Total		144	100,0		

Nutrient retention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	6,9	6,9
	2	17	11,8	19,5	26,4
	3	24	16,7	27,6	54,0

	4	22	15,3	25,3	79,3
	5	11	7,6	12,6	92,0
	6	4	2,8	4,6	96,6
	7	3	2,1	3,4	100,0
	Total	87	60,4	100,0	
Missing	-9	6	4,2		
	-7	35	24,3		
	0	16	11,1		
	Total	57	39,6		
Total		144	100,0		

```
DESCRIPTIVES
VAR00376
VAR00377.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
###### 18. original #### Water retention	89	1	7	3,46	1,439
Nutrient retention	87	1	7	3,45	1,420
Valid N (listwise)	78				

```
FREQUENCIES VAR00392
VAR00393
VAR00394
VAR00395
VAR00396.
```

Frequencies

Statistics

	####19. ORIGINAL Financial support/subsidies	Penalties	Legal framework support in non. financial way	Expects voluntary action no legal or financial support	other

N	Valid	91	75	75	64	8
	Missing	53	69	69	80	136

Frequency Table

####19. ORIGINAL Financial support/subsidies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	3,3	3,3
	2	4	2,8	4,4	7,7
	3	17	11,8	18,7	26,4
	4	12	8,3	13,2	39,6
	5	15	10,4	16,5	56,0
	6	23	16,0	25,3	81,3
	7	17	11,8	18,7	100,0
	Total	91	63,2	100,0	
Missing	-9	4	2,8		
	-7	42	29,2		
	0	7	4,9		
	Total	53	36,8		
Total		144	100,0		

Penalties

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	12,0	12,0
	2	2	1,4	2,7	14,7
	3	16	11,1	21,3	36,0
	4	20	13,9	26,7	62,7
	5	15	10,4	20,0	82,7
	6	9	6,3	12,0	94,7
	7	4	2,8	5,3	100,0
	Total	75	52,1	100,0	
Missing	-9	5	3,5		
	-7	49	34,0		
	0	15	10,4		

	Total	69	47,9		
Total		144	100,0		

Legal framework support in non. financial way

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	10,7	10,7
	2	11	7,6	14,7	25,3
	3	12	8,3	16,0	41,3
	4	17	11,8	22,7	64,0
	5	16	11,1	21,3	85,3
	6	7	4,9	9,3	94,7
	7	4	2,8	5,3	100,0
	Total	75	52,1	100,0	
Missing	-9	6	4,2		
	-7	54	37,5		
	0	9	6,3		
	Total	69	47,9		
Total		144	100,0		

Expects voluntary action no legal or financial support

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	13	9,0	20,3	20,3
	2	9	6,3	14,1	34,4
	3	15	10,4	23,4	57,8
	4	7	4,9	10,9	68,8
	5	6	4,2	9,4	78,1
	6	6	4,2	9,4	87,5
	7	8	5,6	12,5	100,0
	Total	64	44,4	100,0	
Missing	-9	8	5,6		
	-7	56	38,9		
	0	16	11,1		
	Total	80	55,6		

Total	144	100,0		

other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	2	1,4	25,0	25,0
	4	2	1,4	25,0	50,0
	5	1	,7	12,5	62,5
	6	2	1,4	25,0	87,5
	7	1	,7	12,5	100,0
	Total	8	5,6	100,0	
Missing	-9	122	84,7		
	-7	12	8,3		
	0	2	1,4		
	Total	136	94,4		
Total		144	100,0		

```
DESCRIPTIVES
VAR00392
VAR00393
VAR00394
VAR00395
VAR00396.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
####19. ORIGINAL Financial support/subsidies	91	1	7	4,86	1,677
Penalties	75	1	7	3,97	1,611
Legal framework support in non. financial way	75	1	7	3,79	1,663
Expects voluntary action no legal or financial support	64	1	7	3,53	2,016
other	8	3	7	4,75	1,488
Valid N (listwise)	6				

```
FREQUENCIES
VAR00392
VAR00393
VAR00394
VAR00395
VAR00396.
```

Frequencies

Statistics

		####19. ORIGINAL Financial support/subsidies	Penalties	Legal framework support in non. financial way	Expects voluntary action no legal or financial support	other
N	Valid	91	75	75	64	8
	Missing	53	69	69	80	136

Frequency Table

####19. ORIGINAL Financial support/subsidies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	3,3	3,3
	2	4	2,8	4,4	7,7
	3	17	11,8	18,7	26,4
	4	12	8,3	13,2	39,6
	5	15	10,4	16,5	56,0
	6	23	16,0	25,3	81,3
	7	17	11,8	18,7	100,0
	Total	91	63,2	100,0	
Missing	-9	4	2,8		
	-7	42	29,2		
	0	7	4,9		
	Total	53	36,8		
Total		144	100,0		

Penalties

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6,3	12,0	12,0
	2	2	1,4	2,7	14,7
	3	16	11,1	21,3	36,0
	4	20	13,9	26,7	62,7
	5	15	10,4	20,0	82,7
	6	9	6,3	12,0	94,7
	7	4	2,8	5,3	100,0
	Total	75	52,1	100,0	
Missing	-9	5	3,5		
	-7	49	34,0		
	0	15	10,4		
	Total	69	47,9		
Total		144	100,0		

Legal framework support in non. financial way

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	5,6	10,7	10,7
	2	11	7,6	14,7	25,3
	3	12	8,3	16,0	41,3
	4	17	11,8	22,7	64,0
	5	16	11,1	21,3	85,3
	6	7	4,9	9,3	94,7
	7	4	2,8	5,3	100,0
	Total	75	52,1	100,0	
Missing	-9	6	4,2		
	-7	54	37,5		
	0	9	6,3		
	Total	69	47,9		
Total		144	100,0		

Expects voluntary action no legal or financial support

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	13	9,0	20,3	20,3
	2	9	6,3	14,1	34,4
	3	15	10,4	23,4	57,8
	4	7	4,9	10,9	68,8
	5	6	4,2	9,4	78,1
	6	6	4,2	9,4	87,5
	7	8	5,6	12,5	100,0
	Total	64	44,4	100,0	
Missing	-9	8	5,6		
	-7	56	38,9		
	0	16	11,1		
	Total	80	55,6		
Total		144	100,0		

other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	2	1,4	25,0	25,0
	4	2	1,4	25,0	50,0
	5	1	,7	12,5	62,5
	6	2	1,4	25,0	87,5
	7	1	,7	12,5	100,0
	Total	8	5,6	100,0	
Missing	-9	122	84,7		
	-7	12	8,3		
	0	2	1,4		
	Total	136	94,4		
Total		144	100,0		

```
DESCRIPTIVES VAR00392
VAR00393
VAR00394
VAR00395
VAR00396.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
####19. ORIGINAL Financial support/subsidies	91	1	7	4,86	1,677
Penalties	75	1	7	3,97	1,611
Legal framework support in non. financial way	75	1	7	3,79	1,663
Expects voluntary action no legal or financial support	64	1	7	3,53	2,016
other	8	3	7	4,75	1,488
Valid N (listwise)	6				

```
FREQUENCIES VAR00407
VAR00409
VAR00410
VAR00411.
```

Frequencies

Statistics

		#########20 original Economic – farm level	Economic – catchment level	Environmental – farm level	Environmental – catchment level
N	Valid	40	41	50	60
	Missing	104	103	94	84

Frequency Table

#########20 original Economic – farm level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	7,5	7,5
	2	2	1,4	5,0	12,5
	3	10	6,9	25,0	37,5

	4	10	6,9	25,0	62,5
	5	4	2,8	10,0	72,5
	6	7	4,9	17,5	90,0
	7	3	2,1	7,5	97,5
	9	1	,7	2,5	100,0
	Total	40	27,8	100,0	
Missing	-9	10	6,9		
	-7	74	51,4		
	0	20	13,9		
	Total	104	72,2		
Total		144	100,0		

Economic – catchment level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	12,2	12,2
	2	9	6,3	22,0	34,1
	3	9	6,3	22,0	56,1
	4	11	7,6	26,8	82,9
	5	2	1,4	4,9	87,8
	6	4	2,8	9,8	97,6
	7	1	,7	2,4	100,0
	Total	41	28,5	100,0	
Missing	-9	10	6,9		
	-7	70	48,6		
	0	23	16,0		
	Total	103	71,5		
Total		144	100,0		

Environmental – farm level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	8,0	8,0
	2	9	6,3	18,0	26,0
	3	11	7,6	22,0	48,0

	4	7	4,9	14,0	62,0
	5	10	6,9	20,0	82,0
	6	6	4,2	12,0	94,0
	7	3	2,1	6,0	100,0
	Total	50	34,7	100,0	
Missing	-9	10	6,9		
	-7	66	45,8		
	0	18	12,5		
	Total	94	65,3		
Total		144	100,0		

Environmental – catchment level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	3,3	3,3
	2	9	6,3	15,0	18,3
	3	10	6,9	16,7	35,0
	4	11	7,6	18,3	53,3
	5	9	6,3	15,0	68,3
	6	14	9,7	23,3	91,7
	7	5	3,5	8,3	100,0
	Total	60	41,7	100,0	
Missing	-9	9	6,3		
	-7	63	43,8		
	0	12	8,3		
	Total	84	58,3		
Total		144	100,0		

```
DESCRIPTIVES
VAR00407
VAR00409
VAR00410
VAR00411.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
#########20 original Economic – farm level	40	1	9	4,22	1,804
Economic – catchment level	41	1	7	3,29	1,553
Environmental – farm level	50	1	7	3,80	1,702
Environmental – catchment level	60	1	7	4,30	1,690
Valid N (listwise)	28				

```
####Q21

Error # 1.  Command name: ####Q21
The first word in the line is not recognized as an SPSS Statistics command.
Execution of this command stops.

FREQUENCIES VAR00414
VAR00415.
```

Frequencies

Statistics

		###21 ORIGINAL Water efficiency	Nutrient efficiency
N	Valid	91	90
	Missing	53	54

Frequency Table

###21 ORIGINAL Water efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	7,7	7,7
	2	19	13,2	20,9	28,6
	3	21	14,6	23,1	51,6
	4	18	12,5	19,8	71,4

	5	17	11,8	18,7	90,1
	6	7	4,9	7,7	97,8
	7	2	1,4	2,2	100,0
	Total	91	63,2	100,0	
Missing	-9	3	2,1		
	-7	32	22,2		
	0	18	12,5		
	Total	53	36,8		
Total		144	100,0		

Nutrient efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	6,7	6,7
	2	15	10,4	16,7	23,3
	3	21	14,6	23,3	46,7
	4	23	16,0	25,6	72,2
	5	16	11,1	17,8	90,0
	6	7	4,9	7,8	97,8
	7	2	1,4	2,2	100,0
	Total	90	62,5	100,0	
Missing	-9	4	2,8		
	-7	35	24,3		
	0	15	10,4		
	Total	54	37,5		
Total		144	100,0		

```
DESCRIPTIVES VAR00414
VAR00415.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
###21 ORIGINAL Water efficiency	91	1	7	3,53	1,501

Nutrient efficiency	90	1	7	3,63	1,441
Valid N (listwise)	79				

```
#######Q22

Error # 1.  Command name: #######Q22
The first word in the line is not recognized as an SPSS Statistics command.
Execution of this command stops.

FREQUENCIES
VAR00420
VAR00421.
```

Frequencies

Statistics

		###22 ORIGINAL Water efficiency	Nutrient efficiency
N	Valid	86	85
	Missing	58	59

Frequency Table

###22 ORIGINAL Water efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	8,1	8,1
	2	14	9,7	16,3	24,4
	3	23	16,0	26,7	51,2
	4	20	13,9	23,3	74,4
	5	15	10,4	17,4	91,9
	6	4	2,8	4,7	96,5
	7	3	2,1	3,5	100,0
	Total	86	59,7	100,0	
Missing	-9	4	2,8		
	-7	34	23,6		
	0	20	13,9		
	Total	58	40,3		

Total	144	100,0		

Nutrient efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	3,5	5,9	5,9
	2	13	9,0	15,3	21,2
	3	20	13,9	23,5	44,7
	4	24	16,7	28,2	72,9
	5	12	8,3	14,1	87,1
	6	9	6,3	10,6	97,6
	7	2	1,4	2,4	100,0
	Total	85	59,0	100,0	
Missing	-9	6	4,2		
	-7	37	25,7		
	0	16	11,1		
	Total	59	41,0		
Total		144	100,0		

```
DESCRIPTIVES
VAR00420
VAR00421.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
###22 ORIGINAL Water efficiency	86	1	7	3,53	1,461
Nutrient efficiency	85	1	7	3,71	1,446
Valid N (listwise)	77				

```
FREQUENCIES VAR00433
VAR00434
VAR00435
VAR00436
VAR00437
```

```
VAR00438
VAR00439
VAR00440
VAR00441.
```

Frequencies

Statistics

		#### 23. ORIGINAL financial support	de-bureaucratization of administration	control/inspection	licensing/permits	product quality brands (e.g. Global GAP)
N	Valid	133	127	130	116	105
	Missing	11	17	14	28	39

Statistics

		formal education	informal education (practical demonstration/workshops)	digital information sharing (web, app)	other
N	Valid	128	135	131	17
	Missing	16	9	13	127

Frequency Table

23. ORIGINAL financial support

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	1,4	1,5	1,5
	3	4	2,8	3,0	4,5
	4	6	4,2	4,5	9,0
	5	34	23,6	25,6	34,6
	6	27	18,8	20,3	54,9
	7	60	41,7	45,1	100,0
	Total	133	92,4	100,0	
Missing	-9	10	6,9		
	0	1	,7		
	Total	11	7,6		
Total		144	100,0		

de-bureaucratization of administration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	11	7,6	8,7	8,7
	3	9	6,3	7,1	15,7
	4	10	6,9	7,9	23,6
	5	21	14,6	16,5	40,2
	6	32	22,2	25,2	65,4
	7	44	30,6	34,6	100,0
	Total	127	88,2	100,0	
Missing	-9	10	6,9		
	0	7	4,9		
	Total	17	11,8		
Total		144	100,0		

control/inspection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	1,5	1,5
	2	14	9,7	10,8	12,3
	3	21	14,6	16,2	28,5
	4	26	18,1	20,0	48,5
	5	31	21,5	23,8	72,3
	6	22	15,3	16,9	89,2
	7	14	9,7	10,8	100,0
	Total	130	90,3	100,0	
Missing	-9	11	7,6		
	0	3	2,1		
	Total	14	9,7		
Total		144	100,0		

licensing/permits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	2,6	2,6
	2	17	11,8	14,7	17,2
	3	17	11,8	14,7	31,9
	4	22	15,3	19,0	50,9
	5	24	16,7	20,7	71,6
	6	21	14,6	18,1	89,7
	7	12	8,3	10,3	100,0
	Total	116	80,6	100,0	
Missing	-9	17	11,8		
	-7	1	,7		
	0	10	6,9		
	Total	28	19,4		
Total		144	100,0		

product quality brands (e.g. Global GAP)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	4,9	6,7	6,7
	2	18	12,5	17,1	23,8
	3	13	9,0	12,4	36,2
	4	16	11,1	15,2	51,4
	5	20	13,9	19,0	70,5
	6	20	13,9	19,0	89,5
	7	11	7,6	10,5	100,0
	Total	105	72,9	100,0	
Missing	-9	31	21,5		
	-7	1	,7		
	0	7	4,9		
	Total	39	27,1		
Total		144	100,0		

formal education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	4,2	4,7	4,7
	2	7	4,9	5,5	10,2
	3	6	4,2	4,7	14,8
	4	24	16,7	18,8	33,6
	5	21	14,6	16,4	50,0
	6	34	23,6	26,6	76,6
	7	30	20,8	23,4	100,0
	Total	128	88,9	100,0	
Missing	-9	12	8,3		
	-7	1	,7		
	0	3	2,1		
	Total	16	11,1		
Total		144	100,0		

informal education (practical demonstration/workshops)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	1,5	1,5
	2	4	2,8	3,0	4,4
	3	6	4,2	4,4	8,9
	4	16	11,1	11,9	20,7
	5	18	12,5	13,3	34,1
	6	51	35,4	37,8	71,9
	7	38	26,4	28,1	100,0
	Total	135	93,8	100,0	
Missing	-9	9	6,3		
Total		144	100,0		

digital information sharing (web, app)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	1,5	1,5

	2	9	6,3	6,9	8,4
	3	14	9,7	10,7	19,1
	4	17	11,8	13,0	32,1
	5	22	15,3	16,8	48,9
	6	40	27,8	30,5	79,4
	7	27	18,8	20,6	100,0
	Total	131	91,0	100,0	
Missing	-9	11	7,6		
	0	2	1,4		
	Total	13	9,0		
Total		144	100,0		

other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	,7	5,9	5,9
	4	2	1,4	11,8	17,6
	5	2	1,4	11,8	29,4
	6	5	3,5	29,4	58,8
	7	7	4,9	41,2	100,0
	Total	17	11,8	100,0	
Missing	-9	125	86,8		
	0	2	1,4		
	Total	127	88,2		
Total		144	100,0		

```
DESCRIPTIVES
VAR00433
VAR00434
VAR00435
VAR00436
VAR00437
VAR00438
VAR00439
VAR00440
VAR00441.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
#### 23. ORIGINAL financial support	133	2	7	5,95	1,186
de-bureaucratization of administration	127	2	7	5,46	1,607
control/inspection	130	1	7	4,48	1,551
licensing/permits	116	1	7	4,36	1,649
product quality brands (e.g. Global GAP)	105	1	7	4,22	1,813
formal education	128	1	7	5,10	1,683
informal education (practical demonstration/workshops)	135	1	7	5,59	1,406
digital information sharing (web, app)	131	1	7	5,11	1,599
other	17	2	7	5,82	1,425
Valid N (listwise)	15				

```
FREQUENCIES
VAR00478
VAR00479
VAR00480
VAR00481
VAR00482
VAR00483
VAR00484.
```

Frequencies

Statistics

		####25 ORIGINAL water quantity - excess water management – flood protection	water quantity – water scarcity - shortage – drought - irrigation	water quantity – in-field water retention measures	water quality – in-field nutrient retention measures	water quality - nutrients recovery from streams
N	Valid	83	76	79	71	48

	Missing	61	68	65	73	96

Statistics

		climate change – mitigation/adaptation	nature conservation
N	Valid	76	75
	Missing	68	69

Frequency Table

####25 ORIGINAL water quantity - excess water management – flood protection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	3,6	3,6
	2	3	2,1	3,6	7,2
	3	10	6,9	12,0	19,3
	4	12	8,3	14,5	33,7
	5	13	9,0	15,7	49,4
	6	24	16,7	28,9	78,3
	7	18	12,5	21,7	100,0
	Total	83	57,6	100,0	
Missing	-9	12	8,3		
	-7	44	30,6		
	0	5	3,5		
	Total	61	42,4		
Total		144	100,0		

water quantity – water scarcity - shortage – drought - irrigation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	3,9	3,9
	2	3	2,1	3,9	7,9
	3	17	11,8	22,4	30,3
	4	10	6,9	13,2	43,4
	5	16	11,1	21,1	64,5
	6	15	10,4	19,7	84,2

	7	12	8,3	15,8	100,0
	Total	76	52,8	100,0	
Missing	-9	13	9,0		
	-7	48	33,3		
	0	7	4,9		
	Total	68	47,2		
Total		144	100,0		

water quantity – in-field water retention measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	1,4	2,5	2,5
	2	3	2,1	3,8	6,3
	3	12	8,3	15,2	21,5
	4	20	13,9	25,3	46,8
	5	15	10,4	19,0	65,8
	6	14	9,7	17,7	83,5
	7	13	9,0	16,5	100,0
	Total	79	54,9	100,0	
Missing	-9	13	9,0		
	-7	47	32,6		
	0	5	3,5		
	Total	65	45,1		
Total		144	100,0		

water quality – in-field nutrient retention measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	,7	1,4	1,4
	2	4	2,8	5,6	7,0
	3	12	8,3	16,9	23,9
	4	11	7,6	15,5	39,4
	5	11	7,6	15,5	54,9
	6	20	13,9	28,2	83,1
	7	12	8,3	16,9	100,0

	Total	71	49,3	100,0	
Missing	-9	14	9,7		
	-7	55	38,2		
	0	4	2,8		
	Total	73	50,7		
Total		144	100,0		

water quality - nutrients recovery from streams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	2,8	8,3	8,3
	2	3	2,1	6,3	14,6
	3	8	5,6	16,7	31,3
	4	5	3,5	10,4	41,7
	5	12	8,3	25,0	66,7
	6	13	9,0	27,1	93,8
	7	3	2,1	6,3	100,0
	Total	48	33,3	100,0	
Missing	-9	15	10,4		
	-7	71	49,3		
	0	10	6,9		
	Total	96	66,7		
Total		144	100,0		

climate change – mitigation/adaptation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	2,1	3,9	3,9
	2	9	6,3	11,8	15,8
	3	16	11,1	21,1	36,8
	4	14	9,7	18,4	55,3
	5	8	5,6	10,5	65,8
	6	13	9,0	17,1	82,9
	7	13	9,0	17,1	100,0
	Total	76	52,8	100,0	

Missing	-9	13	9,0		
	-7	50	34,7		
	0	5	3,5		
	Total	68	47,2		
Total		144	100,0		

nature conservation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	1,4	2,7	2,7
	3	12	8,3	16,0	18,7
	4	11	7,6	14,7	33,3
	5	17	11,8	22,7	56,0
	6	18	12,5	24,0	80,0
	7	15	10,4	20,0	100,0
	Total	75	52,1	100,0	
Missing	-9	16	11,1		
	-7	50	34,7		
	0	3	2,1		
	Total	69	47,9		
Total		144	100,0		

```
DESCRIPTIVES
VAR00478
VAR00479
VAR00480
VAR00481
VAR00482
VAR00483
VAR00484.
```

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation

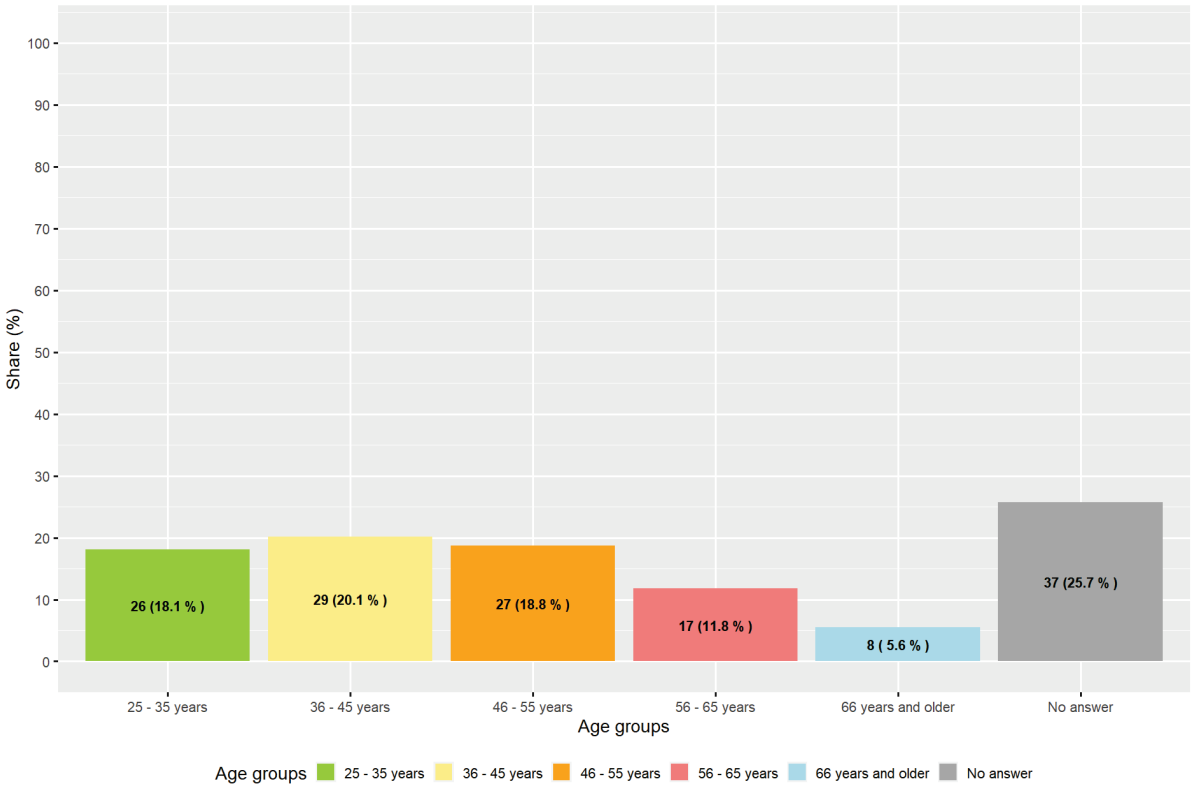
####25 ORIGINAL water quantity - excess water management – flood protection	83	1	7	5,08	1,647
water quantity – water scarcity - shortage – drought - irrigation	76	1	7	4,66	1,662
water quantity – in-field water retention measures	79	1	7	4,73	1,550
water quality – in-field nutrient retention measures	71	1	7	4,90	1,596
water quality - nutrients recovery from streams	48	1	7	4,44	1,712
climate change – mitigation/adaptation	76	1	7	4,39	1,804
nature conservation	75	2	7	5,09	1,444
Valid N (listwise)	30				

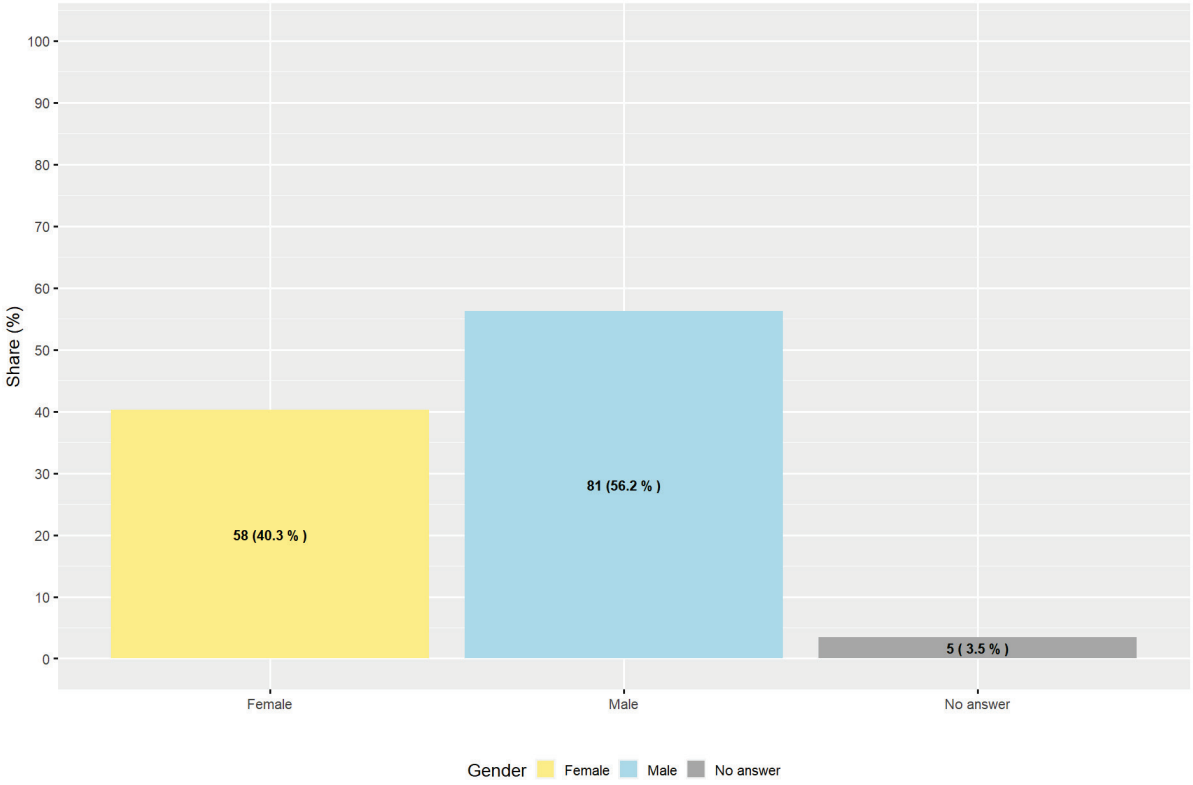
Annex E - The Survey Results - Graphical - Figures

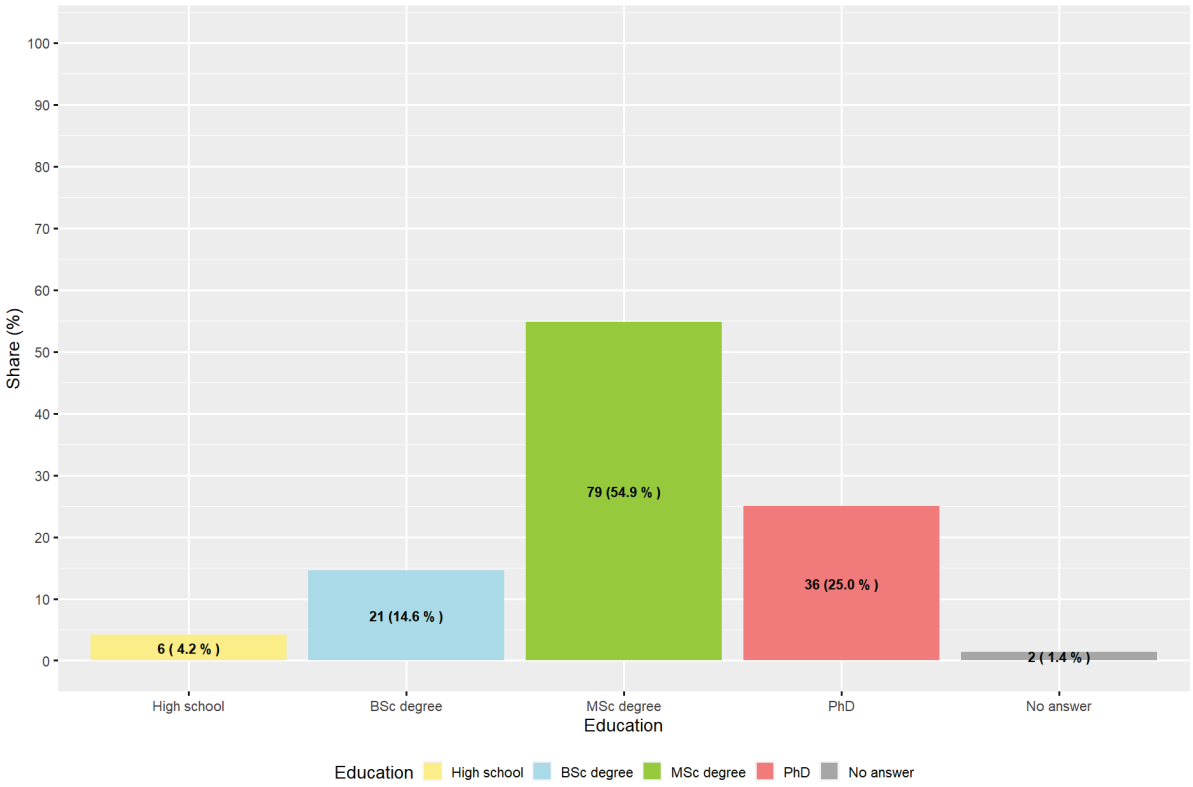
1. Type of stakeholder as key informant familiar with the legislation

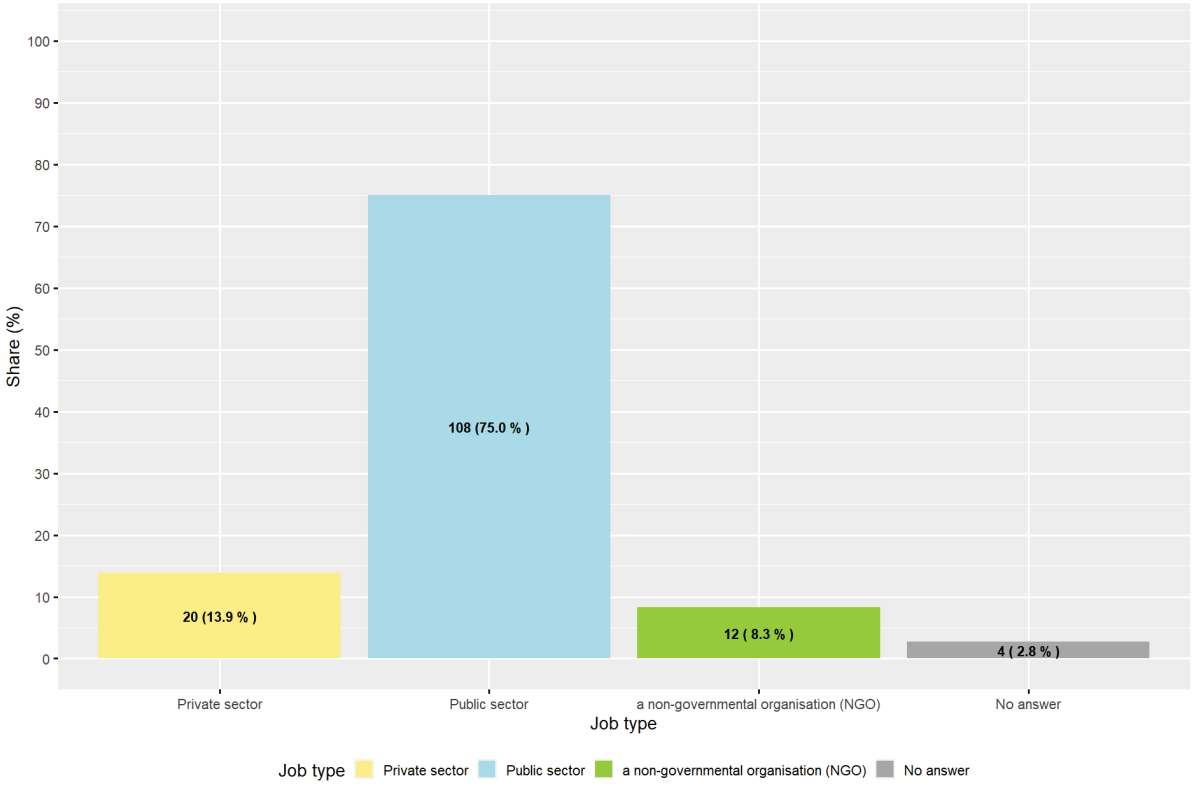
Answers:

Sex	Female	Male	other			
Year of birth	enter age					
Education	high school	BSc degree	MSc degree	PhD	other	
Job type	private sector	public sector	a non-governmental organisation (NGO)	other:_		
Type of organisation	Authorities - policy-making (Governmental ministry, region, local representative)	Authorities - policy implementation (regulatory agencies, inspectors, public agencies, monitoring agencies)	Experts (Agri advisors, Water managers, Environmental managers, Consultants)	Research/ Science (Experts - Researchers dealing with topic professionally)	NGO	other
Level of organisation operation	National level (government, administration/offices (NUTS 0))	Regional level (government, offices, administrative units (NUTS 1-3))	Local municipal (LAU)			
Type of main expertise	Agriculture	water management	environment/nature	spatial planning	climate change	

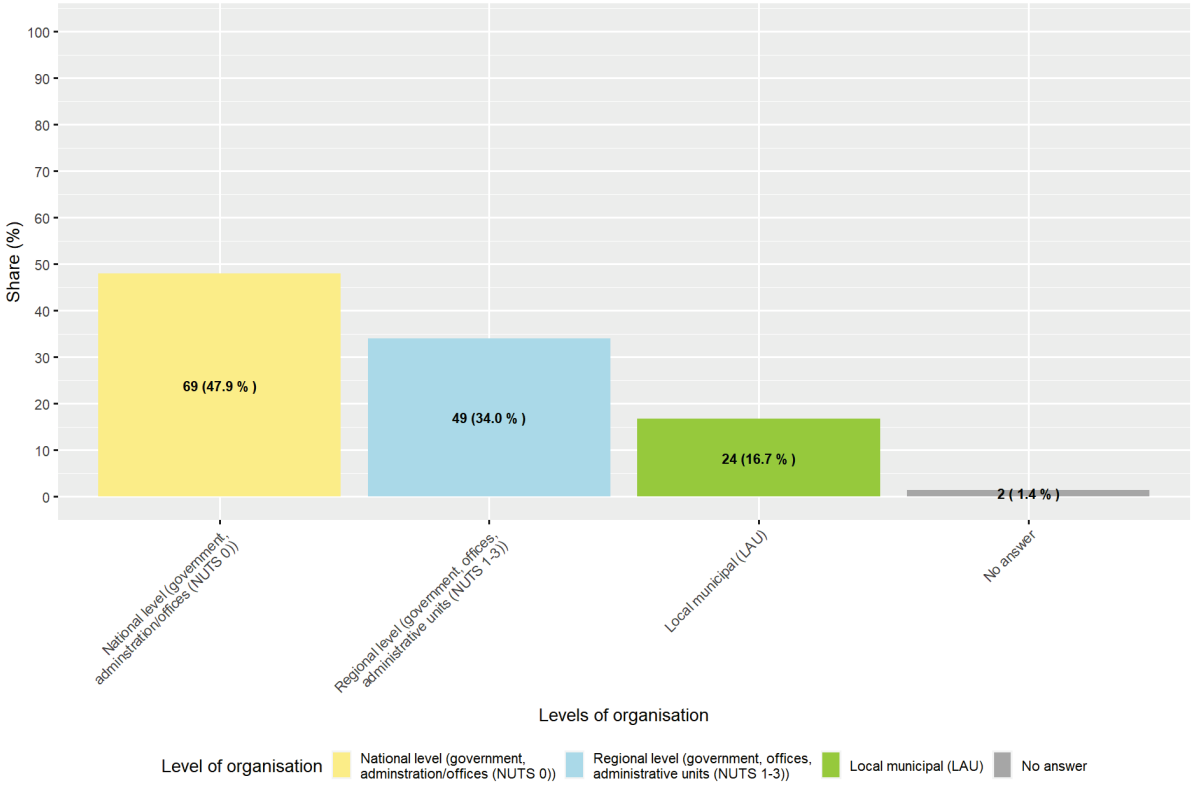


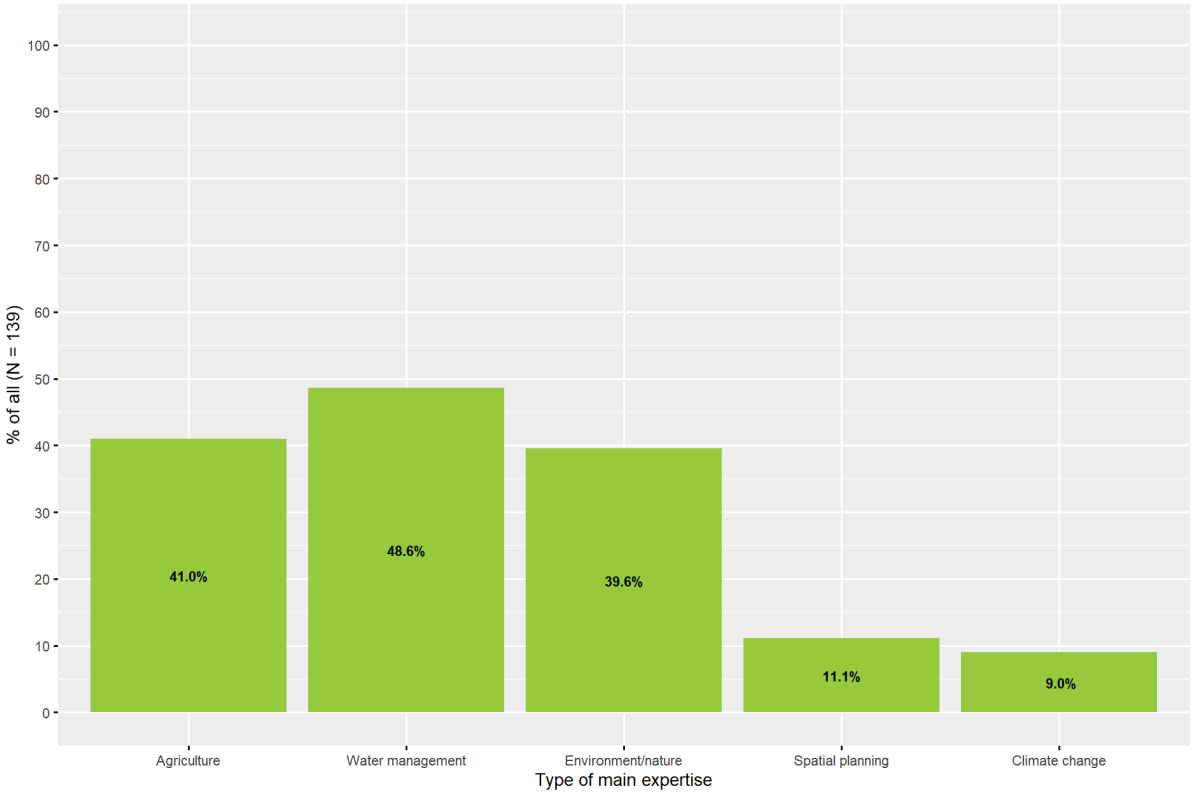

100
90
80
70
60
50
40
30
20
10
0
Share (%)
58 (40.3 %)
81 (56.2 %)
5 (3.5 %)
Female
Male
No answer
Gender
Female
Male
No answer

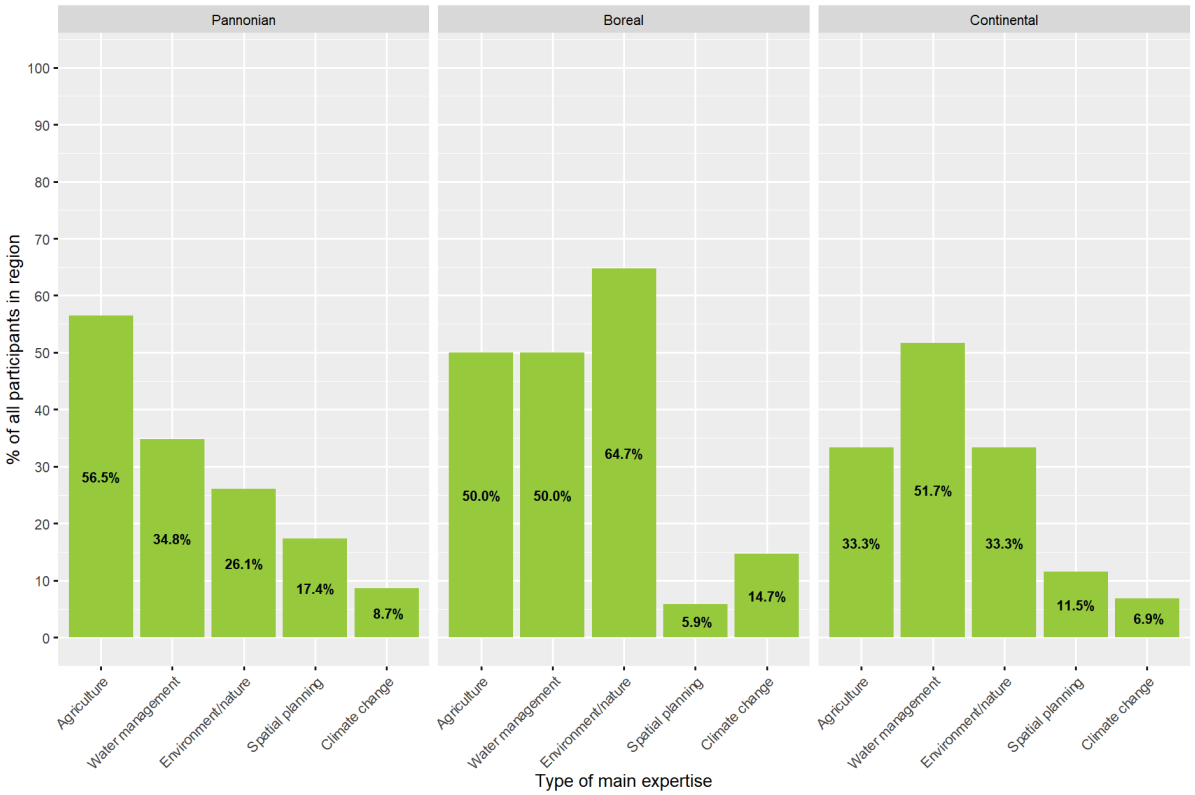

100
90
80
70
60
50
40
30
20
10
0
Share (%)
6 (4.2 %)
21 (14.6 %)
79 (54.9 %)
36 (25.0 %)
2 (1.4 %)
High school
BSc degree
MSc degree
PhD
No answer
Education
Education
High school
BSc degree
MSc degree
PhD
No answer

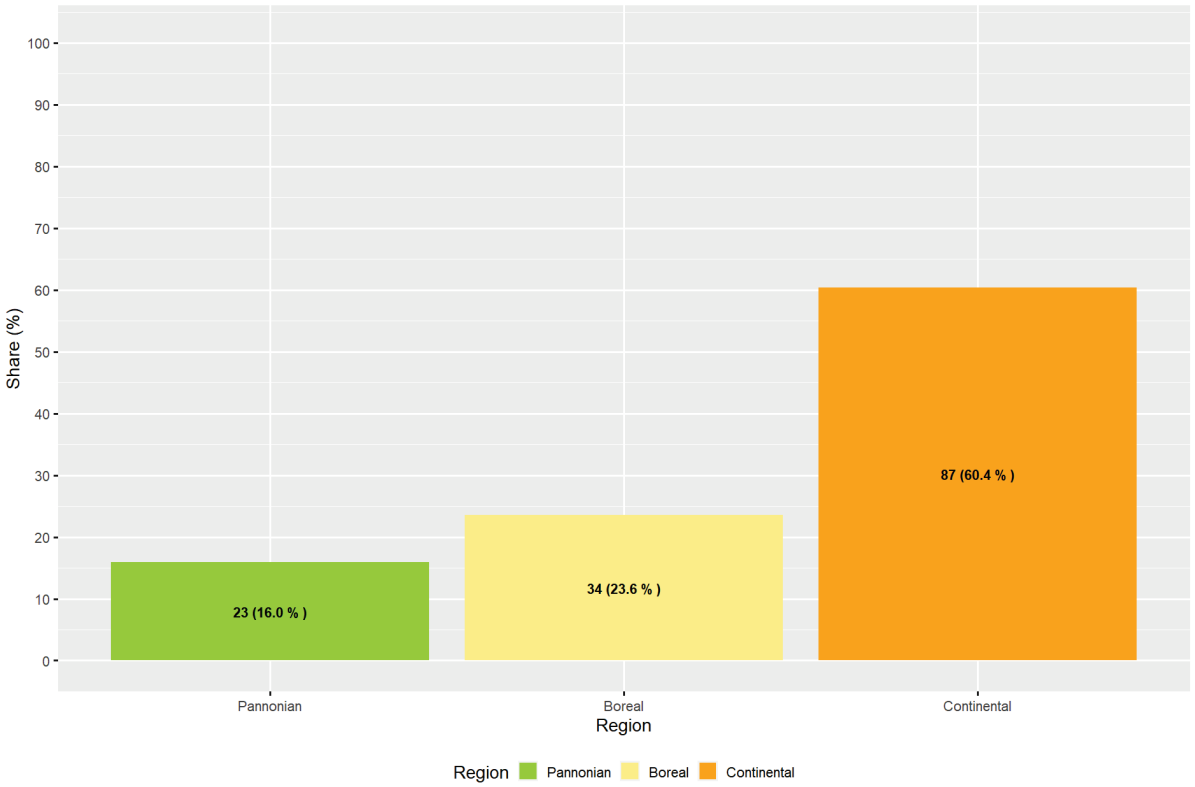

Share (%)
100
90
80
70
60
50
40
30
20
10
0
20 (13.9 %)
108 (75.0 %)
12 (8.3 %)
4 (2.8 %)
Private sector
Public sector
a non-governmental organisation (NGO)
No answer
Job type
Job type
Private sector
Public sector
a non-governmental organisation (NGO)
No answer


Share (%)
100
90
80
70
60
50
40
30
20
10
0
36 (25.0 %)
37 (25.7 %)
36 (25.0 %)
25 (17.4 %)
6 (4.2 %)
2 (1.4 %)
2 (1.4 %)
Authorities - policy-making (Governmental ministry, region, local representative)
Authorities - policy implementation (regulatory agencies, inspector, public agencies, monitoring agencies)
Experts (Agri advisor, Water managers, Environmental managers, Consultants)
Research/ Science (Experts - Researchers dealing with topic professionally)
NGO
Other
No answer
Type of organisation
Type of organisation
Authorities - policy-making (Governmental ministry, region, local representative)
Authorities - policy implementation (regulatory agencies, inspector, public agencies, monitoring agencies)
Experts (Agri advisor, Water managers, Environmental managers, Consultants)
Research/ Science (Experts - Researchers dealing with topic professionally)
NGO
Other
No answer


Share (%)
100
90
80
70
60
50
40
30
20
10
0
69 (47.9 %)
49 (34.0 %)
24 (16.7 %)
2 (1.4 %)
National level (government, adminstration/offices (NUTS 0))
Regional level (government, offices, administrative units (NUTS 1-3))
Local municipal (LAU)
No answer
Levels of organisation
Level of organisation
National level (government, adminstration/offices (NUTS 0))
Regional level (government, offices, administrative units (NUTS 1-3))
Local municipal (LAU)
No answer


% of all (N = 139)
100
90
80
70
60
50
40
30
20
10
0
41.0%
48.6%
39.6%
11.1%
9.0%
Agriculture
Water management
Environment/nature
Spatial planning
Climate change
Type of main expertise

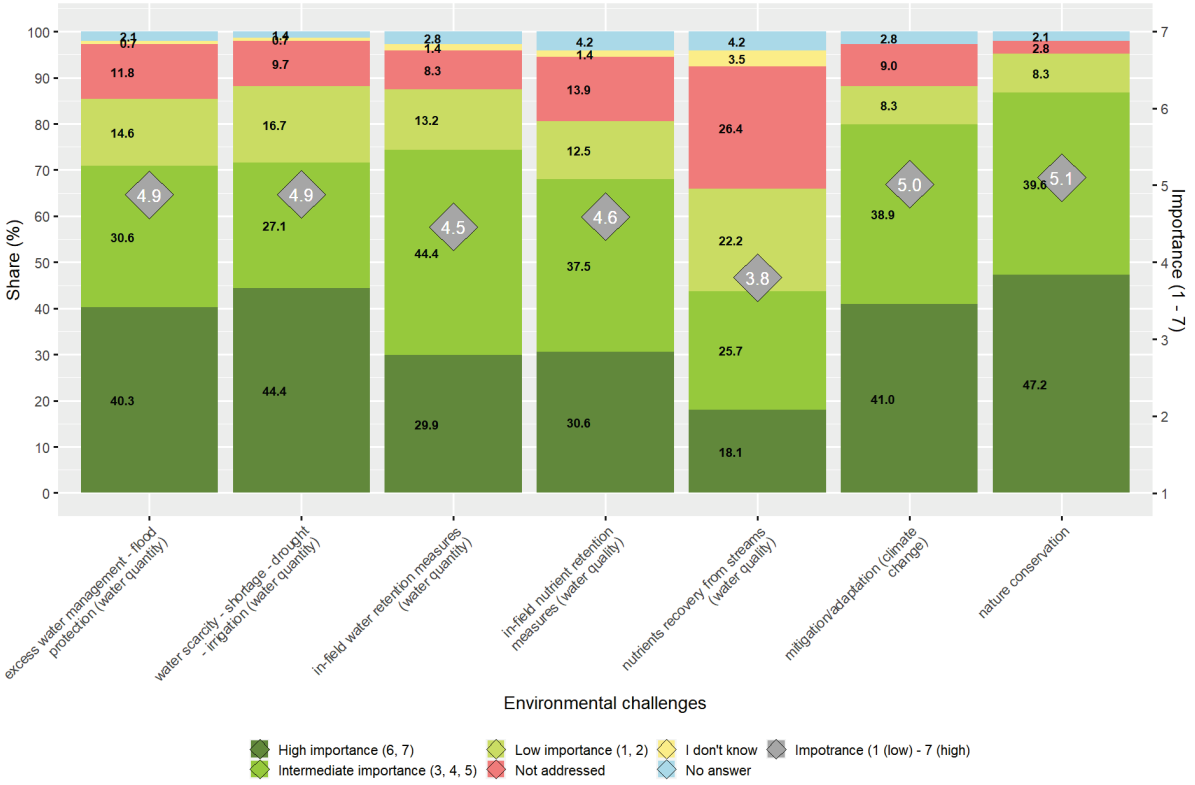

Pannonian
Boreal
Continental
% of all participants in region
100
90
80
70
60
50
40
30
20
10
0
56.5%
34.8%
26.1%
17.4%
8.7%
50.0%
50.0%
64.7%
5.9%
14.7%
33.3%
51.7%
33.3%
11.5%
6.9%
Agriculture
Water management
Environment/nature
Spatial planning
Climate change
Type of main expertise

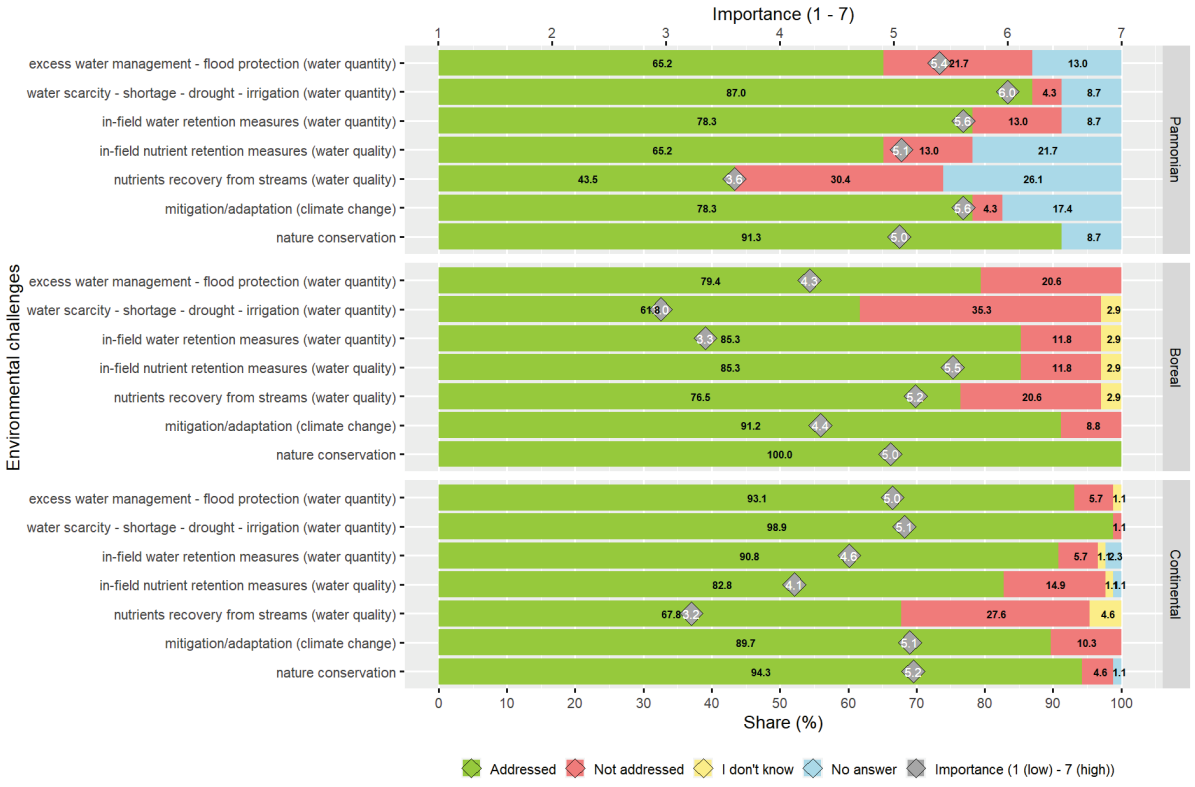

Share (%)
100
90
80
70
60
50
40
30
20
10
0
23 (16.0 %)
34 (23.6 %)
87 (60.4 %)
Pannonian
Boreal
Continental
Region
Region
Pannonian
Boreal
Continental

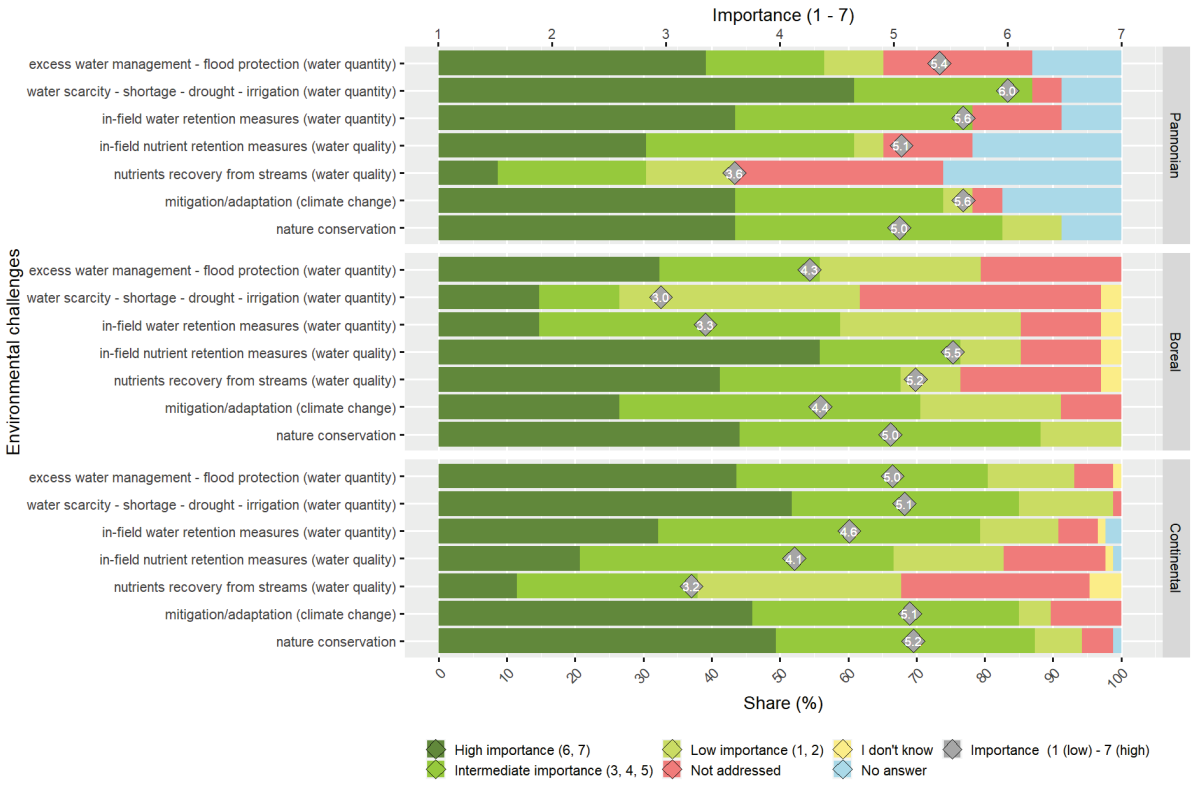
2. Which of the following environmental challenges have you already addressed at your work? How important are to your expert work on a scale from 1 to 7?

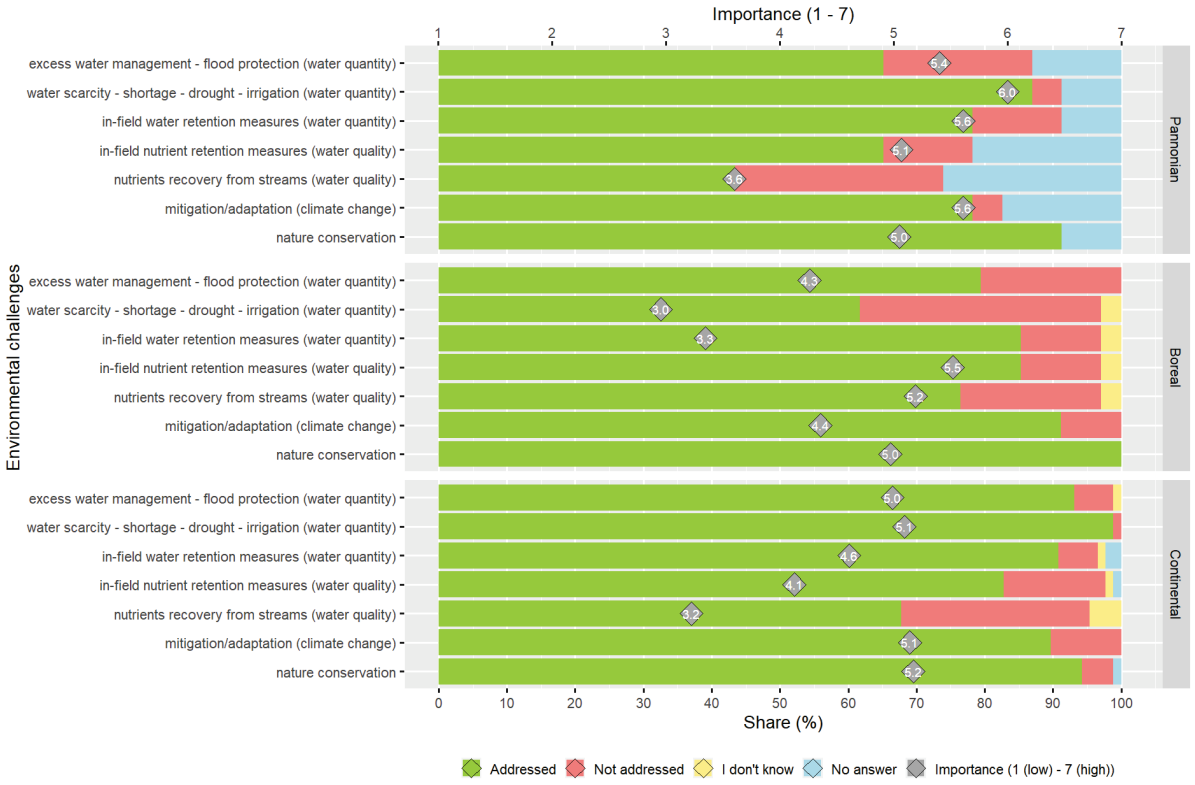
	I do not know (x)	No	Yes - rate						
water quantity - excess water management – flood protection		0	1	2	3	4	5	6	7
water quantity – water scarcity - shortage – drought - irrigation		0	1	2	3	4	5	6	7
water quantity – in-field water retention measures		0	1	2	3	4	5	6	7
water quality – in-field nutrient retention measures		0	1	2	3	4	5	6	7
water quality - nutrients recovery from streams		0	1	2	3	4	5	6	7
climate change – mitigation/adaptation		0	1	2	3	4	5	6	7
nature conservation		0	1	2	3	4	5	6	7
	I do not know	not addressed	low		intermediate			high	

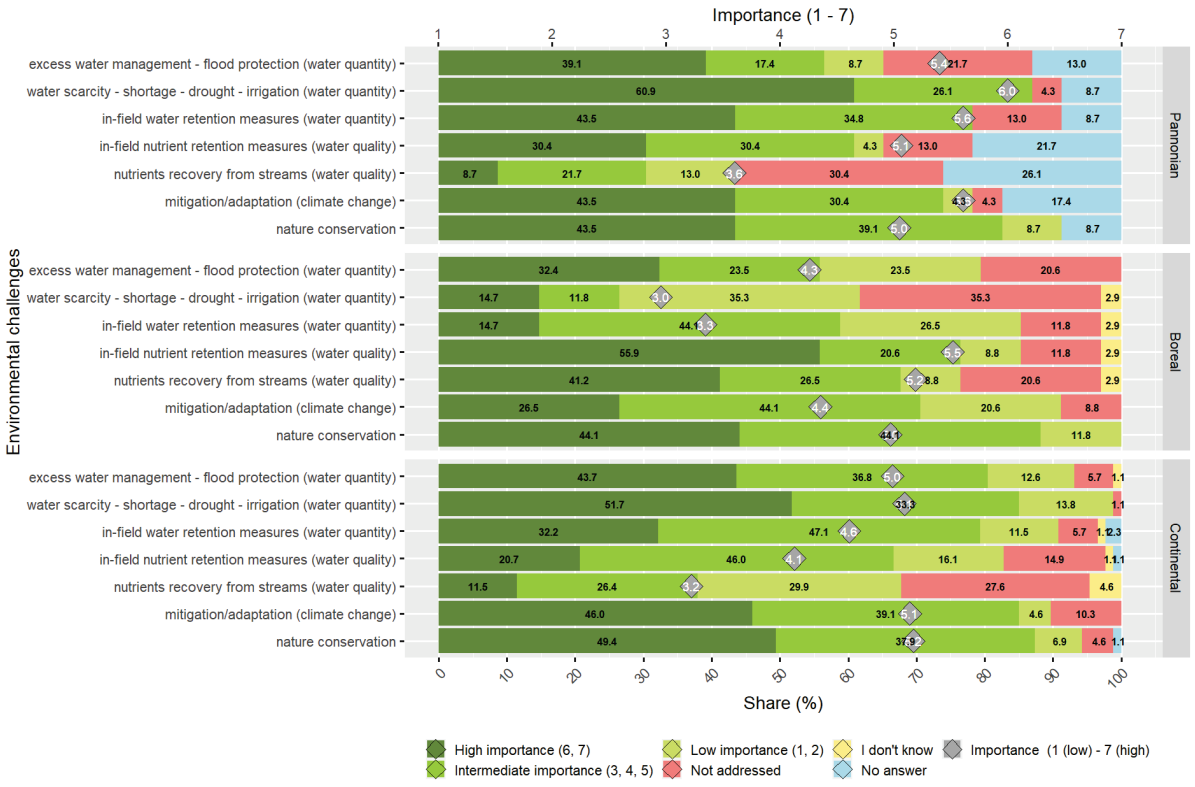
OPTAIN


Share (%)
Importance (1 - 7)
Environmental challenges
excess water management - flood protection (water quantity)
water scarcity - shortage - drought - irrigation (water quantity)
in-field water retention measures (water quantity)
in-field nutrient retention measures (water quality)
nutrients recovery from streams (water quality)
mitigation/adaptation (climate change)
nature conservation
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)
Not addressed
I don't know
No answer
Impotrance (1 (low) - 7 (high)


Importance (1 - 7)
Environmental challenges
Share (%)
Pannonian
Boreal
Continental
Addressed
Not addressed
I don't know
No answer
Importance (1 (low) - 7 (high))


Importance (1 - 7)
1
2
3
4
5
6
7
excess water management - flood protection (water quantity)
water scarcity - shortage - drought - irrigation (water quantity)
in-field water retention measures (water quantity)
in-field nutrient retention measures (water quality)
nutrients recovery from streams (water quality)
mitigation/adaptation (climate change)
nature conservation
5.4
6.0
5.6
5.1
3.6
5.6
5.0
Pannonian
Environmental challenges
4.3
3.0
3.3
5.5
5.2
4.4
5.0
Boreal
5.0
5.1
4.6
4.1
3.2
5.1
5.2
Continental
0
10
20
30
40
50
60
70
80
90
100
Share (%)
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)
Not addressed
I don't know
No answer
Importance (1 (low) - 7 (high))


Importance (1 - 7)
1
2
3
4
5
6
7
excess water management - flood protection (water quantity)
water scarcity - shortage - drought - irrigation (water quantity)
in-field water retention measures (water quantity)
in-field nutrient retention measures (water quality)
nutrients recovery from streams (water quality)
mitigation/adaptation (climate change)
nature conservation
5.4
6.0
5.6
5.1
3.6
5.6
5.0
Pannonian
Environmental challenges
4.3
3.0
3.3
5.5
5.2
4.4
5.0
Boreal
5.0
5.1
4.6
4.1
3.2
5.1
5.2
Continental
0
10
20
30
40
50
60
70
80
90
100
Share (%)
Addressed
Not addressed
I don't know
No answer
Importance (1 (low) - 7 (high))

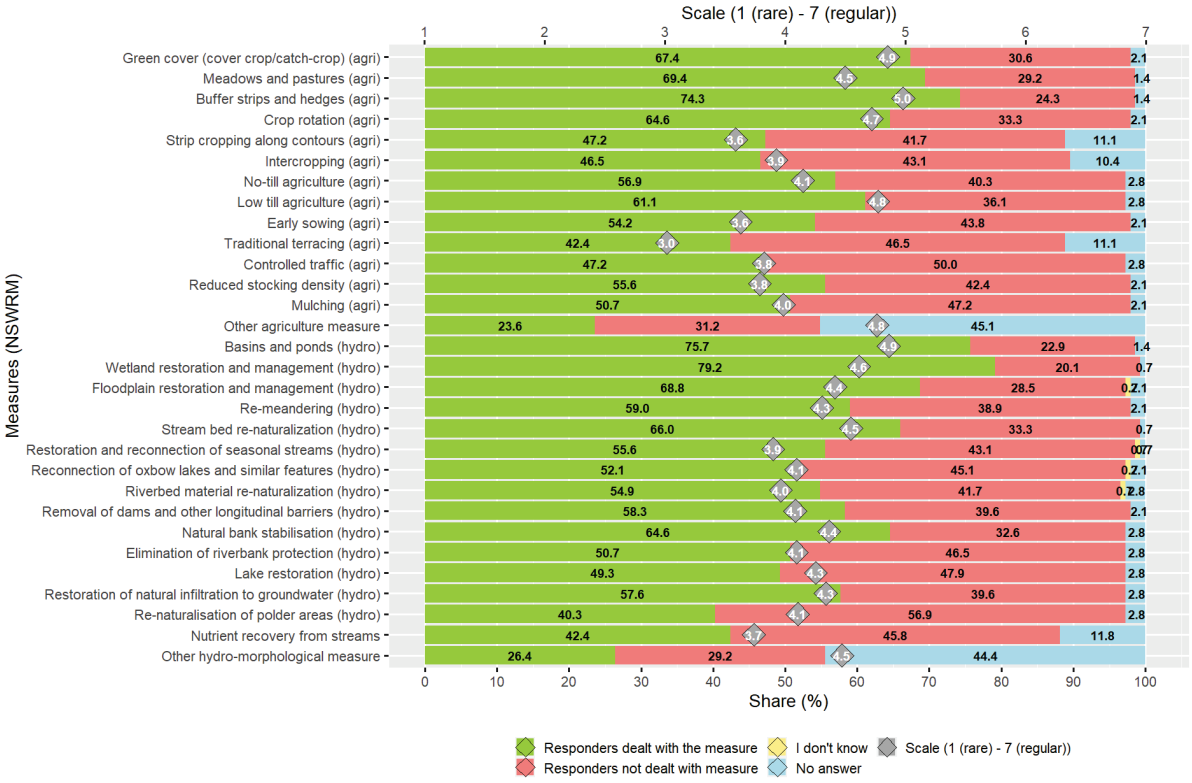

Importance (1 - 7)
1
2
3
4
5
6
7
Environmental challenges
excess water management - flood protection (water quantity)
water scarcity - shortage - drought - irrigation (water quantity)
in-field water retention measures (water quantity)
in-field nutrient retention measures (water quality)
nutrients recovery from streams (water quality)
mitigation/adaptation (climate change)
nature conservation
Pannonian
Boreal
Continental
39.1 17.4 8.7 5.4 21.7 13.0
60.9 26.1 6.0 4.3 8.7
43.5 34.8 5.6 13.0 8.7
30.4 30.4 4.3 5.1 13.0 21.7
8.7 21.7 13.0 3.6 30.4 26.1
43.5 30.4 4.3 4.3 17.4
43.5 39.1 5.0 8.7 8.7
32.4 23.5 4.5 23.5 20.6
14.7 11.8 3.0 35.3 35.3 2.9
14.7 44.1 3.3 26.5 11.8 2.9
55.9 20.6 5.5 8.8 11.8 2.9
41.2 26.5 5.2 8.8 20.6 2.9
26.5 44.1 4.4 20.6 8.8
44.1 44.1 11.8
43.7 36.8 5.0 12.6 5.7 1.1
51.7 33.3 13.8 1.1
32.2 47.1 4.6 11.5 5.7 1.2 2.3
20.7 46.0 4.7 16.1 14.9 1.1 1.1
11.5 26.4 3.2 29.9 27.6 4.6
46.0 39.1 5.1 4.6 10.3
49.4 37.9 6.9 4.6 1.1
0
10
20
30
40
50
60
70
80
90
100
Share (%)
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)
Not addressed
I don't know
No answer
Importance (1 (low) - 7 (high)

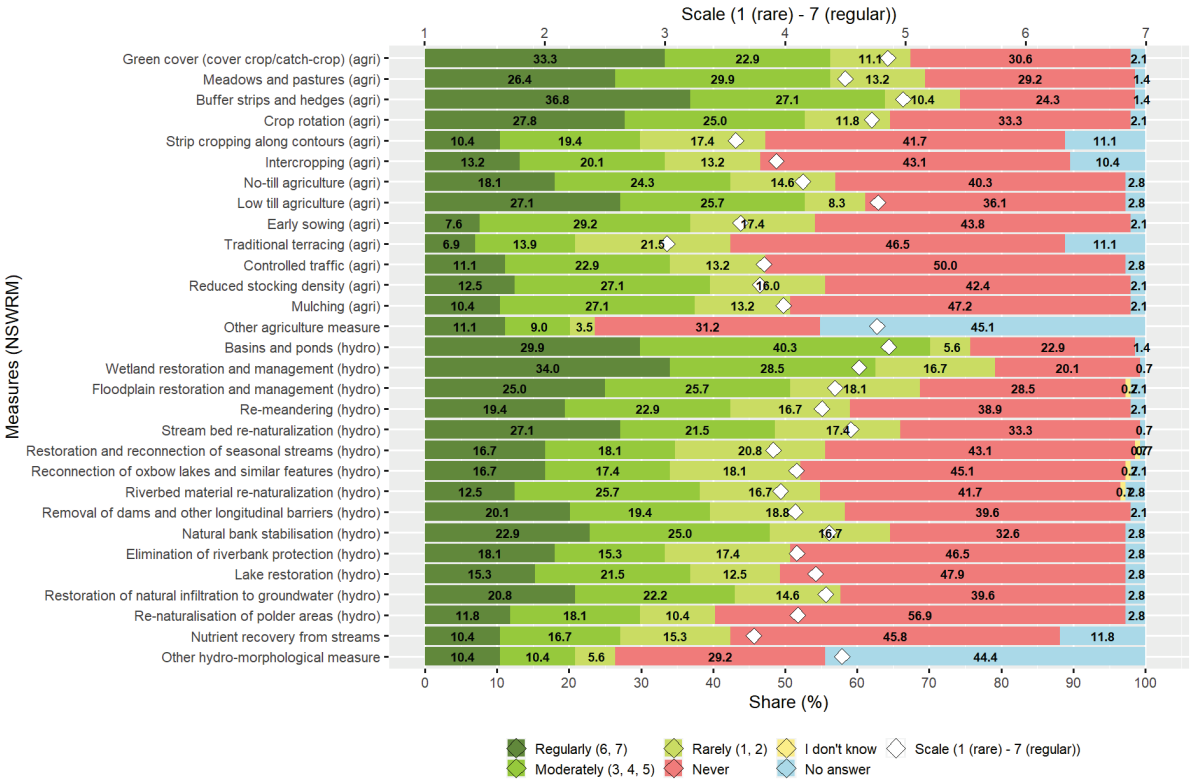
OPTAIN

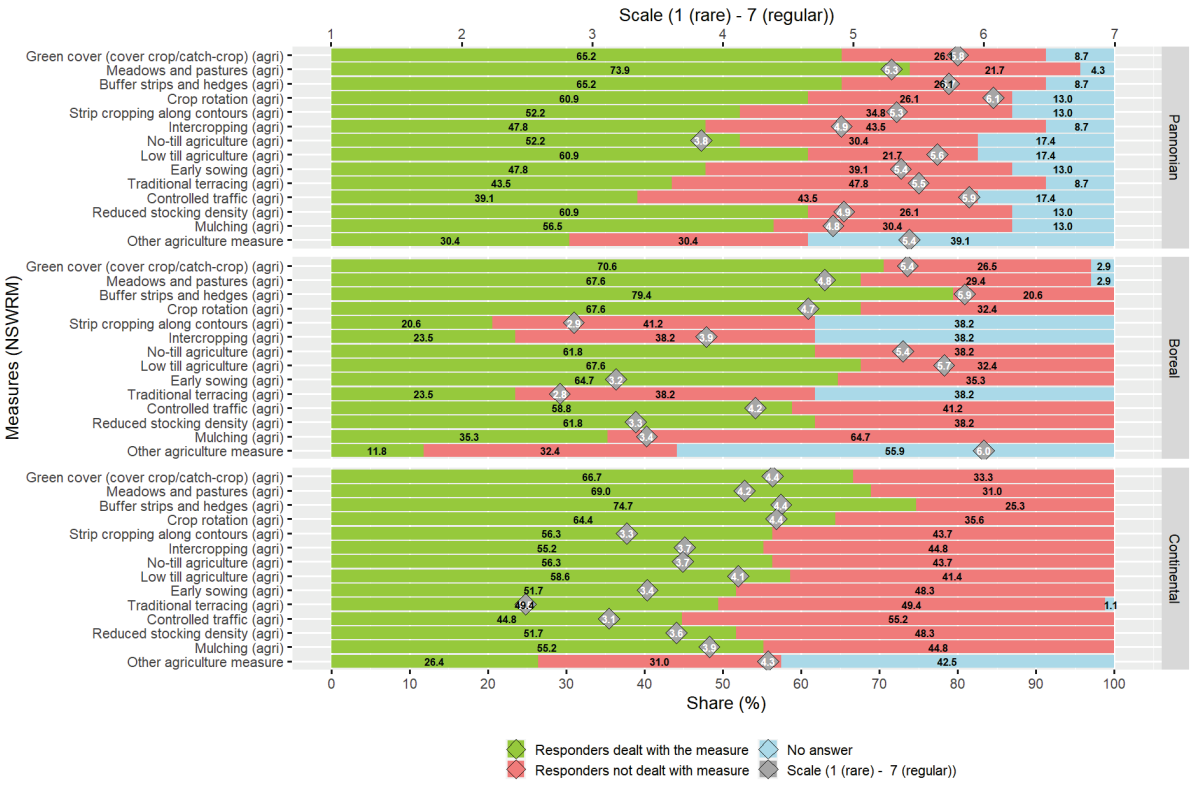
3. Have you already dealt with any of the following agri-hydro-environmental measures at your work? How often do you deal with them in terms of quantity (number of cases, frequency) on a scale from 1 (rare) to 7 (regular)?

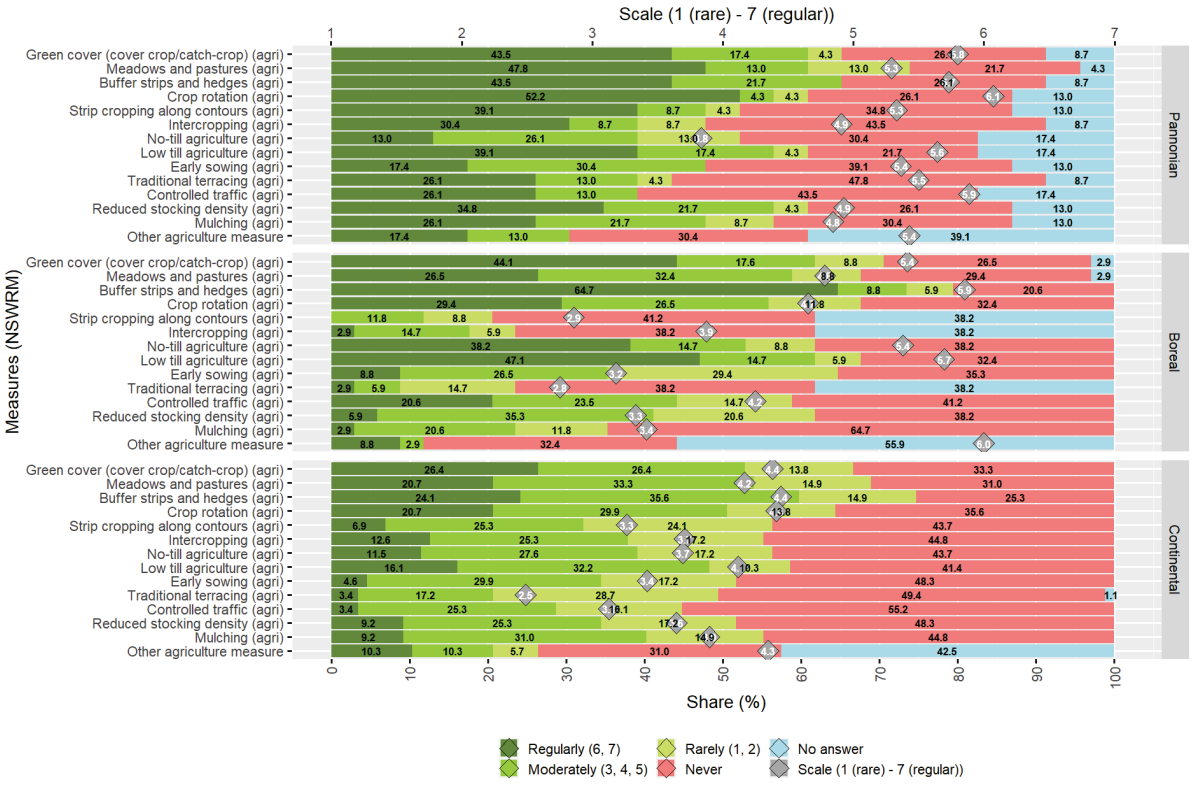
(Explanation of measures is listed at http://nwrm.eu/measures-catalogue)

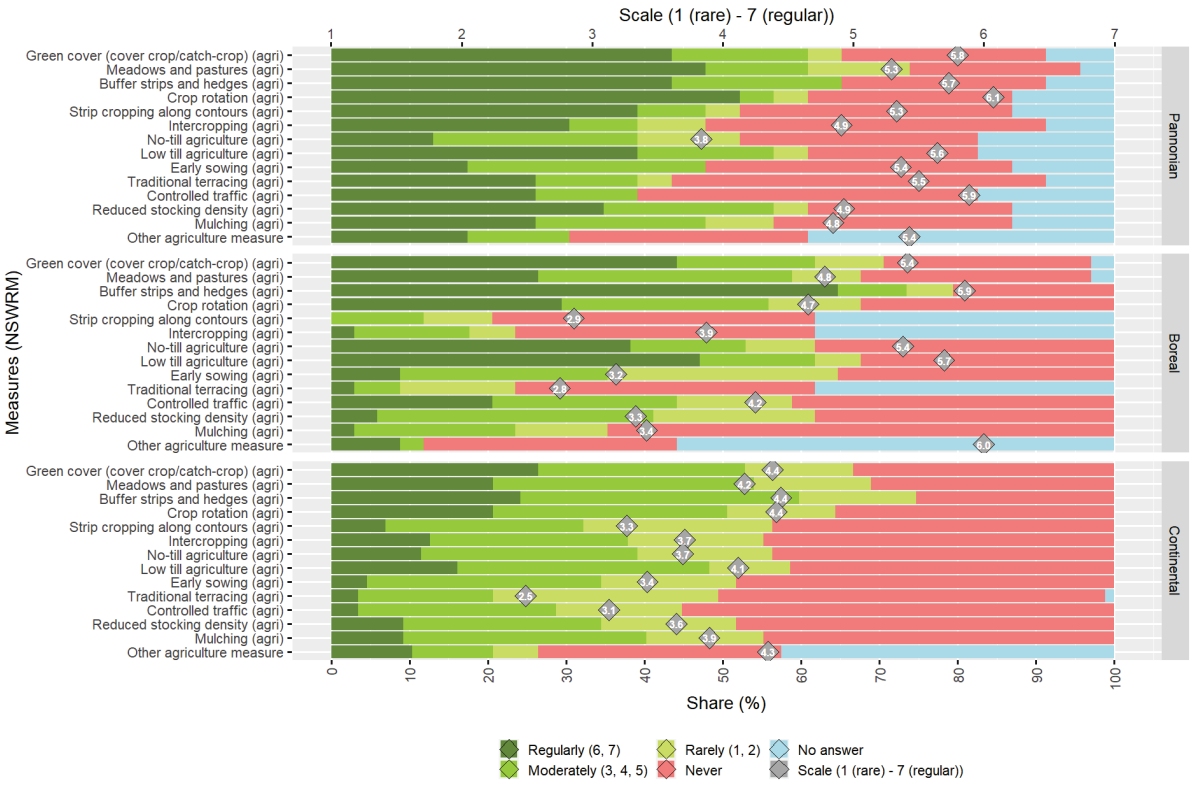
	No	Yes - rate						
Green cover (cover crop/catch-crop) (agri)	0	1	2	3	4	5	6	7
Meadows and pastures (agri)	0	1	2	3	4	5	6	7
Buffer strips and hedges (agri)	0	1	2	3	4	5	6	7
Crop rotation (agri)	0	1	2	3	4	5	6	7
Strip cropping along contours (agri)	0	1	2	3	4	5	6	7
Intercropping (agri)	0	1	2	3	4	5	6	7
No-till agriculture (agri)	0	1	2	3	4	5	6	7
Low till agriculture (agri)	0	1	2	3	4	5	6	7
Early sowing (agri)	0	1	2	3	4	5	6	7
Traditional terracing (agri)	0	1	2	3	4	5	6	7
Controlled traffic (agri)	0	1	2	3	4	5	6	7
Reduced stocking density (agri)	0	1	2	3	4	5	6	7
Mulching (agri)	0	1	2	3	4	5	6	7
Other agriculture measures:	0	1	2	3	4	5	6	7
Basins and ponds (hydro)	0	1	2	3	4	5	6	7
Wetland restoration and management (hydro)	0	1	2	3	4	5	6	7
Floodplain restoration and management (hydro)	0	1	2	3	4	5	6	7
Re-meandering (hydro)	0	1	2	3	4	5	6	7
Stream bed re-naturalisation (hydro)	0	1	2	3	4	5	6	7
Restoration and reconnection of seasonal streams (hydro)	0	1	2	3	4	5	6	7
Reconnection of oxbow lakes and similar features (hydro)	0	1	2	3	4	5	6	7
Riverbed material re-naturalisation (hydro)	0	1	2	3	4	5	6	7
Removal of dams and other longitudinal barriers (hydro)	0	1	2	3	4	5	6	7
Natural bank stabilisation (hydro)	0	1	2	3	4	5	6	7
Elimination of riverbank protection (hydro)	0	1	2	3	4	5	6	7
Lake restoration (hydro)	0	1	2	3	4	5	6	7
Restoration of natural infiltration to groundwater (hydro)	0	1	2	3	4	5	6	7
Re-naturalisation of polder areas (hydro)	0	1	2	3	4	5	6	7
Nutrient recovery from streams	0	1	2	3	4	5	6	7
Other hydro-morphological measures:	0	1	2	3	4	5	6	7
	Never	rarely		moderately			regularly	

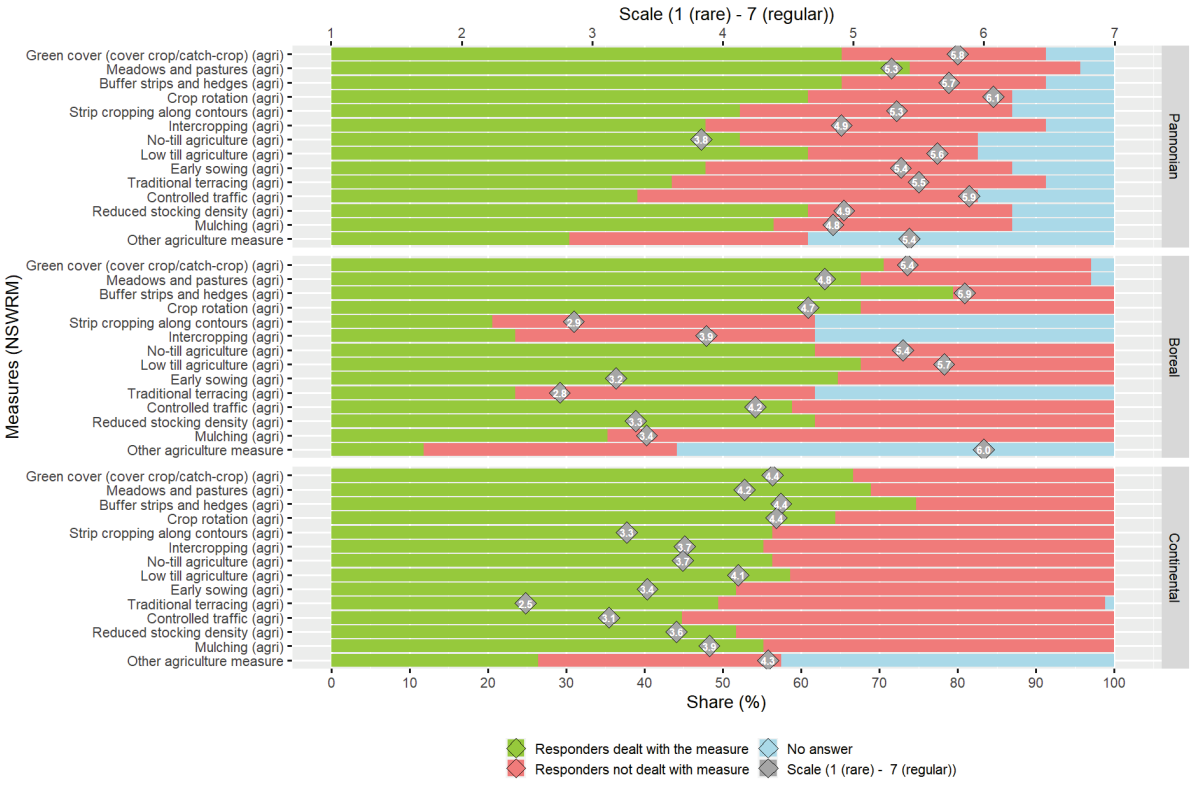

Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Green cover (cover crop/catch-crop) (agri)
Meadows and pastures (agri)
Buffer strips and hedges (agri)
Crop rotation (agri)
Strip cropping along contours (agri)
Intercropping (agri)
No-till agriculture (agri)
Low till agriculture (agri)
Early sowing (agri)
Traditional terracing (agri)
Controlled traffic (agri)
Reduced stocking density (agri)
Mulching (agri)
Other agriculture measure
Basins and ponds (hydro)
Wetland restoration and management (hydro)
Floodplain restoration and management (hydro)
Re-meandering (hydro)
Stream bed re-naturalization (hydro)
Restoration and reconnection of seasonal streams (hydro)
Reconnection of oxbow lakes and similar features (hydro)
Riverbed material re-naturalization (hydro)
Removal of dams and other longitudinal barriers (hydro)
Natural bank stabilisation (hydro)
Elimination of riverbank protection (hydro)
Lake restoration (hydro)
Restoration of natural infiltration to groundwater (hydro)
Re-naturalisation of polder areas (hydro)
Nutrient recovery from streams
Other hydro-morphological measure
Share (%)
Responders dealt with the measure
Responders not dealt with measure
I don't know
No answer
Scale (1 (rare) - 7 (regular))

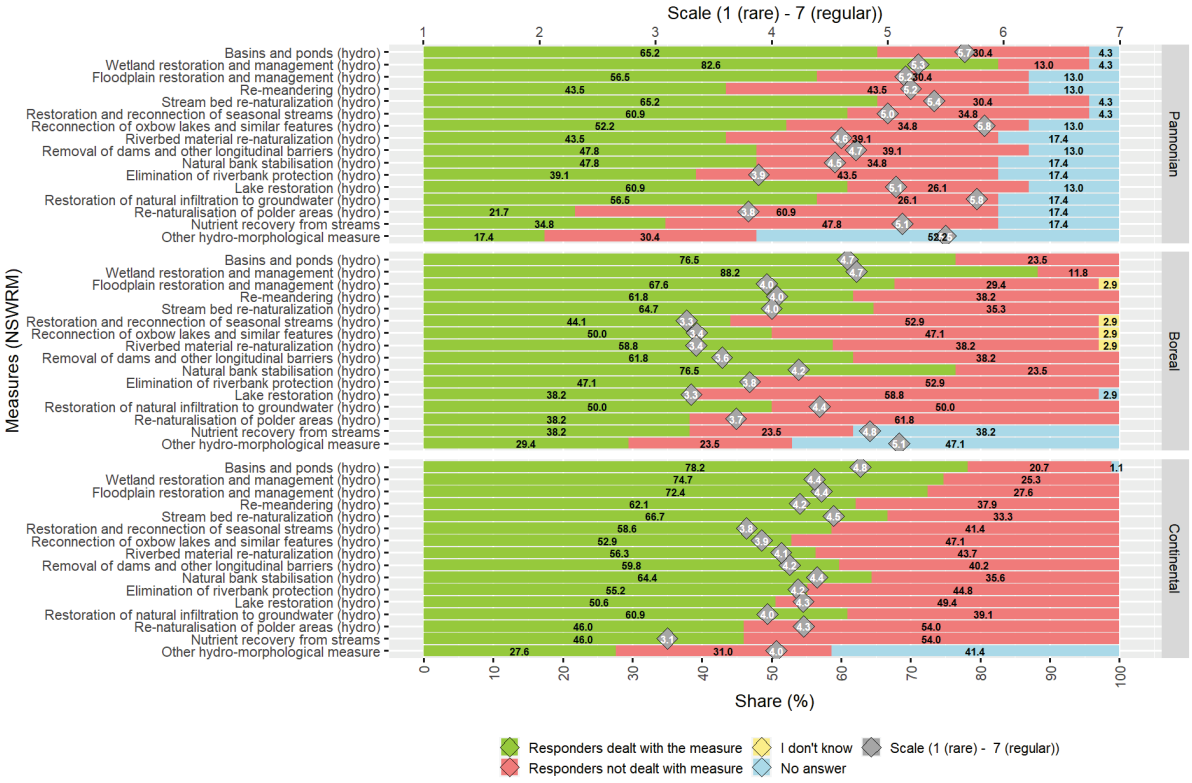

Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Green cover (cover crop/catch-crop) (agri)
Meadows and pastures (agri)
Buffer strips and hedges (agri)
Crop rotation (agri)
Strip cropping along contours (agri)
Intercropping (agri)
No-till agriculture (agri)
Low till agriculture (agri)
Early sowing (agri)
Traditional terracing (agri)
Controlled traffic (agri)
Reduced stocking density (agri)
Mulching (agri)
Other agriculture measure
Basins and ponds (hydro)
Wetland restoration and management (hydro)
Floodplain restoration and management (hydro)
Re-meandering (hydro)
Stream bed re-naturalization (hydro)
Restoration and reconnection of seasonal streams (hydro)
Reconnection of oxbow lakes and similar features (hydro)
Riverbed material re-naturalization (hydro)
Removal of dams and other longitudinal barriers (hydro)
Natural bank stabilisation (hydro)
Elimination of riverbank protection (hydro)
Lake restoration (hydro)
Restoration of natural infiltration to groundwater (hydro)
Re-naturalisation of polder areas (hydro)
Nutrient recovery from streams
Other hydro-morphological measure
Share (%)
Regularly (6, 7)
Moderately (3, 4, 5)
Rarely (1, 2)
Never
I don't know
No answer
Scale (1 (rare) - 7 (regular))

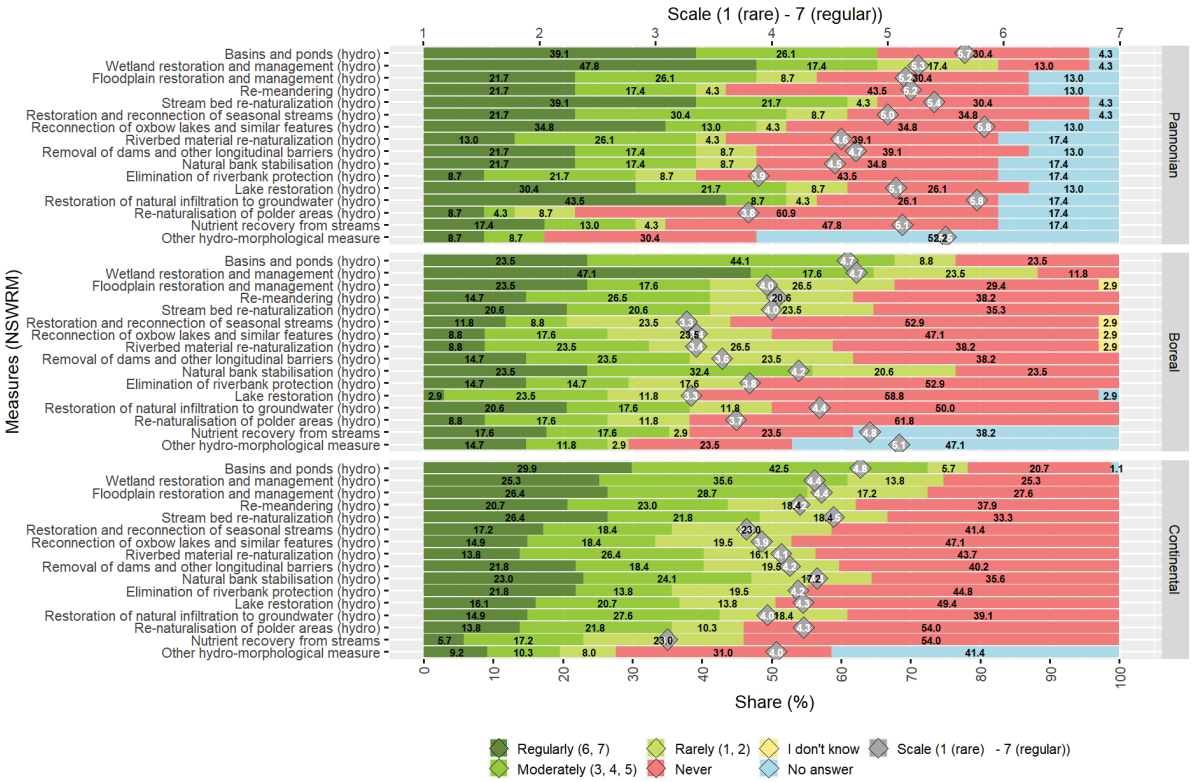

Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Pannonian
Boreal
Continental
Green cover (cover crop/catch-crop) (agri)
Meadows and pastures (agri)
Buffer strips and hedges (agri)
Crop rotation (agri)
Strip cropping along contours (agri)
Intercropping (agri)
No-till agriculture (agri)
Low till agriculture (agri)
Early sowing (agri)
Traditional terracing (agri)
Controlled traffic (agri)
Reduced stocking density (agri)
Mulching (agri)
Other agriculture measure
Share (%)
Responders dealt with the measure
Responders not dealt with measure
No answer
Scale (1 (rare) - 7 (regular))

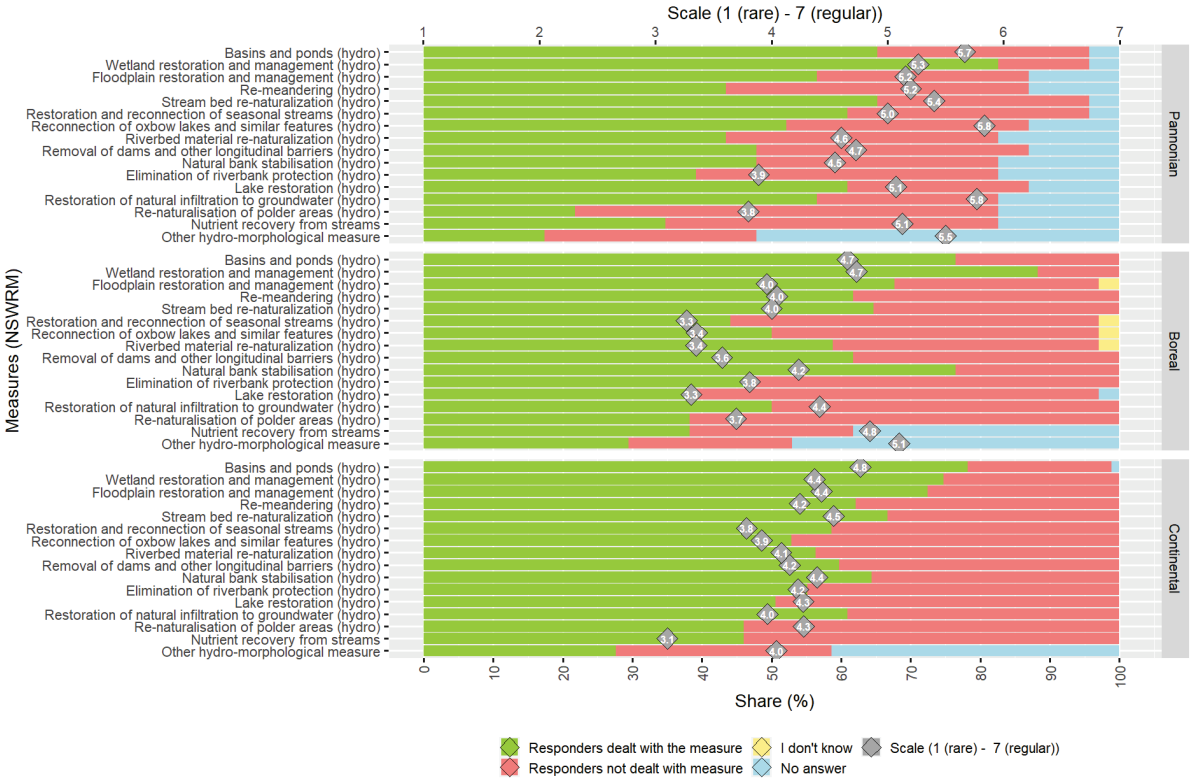

Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Pannonian
Boreal
Continental
Green cover (cover crop/catch-crop) (agri)
Meadows and pastures (agri)
Buffer strips and hedges (agri)
Crop rotation (agri)
Strip cropping along contours (agri)
Intercropping (agri)
No-till agriculture (agri)
Low till agriculture (agri)
Early sowing (agri)
Traditional terracing (agri)
Controlled traffic (agri)
Reduced stocking density (agri)
Mulching (agri)
Other agriculture measure
Share (%)
Regularly (6, 7)
Moderately (3, 4, 5)
Rarely (1, 2)
Never
No answer
Scale (1 (rare) - 7 (regular))


Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Green cover (cover crop/catch-crop) (agri)
Meadows and pastures (agri)
Buffer strips and hedges (agri)
Crop rotation (agri)
Strip cropping along contours (agri)
Intercropping (agri)
No-till agriculture (agri)
Low till agriculture (agri)
Early sowing (agri)
Traditional terracing (agri)
Controlled traffic (agri)
Reduced stocking density (agri)
Mulching (agri)
Other agriculture measure
Pannonian
Boreal
Continental
Share (%)
Regularly (6, 7)
Moderately (3, 4, 5)
Rarely (1, 2)
Never
No answer
Scale (1 (rare) - 7 (regular))


Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Green cover (cover crop/catch-crop) (agri)
Meadows and pastures (agri)
Buffer strips and hedges (agri)
Crop rotation (agri)
Strip cropping along contours (agri)
Intercropping (agri)
No-till agriculture (agri)
Low till agriculture (agri)
Early sowing (agri)
Traditional terracing (agri)
Controlled traffic (agri)
Reduced stocking density (agri)
Mulching (agri)
Other agriculture measure
Pannonian
Boreal
Continental
Share (%)
Responders dealt with the measure
Responders not dealt with measure
No answer
Scale (1 (rare) - 7 (regular))


Scale (1 (rare) - 7 (regular))
Basins and ponds (hydro)
Wetland restoration and management (hydro)
Floodplain restoration and management (hydro)
Re-meandering (hydro)
Stream bed re-naturalization (hydro)
Restoration and reconnection of seasonal streams (hydro)
Reconnection of oxbow lakes and similar features (hydro)
Riverbed material re-naturalization (hydro)
Removal of dams and other longitudinal barriers (hydro)
Natural bank stabilisation (hydro)
Elimination of riverbank protection (hydro)
Lake restoration (hydro)
Restoration of natural infiltration to groundwater (hydro)
Re-naturalisation of polder areas (hydro)
Nutrient recovery from streams
Other hydro-morphological measure
Measures (NSWRM)
Pannonian
Boreal
Continental
Share (%)
Responders dealt with the measure
Responders not dealt with measure
I don't know
No answer
Scale (1 (rare) - 7 (regular))


Scale (1 (rare) - 7 (regular))
Basins and ponds (hydro)
Wetland restoration and management (hydro)
Floodplain restoration and management (hydro)
Re-meandering (hydro)
Stream bed re-naturalization (hydro)
Restoration and reconnection of seasonal streams (hydro)
Reconnection of oxbow lakes and similar features (hydro)
Riverbed material re-naturalization (hydro)
Removal of dams and other longitudinal barriers (hydro)
Natural bank stabilisation (hydro)
Elimination of riverbank protection (hydro)
Lake restoration (hydro)
Restoration of natural infiltration to groundwater (hydro)
Re-naturalisation of polder areas (hydro)
Nutrient recovery from streams
Other hydro-morphological measure
Measures (NSWRM)
Pannonian
Boreal
Continental
Share (%)
Regularly (6, 7)
Moderately (3, 4, 5)
Rarely (1, 2)
Never
I don't know
No answer
Scale (1 (rare) - 7 (regular))


Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Basins and ponds (hydro)
Wetland restoration and management (hydro)
Floodplain restoration and management (hydro)
Re-meandering (hydro)
Stream bed re-naturalization (hydro)
Restoration and reconnection of seasonal streams (hydro)
Reconnection of oxbow lakes and similar features (hydro)
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Removal of dams and other longitudinal barriers (hydro)
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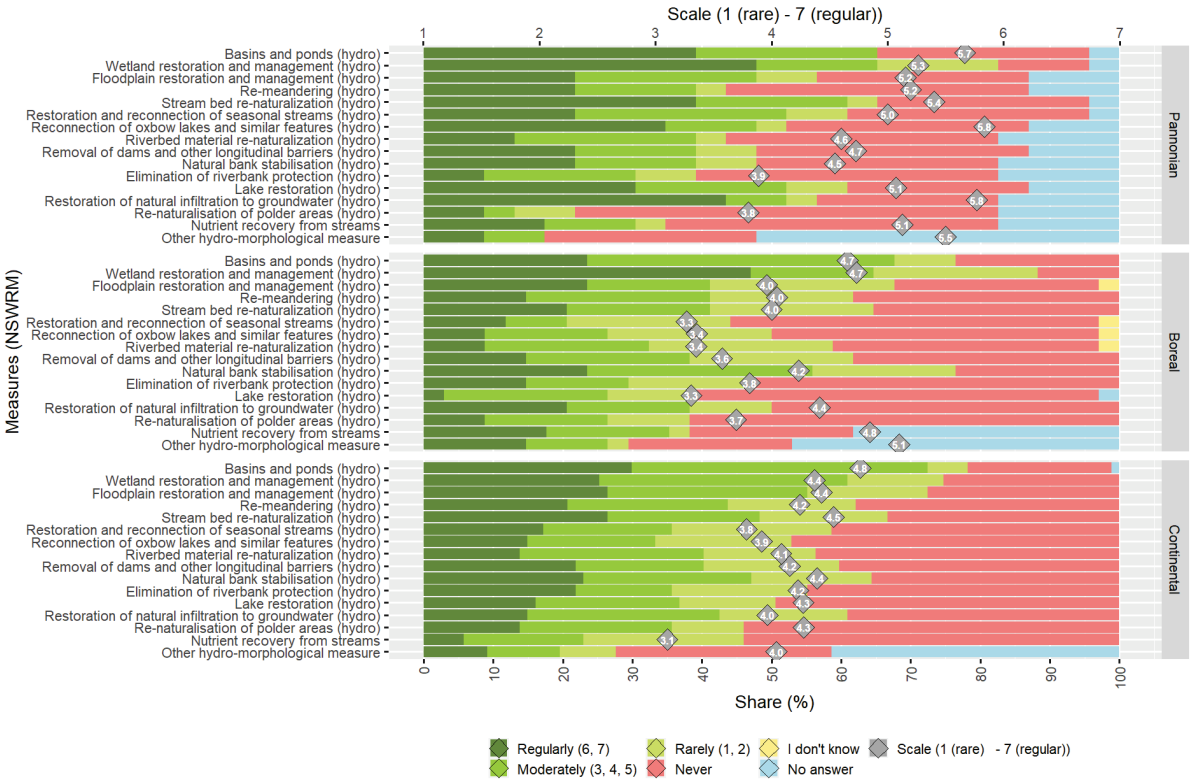
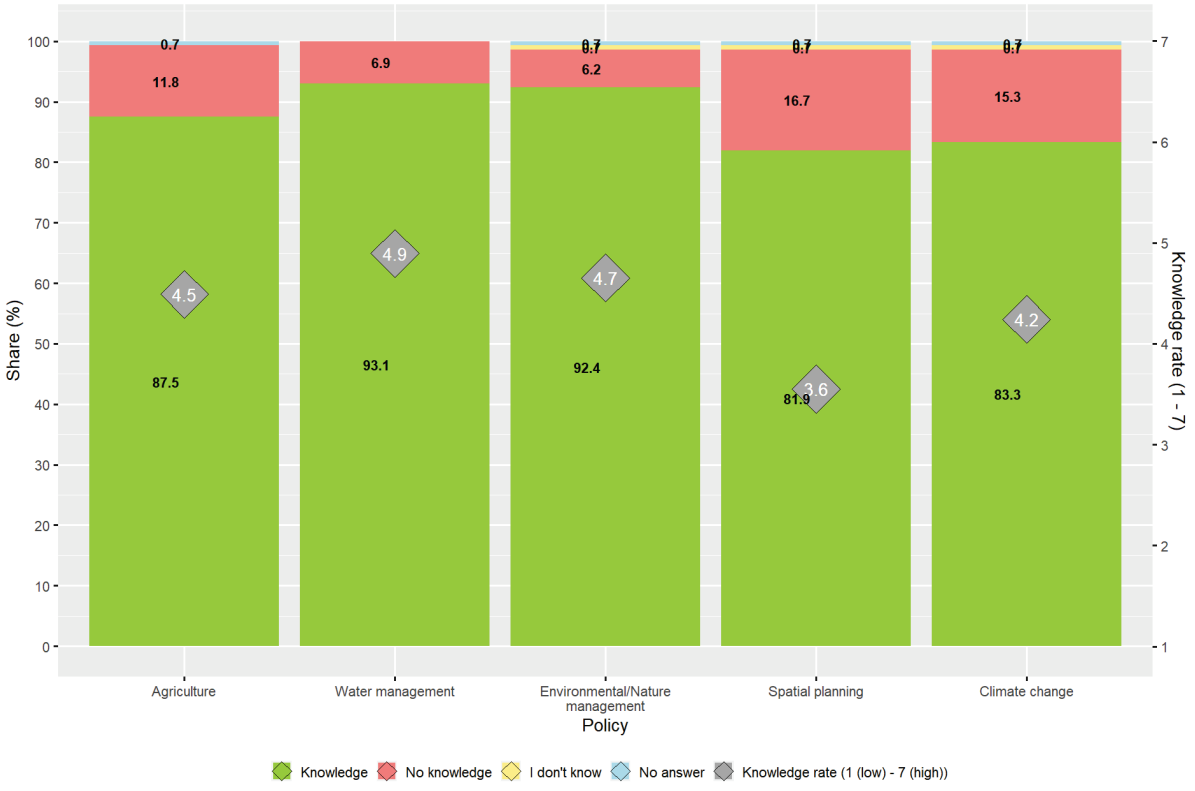
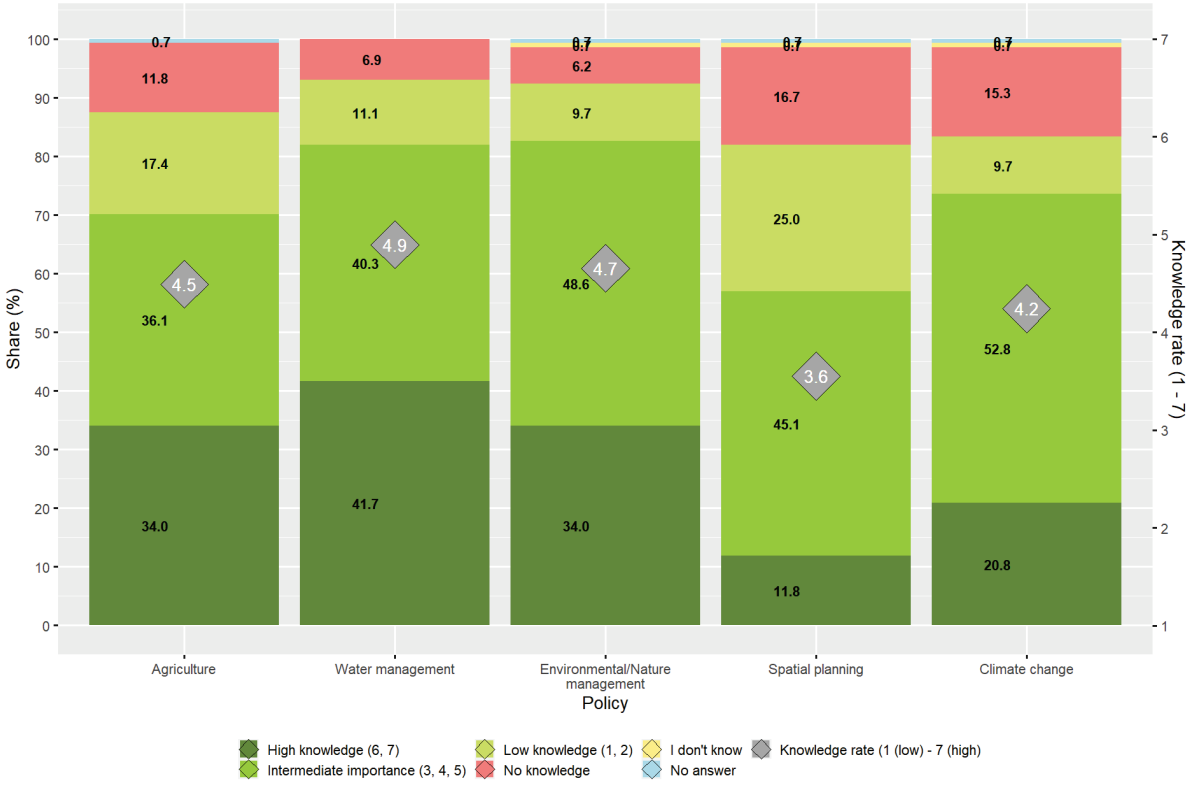
Elimination of riverbank protection (hydro)
Lake restoration (hydro)
Restoration of natural infiltration to groundwater (hydro)
Re-naturalisation of polder areas (hydro)
Nutrient recovery from streams
Other hydro-morphological measure
Pannonian
Boreal
Continental
Share (%)
Responders dealt with the measure
Responders not dealt with measure
I don't know
No answer
Scale (1 (rare) - 7 (regular))

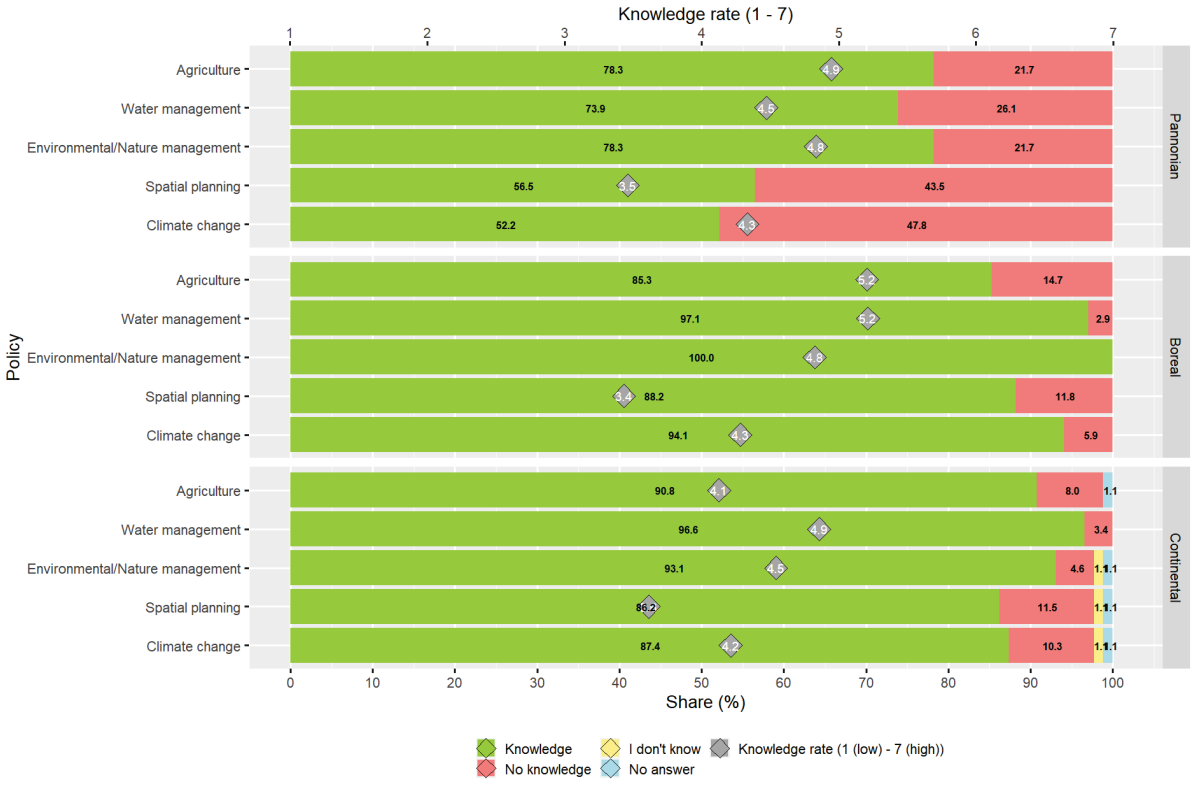

Scale (1 (rare) - 7 (regular))
Measures (NSWRM)
Basins and ponds (hydro)
Wetland restoration and management (hydro)
Floodplain restoration and management (hydro)
Re-meandering (hydro)
Stream bed re-naturalization (hydro)
Restoration and reconnection of seasonal streams (hydro)
Reconnection of oxbow lakes and similar features (hydro)
Riverbed material re-naturalization (hydro)
Removal of dams and other longitudinal barriers (hydro)
Natural bank stabilisation (hydro)
Elimination of riverbank protection (hydro)
Lake restoration (hydro)
Restoration of natural infiltration to groundwater (hydro)
Re-naturalisation of polder areas (hydro)
Nutrient recovery from streams
Other hydro-morphological measure
Pannonian
Boreal
Continental
Share (%)
Regularly (6, 7)
Moderately (3, 4, 5)
Rarely (1, 2)
Never
I don't know
No answer
Scale (1 (rare) - 7 (regular))

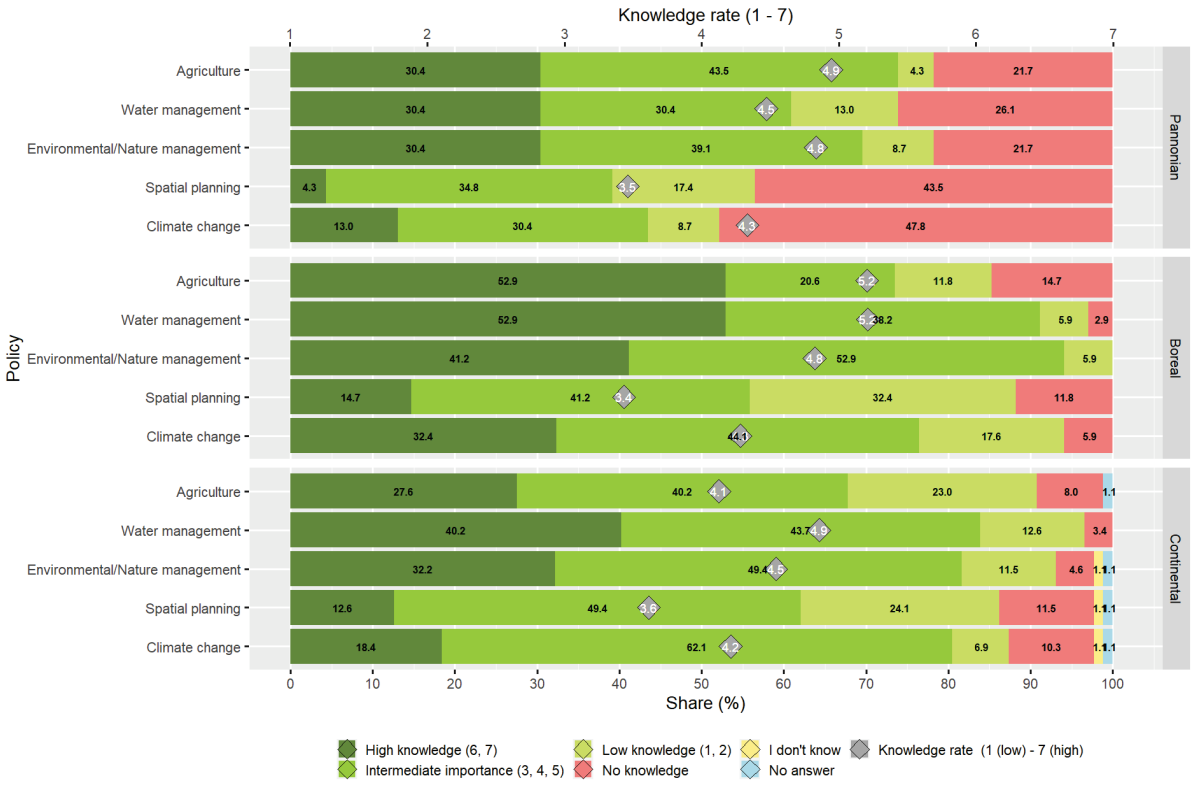
4. Select your central field of expertise and rate the level of knowledge on policies (legislation/regulation/strategies/programmes) for all presented fields of expertise (rate 1-7)

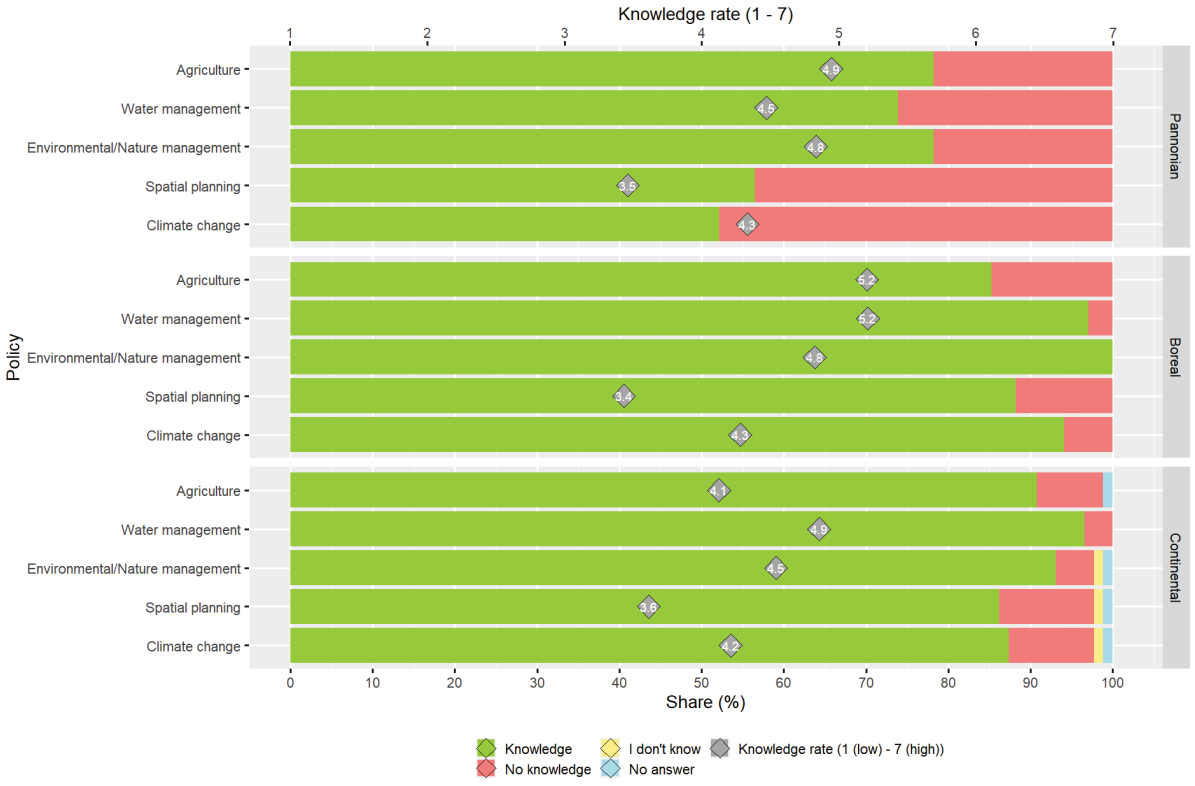
	No	Yes – rate							Additional comments (more precise expertise)
Agriculture	0	1	2	3	4	5	6	7	
Water management	0	1	2	3	4	5	6	7	
Environmental/Nature management	0	1	2	3	4	5	6	7	
Spatial planning	0	1	2	3	4	5	6	7	
Climate change	0	1	2	3	4	5	6	7	
	no knowledge	low		intermediate			High		

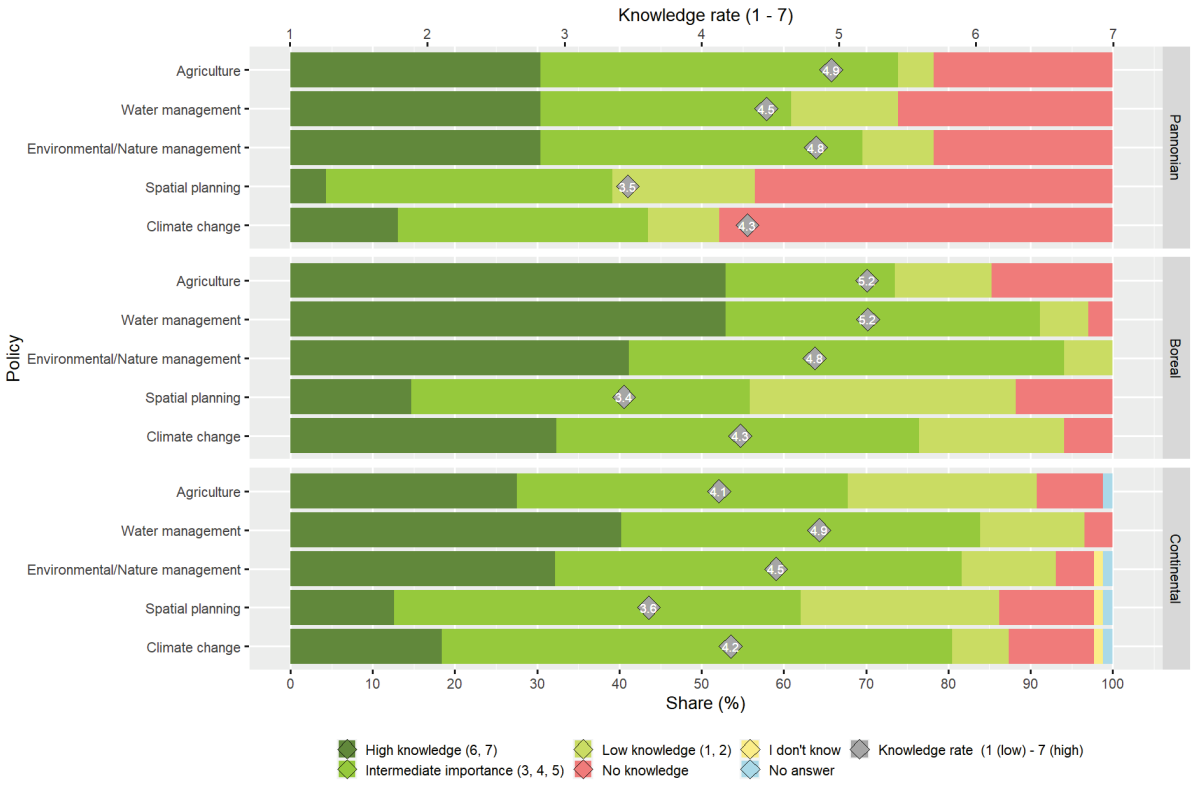



Share (%)
Knowledge rate (1 - 7)
Policy
Agriculture
Water management
Environmental/Nature management
Spatial planning
Climate change
0.7
11.8
17.4
4.5
36.1
34.0
6.9
11.1
4.9
40.3
41.7
0.7
6.2
9.7
4.7
48.6
34.0
0.7
16.7
25.0
3.6
45.1
11.8
0.7
15.3
9.7
4.2
52.8
20.8
High knowledge (6, 7)
Intermediate importance (3, 4, 5)
Low knowledge (1, 2)
No knowledge
I don't know
No answer
Knowledge rate (1 (low) - 7 (high)


Knowledge rate (1 - 7)
Policy
Share (%)
Pannonian
Boreal
Continental
Agriculture
Water management
Environmental/Nature management
Spatial planning
Climate change
78.3
21.7
73.9
26.1
78.3
21.7
56.5
43.5
52.2
47.8
85.3
14.7
97.1
2.9
100.0
88.2
11.8
94.1
5.9
90.8
8.0
96.6
3.4
93.1
4.6
86.2
11.5
87.4
10.3
Knowledge
No knowledge
I don't know
No answer
Knowledge rate (1 (low) - 7 (high))


Knowledge rate (1 - 7)
Policy
Agriculture
Water management
Environmental/Nature management
Spatial planning
Climate change
Pannonian
Boreal
Continental
Share (%)
High knowledge (6, 7)
Intermediate importance (3, 4, 5)
Low knowledge (1, 2)
No knowledge
I don't know
No answer
Knowledge rate (1 (low) - 7 (high)


Knowledge rate (1 - 7)
Policy
Agriculture
Water management
Environmental/Nature management
Spatial planning
Climate change
Pannonian
Boreal
Continental
Share (%)
Knowledge
No knowledge
I don't know
No answer
Knowledge rate (1 (low) - 7 (high))


Knowledge rate (1 - 7)
1
2
3
4
5
6
7
Agriculture
Water management
Environmental/Nature management
Spatial planning
Climate change
Pannonian
Boreal
Continental
Policy
4.9
4.5
4.8
3.5
4.3
5.2
5.2
4.8
3.4
4.6
4.1
4.9
4.5
3.6
4.2
0
10
20
30
40
50
60
70
80
90
100
Share (%)
High knowledge (6, 7)
Intermediate importance (3, 4, 5)
Low knowledge (1, 2)
No knowledge
I don't know
No answer
Knowledge rate (1 (low) - 7 (high)

5. Name one document (act, regulation, decree, strategy, programme) that has, by your knowledge, the most significant impact on NSWRM (agriculture or hydro-physical) implementation in your CS/Region/State.

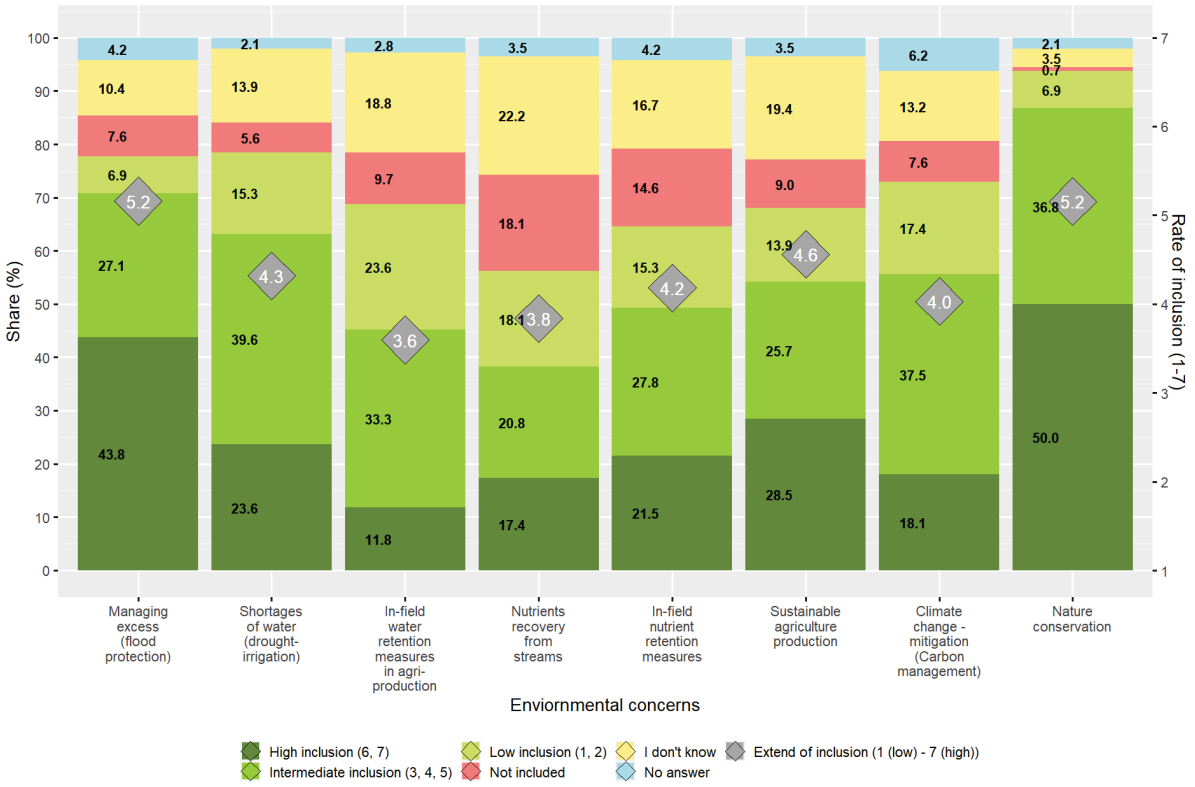
Name document (title):	*National language*			*English translation*			
Level of governance:	National-1	Regional-2	Local3-	Other (describe):			
Sector:	Agriculture 1	water management2	environment/nature3	spatial planning4	other (describe):5		
Type of impact/promotion of measure:	legal obligation - no subsidy	legal obligation + economic subsidy	voluntary + economic subsidy	voluntary - no subsidy	Other (describe):		
The magnitude of the impact on end-users (willingness to change)							
Rate	1	2	3	4	5	6	7
	low		intermediate			high	
Explain the impact (three sentences max):	*Text:*						

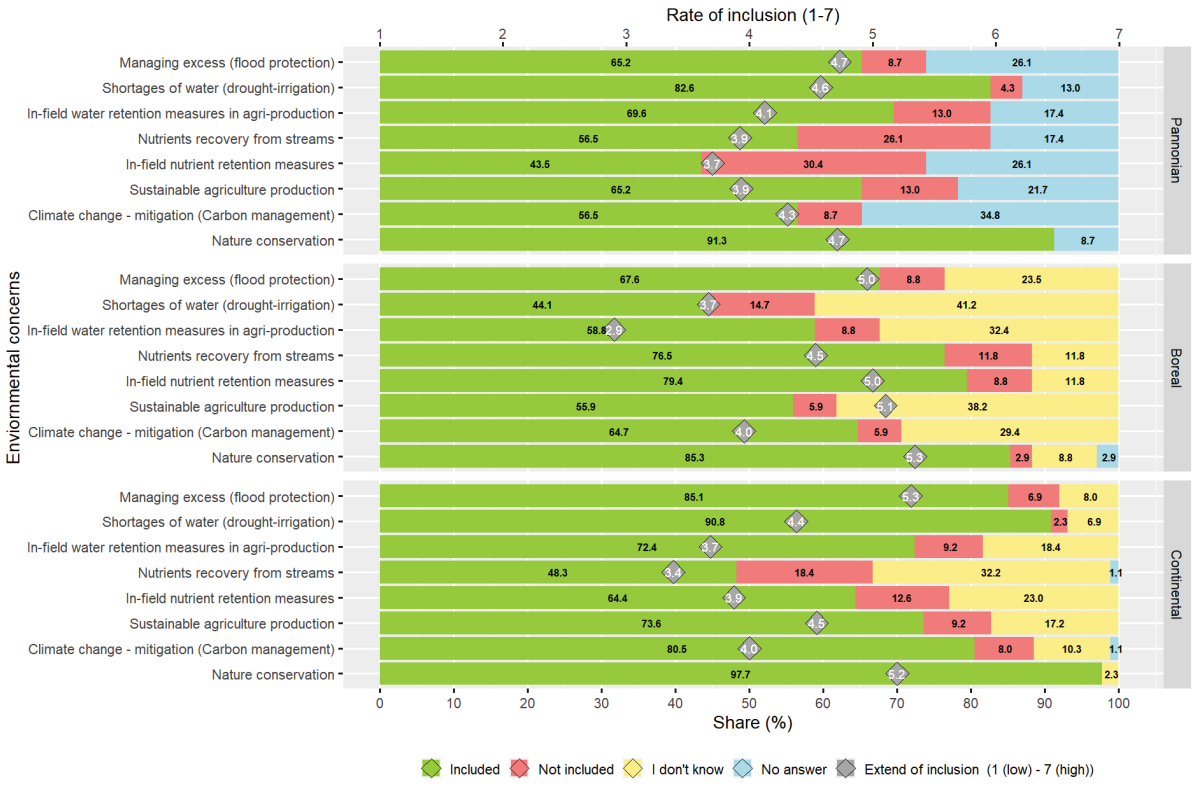
Only tables in the Report D6.2.

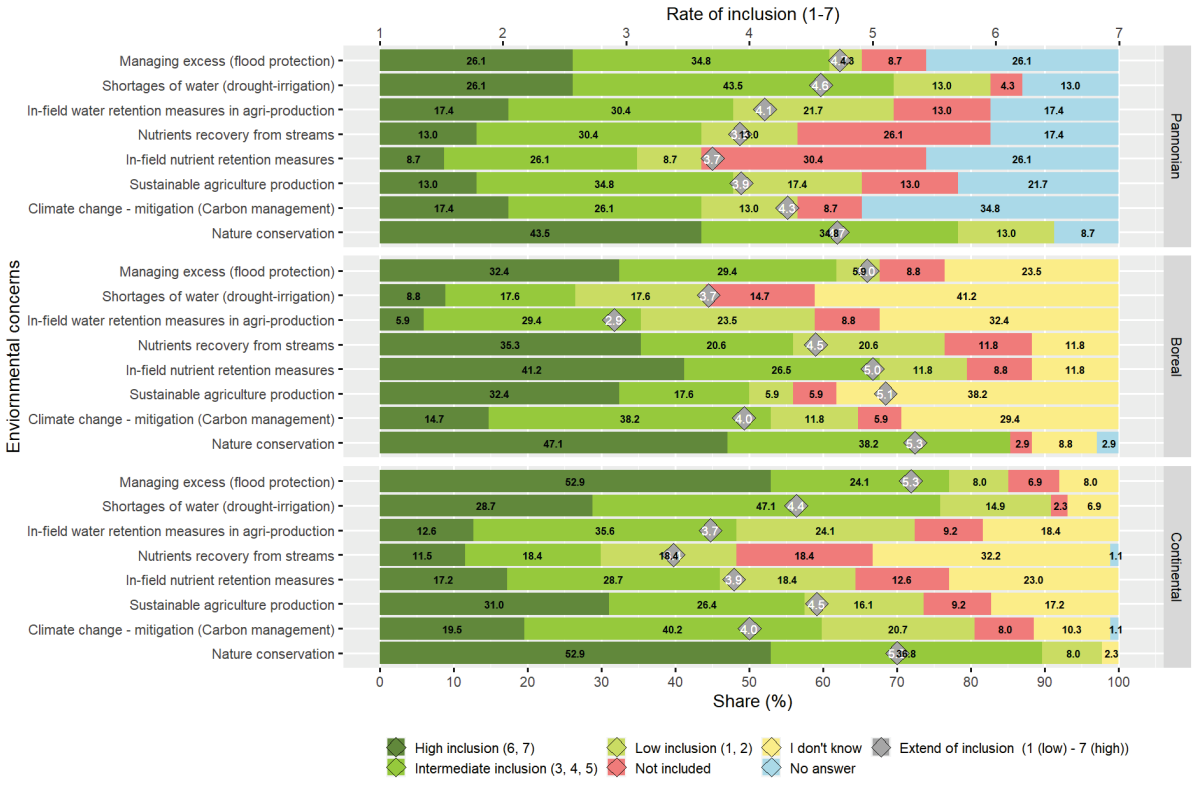
6. Are, by your knowledge, listed environmental concerns included in legislation from your field of expertise and to what extent? Assess the degree of incorporation of these topics into legislation by rating 1-7. Are included directly mentioned in the text (direct effect) or indirectly (side effect of some other policy purpose)?

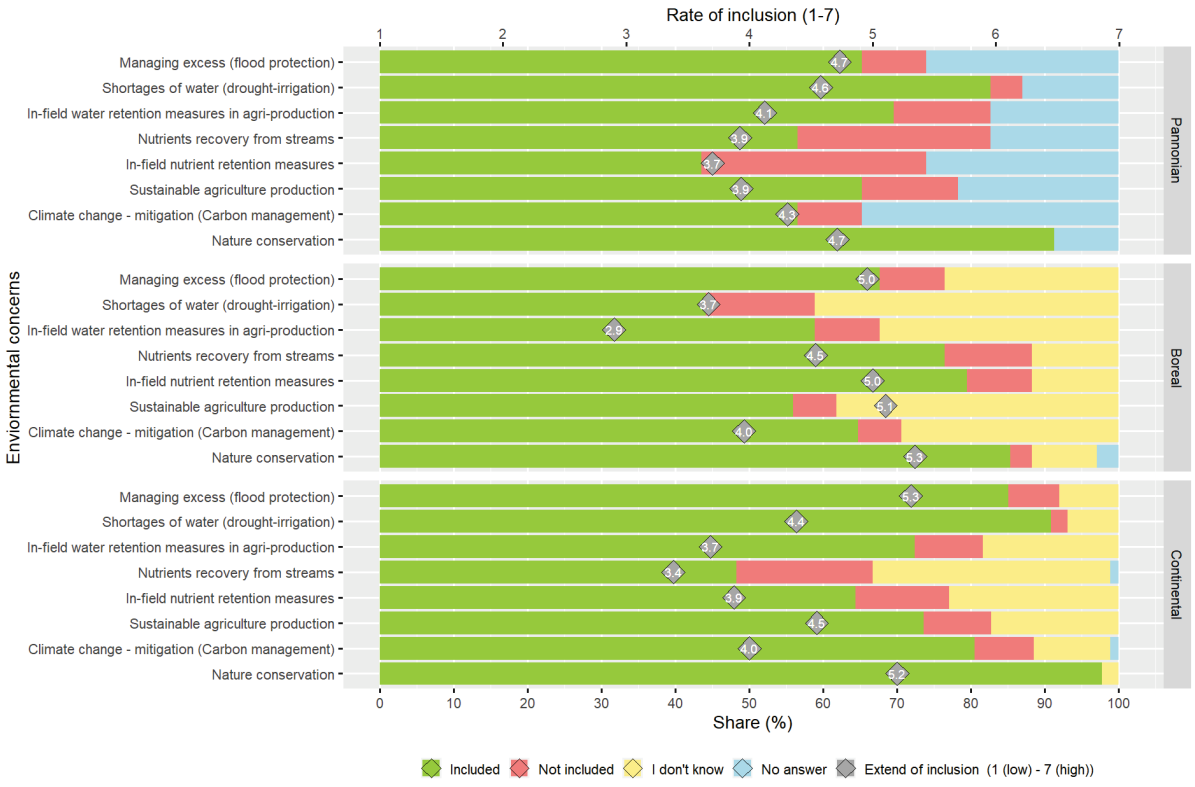
	I do not know (x)	No	Yes - rate							Directly mentioned (X)	Indirect as a side effect of other policy (x)
water quantity - managing excess (flood protection)		0	1	2	3	4	5	6	7		
water quantity - shortages of water (drought-irrigation)		0	1	2	3	4	5	6	7		
water quantity – in-field water retention measures in agri-production		0	1	2	3	4	5	6	7		
water quality - nutrients recovery from streams		0	1	2	3	4	5	6	7		
water quality – in-field nutrient retention measures		0	1	2	3	4	5	6	7		
sustainable agriculture production		0	1	2	3	4	5	6	7		
climate change – mitigation (Carbon management)		0	1	2	3	4	5	6	7		
nature conservation		0	1	2	3	4	5	6	7		
	I don't know (x)	not included	low		intermediate			high		*Direct (x)*	*Indirect (x)*

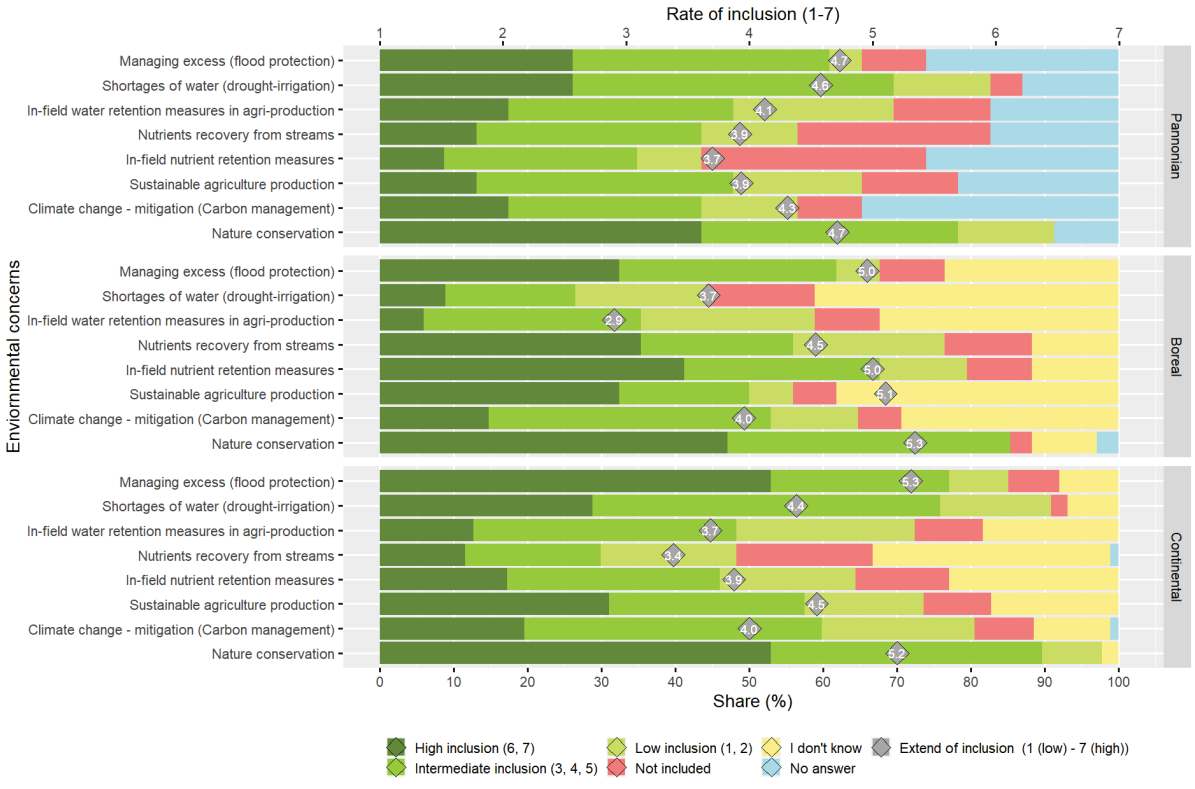

Share (%)
Rate of inclusion (1-7)
Managing excess (flood protection)
Shortages of water (drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Sustainable agriculture production
Climate change - mitigation (Carbon management)
Nature conservation
Enviornmental concerns
Included
Not included
I don't know
No answer
Extend of inclusion (1 (low) - 7 (high))


Share (%)
Rate of inclusion (1-7)
Managing excess (flood protection)
Shortages of water (drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Sustainable agriculture production
Climate change - mitigation (Carbon management)
Nature conservation
Enviornmental concerns
High inclusion (6, 7)
Intermediate inclusion (3, 4, 5)
Low inclusion (1, 2)
Not included
I don't know
No answer
Extend of inclusion (1 (low) - 7 (high))


Rate of inclusion (1-7)
Enviornmental concerns
Managing excess (flood protection)
Shortages of water (drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Sustainable agriculture production
Climate change - mitigation (Carbon management)
Nature conservation
Pannonian
Boreal
Continental
Share (%)
Included
Not included
I don't know
No answer
Extend of inclusion (1 (low) - 7 (high))

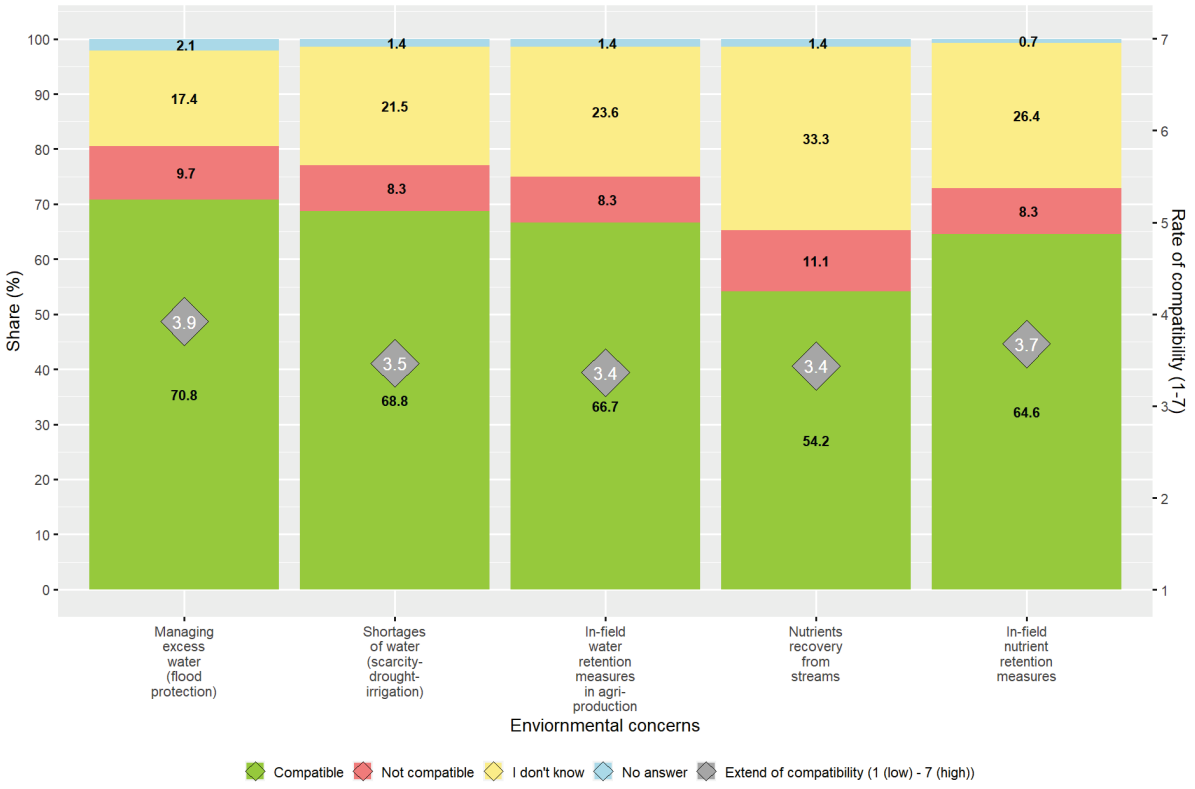

Rate of inclusion (1-7)
Enviornmental concerns
Managing excess (flood protection)
Shortages of water (drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Sustainable agriculture production
Climate change - mitigation (Carbon management)
Nature conservation
Pannonian
Boreal
Continental
Share (%)
High inclusion (6, 7)
Intermediate inclusion (3, 4, 5)
Low inclusion (1, 2)
Not included
I don't know
No answer
Extend of inclusion (1 (low) - 7 (high))

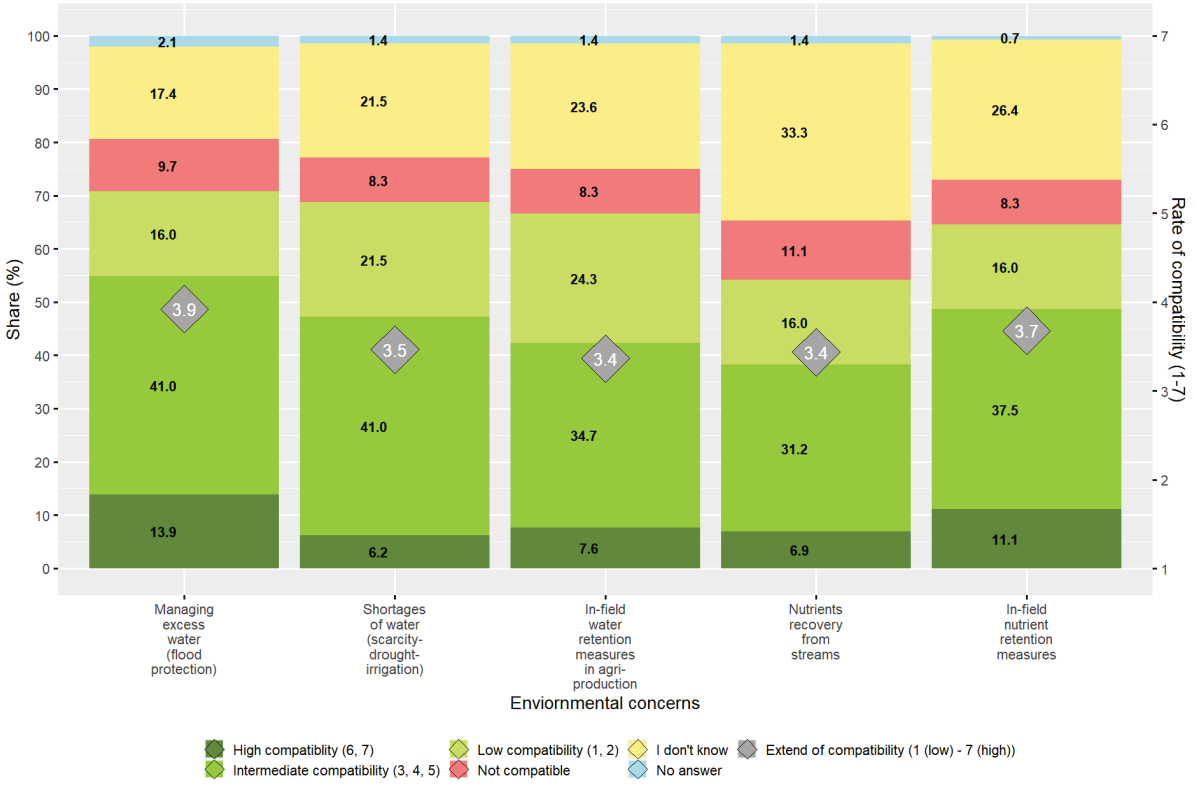

Rate of inclusion (1-7)
Managing excess (flood protection)
Shortages of water (drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Sustainable agriculture production
Climate change - mitigation (Carbon management)
Nature conservation
Pannonian
Boreal
Continental
Enviornmental concerns
Share (%)
Included
Not included
I don't know
No answer
Extend of inclusion (1 (low) - 7 (high))

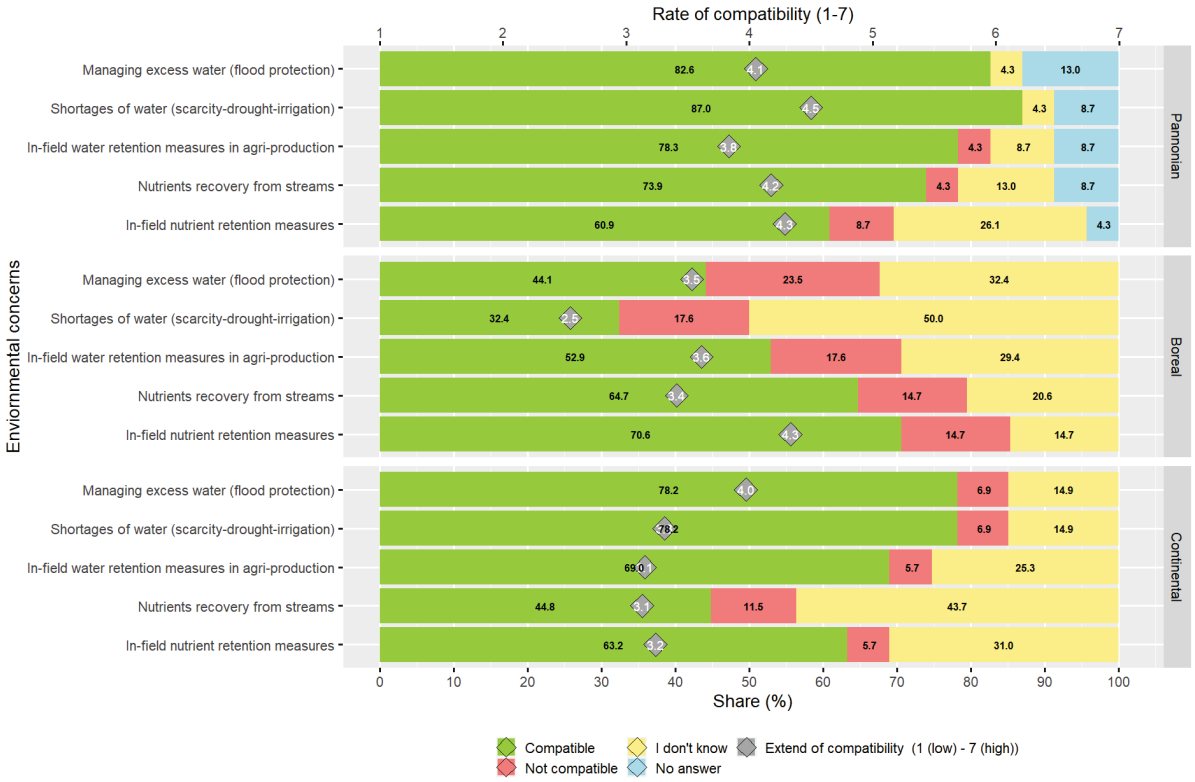

Rate of inclusion (1-7)
Managing excess (flood protection)
Shortages of water (drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Sustainable agriculture production
Climate change - mitigation (Carbon management)
Nature conservation
Pannonian
Boreal
Continental
Enviornmental concerns
Share (%)
High inclusion (6, 7)
Intermediate inclusion (3, 4, 5)
Low inclusion (1, 2)
Not included
I don't know
No answer
Extend of inclusion (1 (low) - 7 (high))

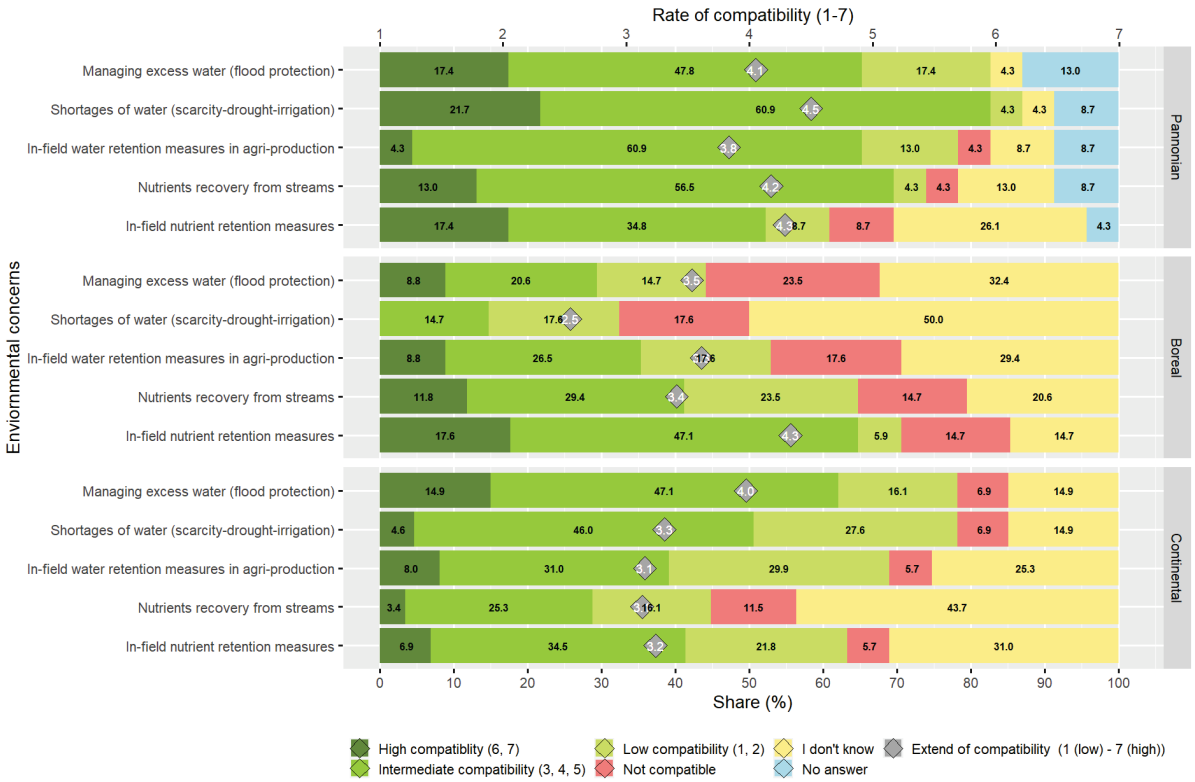
7. Are national policies on water, agriculture, spatial planning, nature conservation and climate change compatible in terms of water quantity and quality? Rate the compatibility (1-7).

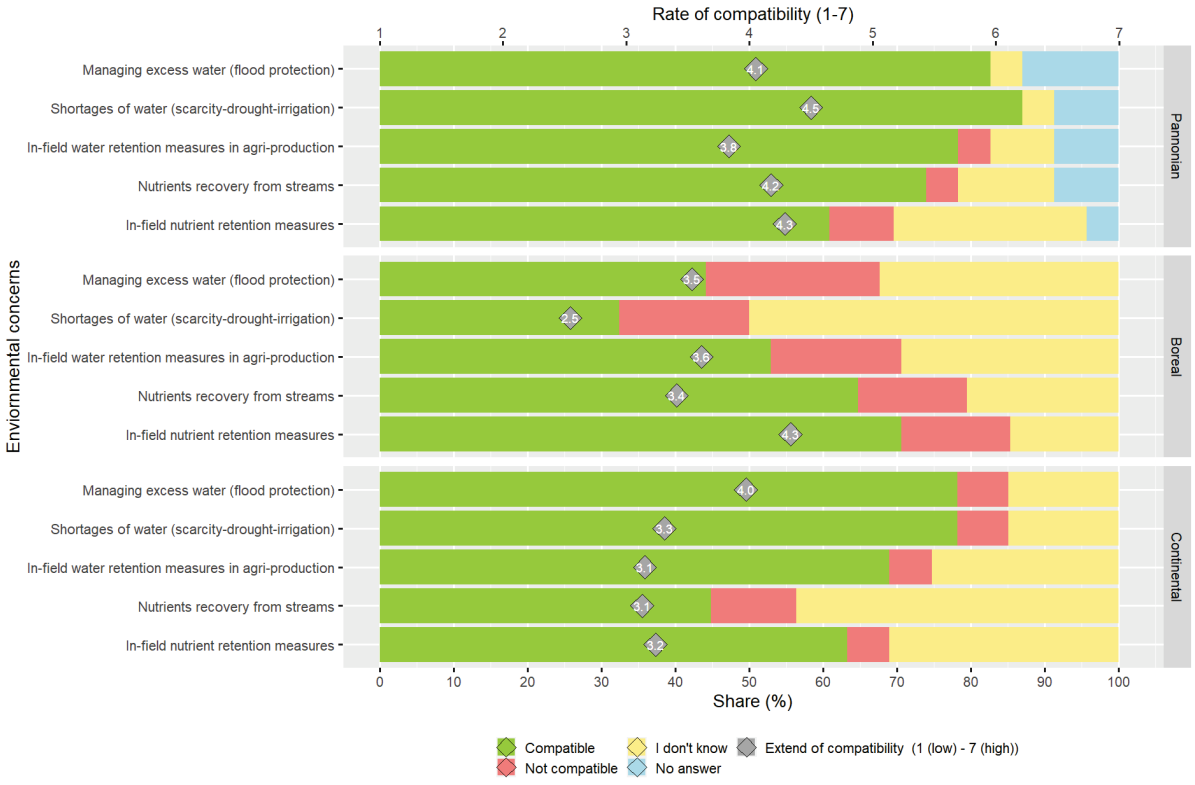
Policy on	*I do not know*	No	Yes						
water quantity - excess water management - flood		0	1	2	3	4	5	6	7
water quantity - scarcity - shortage - drought		0	1	2	3	4	5	6	7
water quantity – in-field water retention measures		0	1	2	3	4	5	6	7
water quality - nutrients recovery from streams		0	1	2	3	4	5	6	7
water quality – in-field nutrient retention measures		0	1	2	3	4	5	6	7
	I do not know (x)	not included	low compatibility of water, agriculture, spatial planning and climate change policy		intermediate			high compatibility of water, agriculture, spatial planning and climate change policy	
General comment on compatibility issue from your expert perspective:	*Text:*								

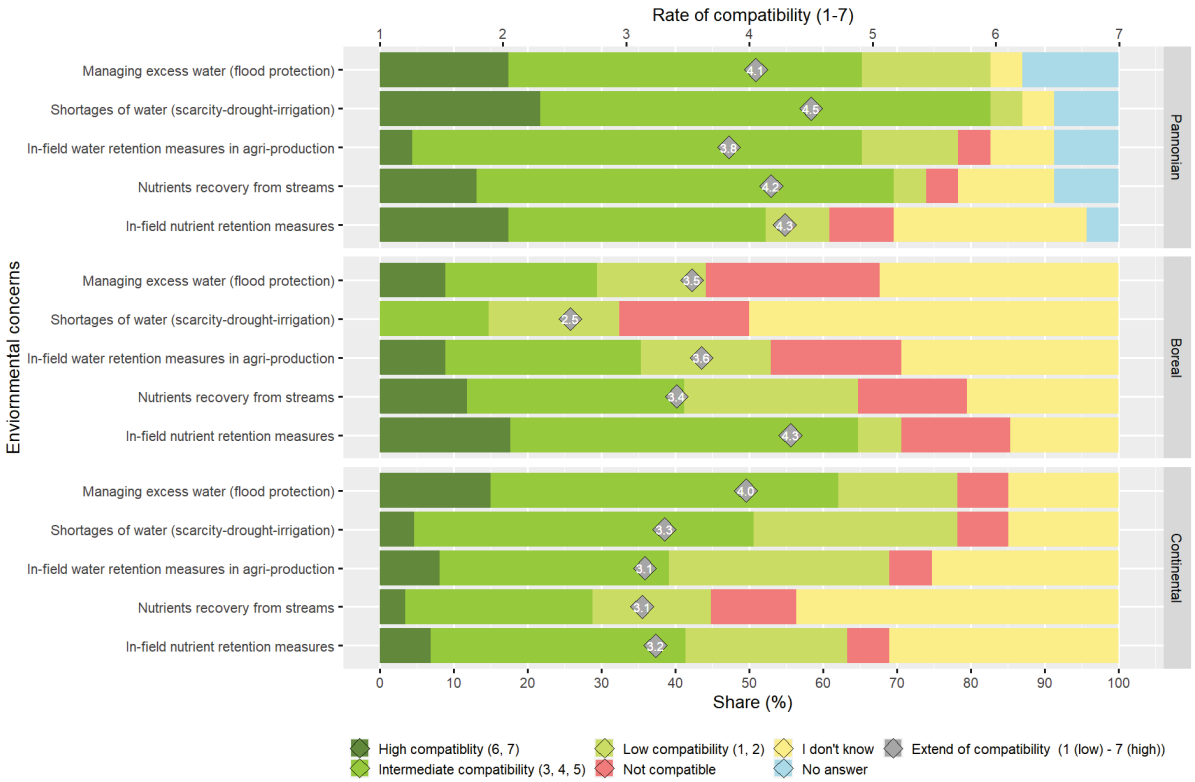



Share (%)
Rate of compatibility (1-7)
Managing excess water (flood protection)
Shortages of water (scarcity-drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Enviornmental concerns
2.1
17.4
9.7
16.0
3.9
41.0
13.9
1.4
21.5
8.3
21.5
3.5
41.0
6.2
1.4
23.6
8.3
24.3
3.4
34.7
7.6
1.4
33.3
11.1
16.0
3.4
31.2
6.9
0.7
26.4
8.3
16.0
3.7
37.5
11.1
High compatiblity (6, 7)
Intermediate compatibility (3, 4, 5)
Low compatibility (1, 2)
Not compatible
I don't know
No answer
Extend of compatibility (1 (low) - 7 (high))


Rate of compatibility (1-7)
Share (%)
Enviornmental concerns
Pannonian
Boreal
Continental
Managing excess water (flood protection)
Shortages of water (scarcity-drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
82.6
4.3
13.0
87.0
4.3
8.7
78.3
4.3
8.7
8.7
73.9
4.3
13.0
8.7
60.9
8.7
26.1
4.3
44.1
23.5
32.4
32.4
17.6
50.0
52.9
17.6
29.4
64.7
14.7
20.6
70.6
14.7
14.7
78.2
6.9
14.9
78.2
6.9
14.9
69.0
5.7
25.3
44.8
11.5
43.7
63.2
5.7
31.0
Compatible
Not compatible
I don't know
No answer
Extend of compatibility (1 (low) - 7 (high))


Rate of compatibility (1-7)
Managing excess water (flood protection)
Shortages of water (scarcity-drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Enviornmental concerns
Pannonian
Boreal
Continental
Share (%)
High compatiblity (6, 7)
Intermediate compatibility (3, 4, 5)
Low compatibility (1, 2)
Not compatible
I don't know
No answer
Extend of compatibility (1 (low) - 7 (high))


Rate of compatibility (1-7)
Managing excess water (flood protection)
Shortages of water (scarcity-drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
Enviornmental concerns
Pannonian
Boreal
Continental
Share (%)
Compatible
Not compatible
I don't know
No answer
Extend of compatibility (1 (low) - 7 (high))


Rate of compatibility (1-7)
1
2
3
4
5
6
7
Managing excess water (flood protection)
Shortages of water (scarcity-drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
4.1
4.5
3.8
4.2
4.3
Pannonian
Managing excess water (flood protection)
Shortages of water (scarcity-drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
3.5
2.5
3.6
3.4
4.3
Boreal
Managing excess water (flood protection)
Shortages of water (scarcity-drought-irrigation)
In-field water retention measures in agri-production
Nutrients recovery from streams
In-field nutrient retention measures
4.0
3.3
3.1
3.1
3.2
Continental
Enviornmental concerns
0
10
20
30
40
50
60
70
80
90
100
Share (%)
High compatiblity (6, 7)
Intermediate compatibility (3, 4, 5)
Low compatibility (1, 2)
Not compatible
I don't know
No answer
Extend of compatibility (1 (low) - 7 (high))

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8. Which are the main general differences/issues of compatibility between the policies you observe (agriculture-water-environment-nature-spatial planning-climate)?

State 1-3 compatibility issues.

	Comment compatibility issues with examples (comment on those you are familiar with/expert in).
Incompatibilities	*Text:*

Only tables in the Report D6.2.

9. How can/could we enhance the synergies between policies in terms of water quantity, water quality, nature conservation and climate changes? State 1-3 proposals.

	Comment possible synergies with examples (comment on those you are familiar with)
Synergies Synchronisations	*Text:*

Only tables in the Report D6.2.

10. Why is some legislation at National and some at the Regional/Local-scale in your country? Only applicable if subdivision exists (Region, Bundeslander, Canton, Department). Mark your system (x).

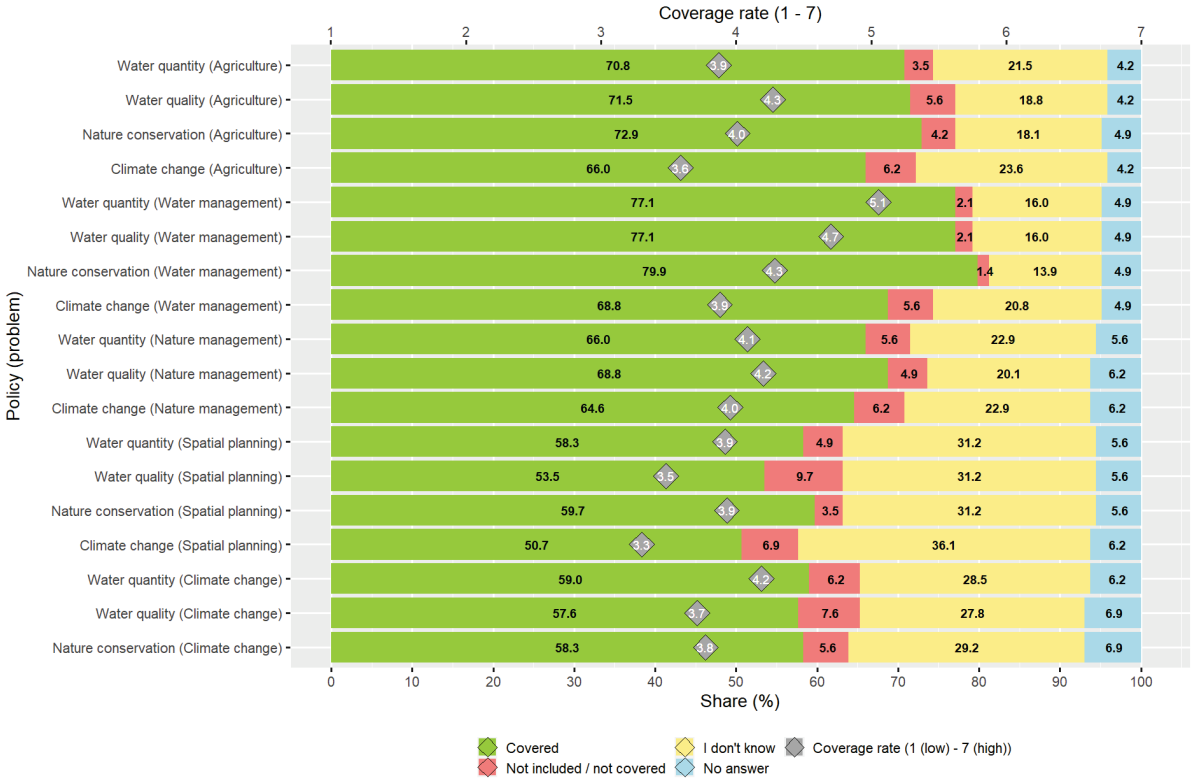
water quantity	Select/Circle:	(a) only national	(b) national/regional	(c) nat/reg/local	(d) other:_____
	Comment:	Give a practical example of these differences (3-5 sentences)			
	text				
water quality	Select/Circle:	(a) only national	(b) national/regional	(c) nat/reg/local	(d) other:_____
	Comment:	Give a practical example of these differences (3-5 sentences)			
	text				
climate change	Select/Circle:	(a) only national	(b) national/regional	(c) nat/reg/local	(d) other:_____
	Comment:	Give a practical example of these differences (3-5 sentences)			
	text				

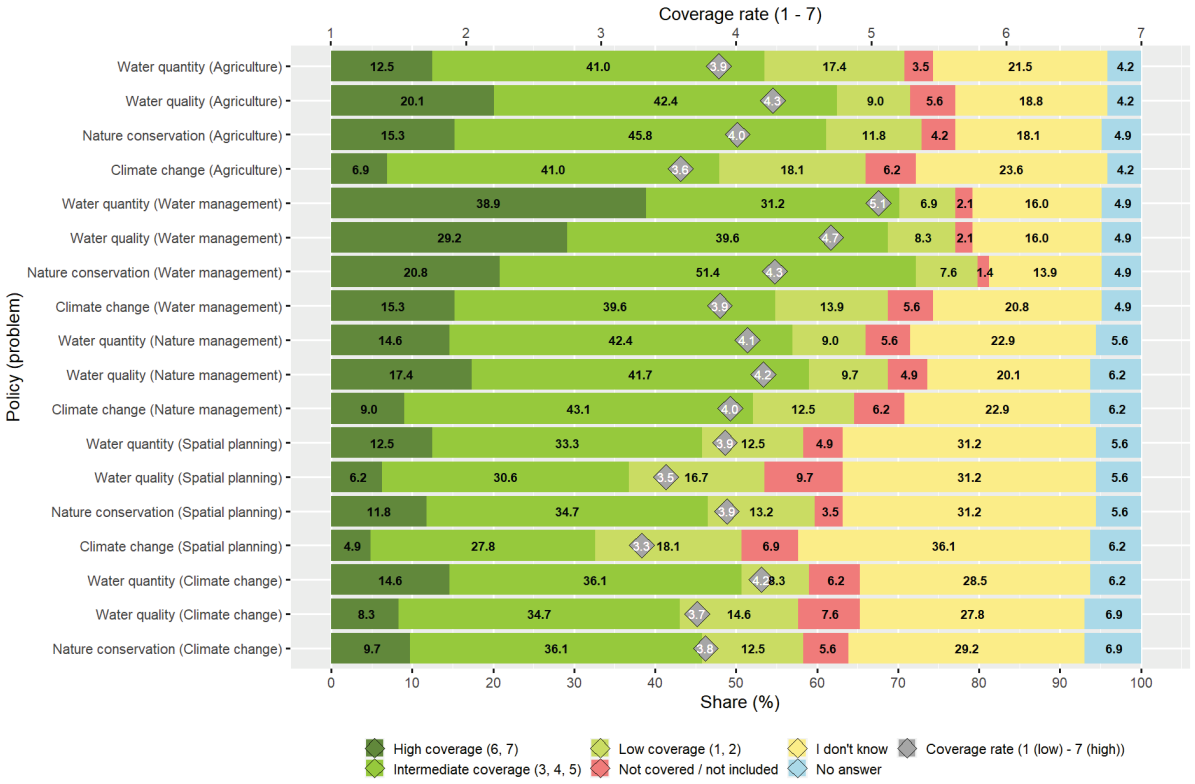
If option (b), (c), or (d), describe the system and reason for sub-national division in terms of water quantity, water quality, and climate change if known and if you are familiar with the expert field.

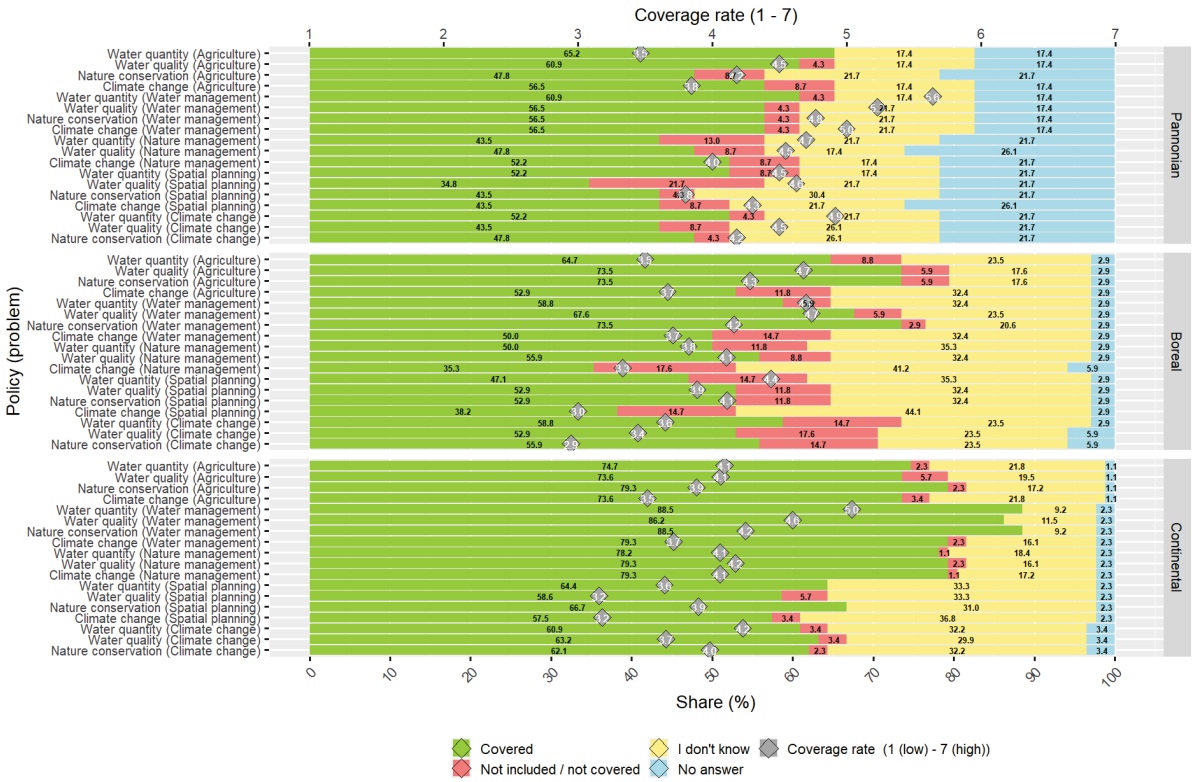
Only tables in the Report D6.2.

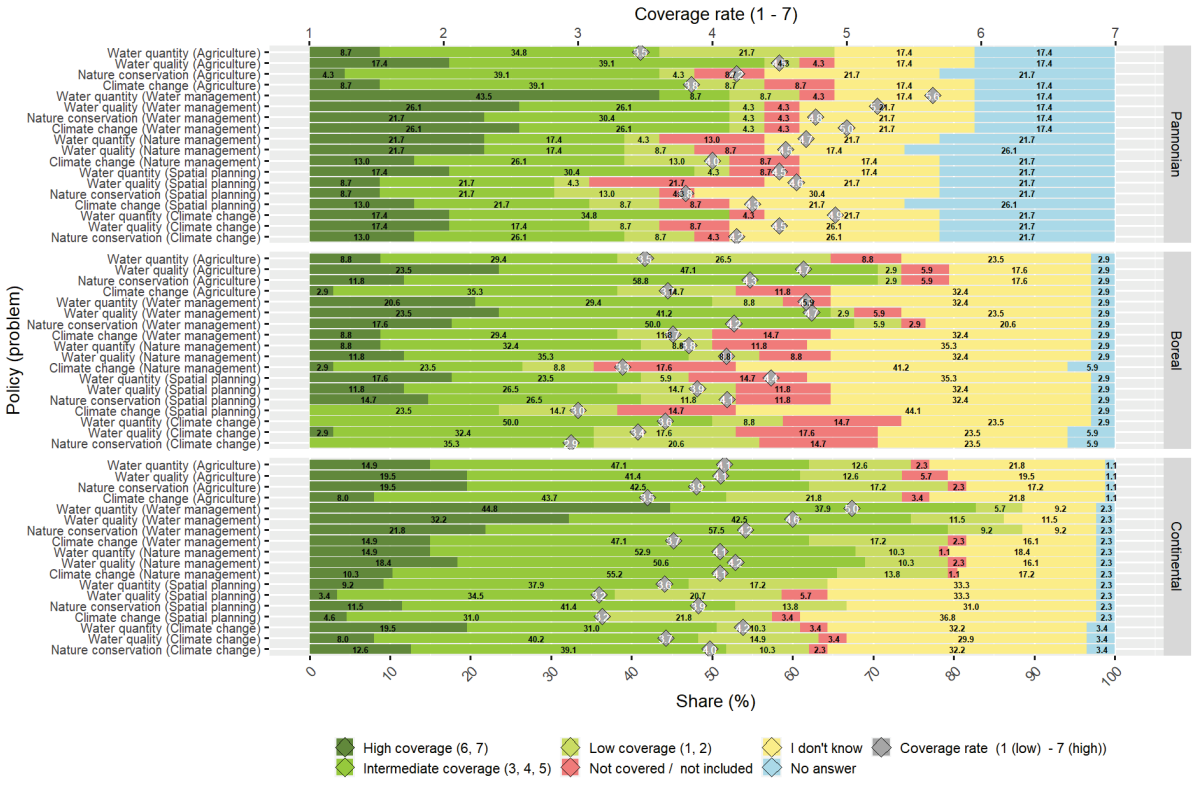
11. Does policies cover/address presented matters/problems related to water quantity, water quality, nature conservation and climate changes at the CSS/local level? Rate the coverage (1-7).

Answer: / **Policy**	*Problem*	*I do not know (x)*	No	Yes						
Agriculture	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Water management	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Nature management	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Spatial planning	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
	Climate change		0	1	2	3	4	5	6	7
Climate change	Water quantity		0	1	2	3	4	5	6	7
	Water quality		0	1	2	3	4	5	6	7
	Nature conservation		0	1	2	3	4	5	6	7
		I do not know (x)	not included	low coverage		intermediate			high coverage	

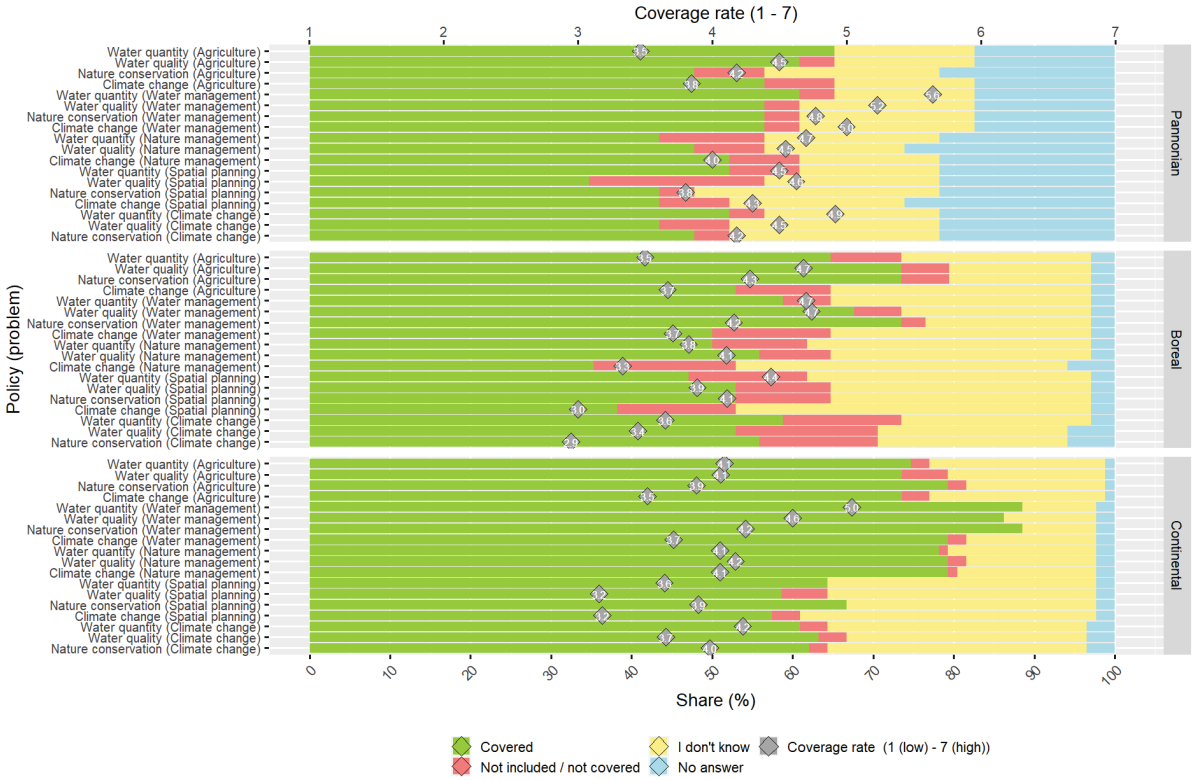

Coverage rate (1 - 7)
Policy (problem)
Water quantity (Agriculture)
Water quality (Agriculture)
Nature conservation (Agriculture)
Climate change (Agriculture)
Water quantity (Water management)
Water quality (Water management)
Nature conservation (Water management)
Climate change (Water management)
Water quantity (Nature management)
Water quality (Nature management)
Climate change (Nature management)
Water quantity (Spatial planning)
Water quality (Spatial planning)
Nature conservation (Spatial planning)
Climate change (Spatial planning)
Water quantity (Climate change)
Water quality (Climate change)
Nature conservation (Climate change)
Share (%)
Covered
Not included / not covered
I don't know
No answer
Coverage rate (1 (low) - 7 (high))

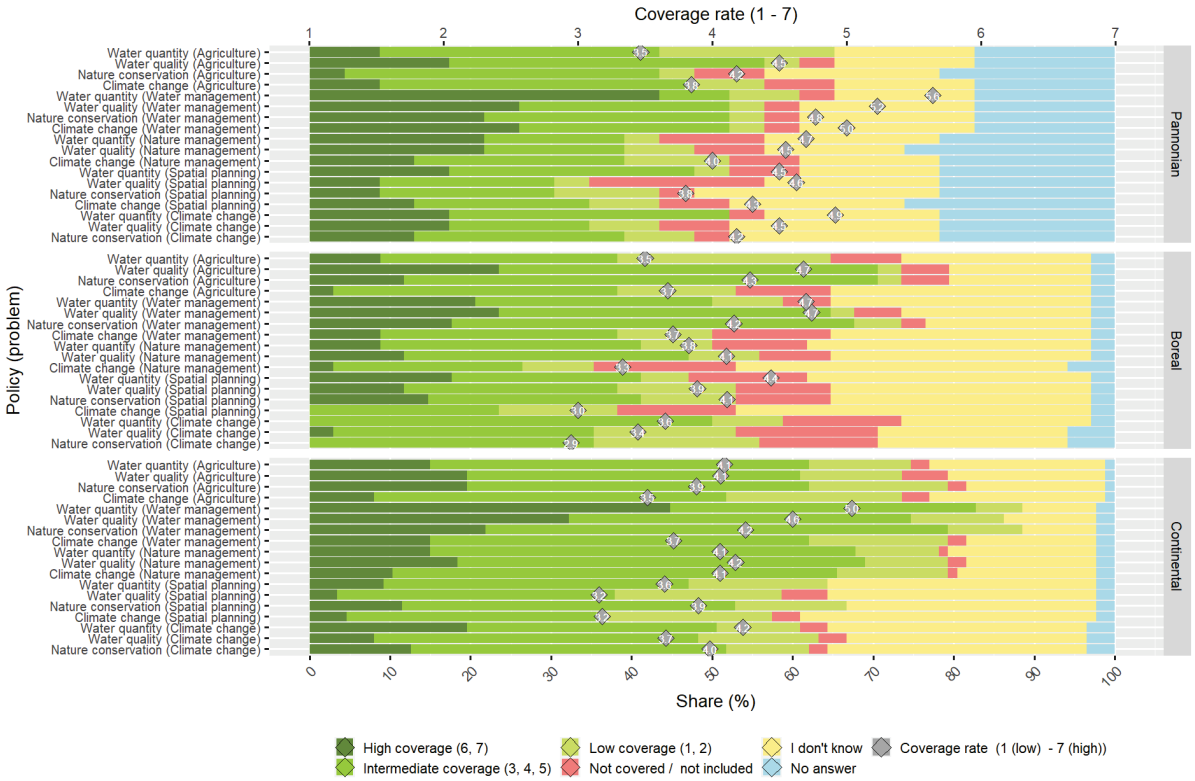

Coverage rate (1 - 7)
Policy (problem)
Water quantity (Agriculture)
Water quality (Agriculture)
Nature conservation (Agriculture)
Climate change (Agriculture)
Water quantity (Water management)
Water quality (Water management)
Nature conservation (Water management)
Climate change (Water management)
Water quantity (Nature management)
Water quality (Nature management)
Climate change (Nature management)
Water quantity (Spatial planning)
Water quality (Spatial planning)
Nature conservation (Spatial planning)
Climate change (Spatial planning)
Water quantity (Climate change)
Water quality (Climate change)
Nature conservation (Climate change)
Share (%)
High coverage (6, 7)
Intermediate coverage (3, 4, 5)
Low coverage (1, 2)
Not covered / not included
I don't know
No answer
Coverage rate (1 (low) - 7 (high))


Coverage rate (1 - 7)
Water quantity (Agriculture)
Water quality (Agriculture)
Nature conservation (Agriculture)
Climate change (Agriculture)
Water quantity (Water management)
Water quality (Water management)
Nature conservation (Water management)
Climate change (Water management)
Water quantity (Nature management)
Water quality (Nature management)
Climate change (Nature management)
Water quantity (Spatial planning)
Water quality (Spatial planning)
Nature conservation (Spatial planning)
Climate change (Spatial planning)
Water quantity (Climate change)
Water quality (Climate change)
Nature conservation (Climate change)
Pannonian
Boreal
Continental
Policy (problem)
Share (%)
Covered
Not included / not covered
I don't know
No answer
Coverage rate (1 (low) - 7 (high))


Coverage rate (1 - 7)
Water quantity (Agriculture)
Water quality (Agriculture)
Nature conservation (Agriculture)
Climate change (Agriculture)
Water quantity (Water management)
Water quality (Water management)
Nature conservation (Water management)
Climate change (Water management)
Water quantity (Nature management)
Water quality (Nature management)
Climate change (Nature management)
Water quantity (Spatial planning)
Water quality (Spatial planning)
Nature conservation (Spatial planning)
Climate change (Spatial planning)
Water quantity (Climate change)
Water quality (Climate change)
Nature conservation (Climate change)
Pannonian
Boreal
Continental
Policy (problem)
Share (%)
High coverage (6, 7)
Intermediate coverage (3, 4, 5)
Low coverage (1, 2)
Not covered / not included
I don't know
No answer
Coverage rate (1 (low) - 7 (high))

OPTAIN


Coverage rate (1 - 7)
Policy (problem)
Water quantity (Agriculture)
Water quality (Agriculture)
Nature conservation (Agriculture)
Climate change (Agriculture)
Water quantity (Water management)
Water quality (Water management)
Nature conservation (Water management)
Climate change (Water management)
Water quantity (Nature management)
Water quality (Nature management)
Climate change (Nature management)
Water quantity (Spatial planning)
Water quality (Spatial planning)
Nature conservation (Spatial planning)
Climate change (Spatial planning)
Water quantity (Climate change)
Water quality (Climate change)
Nature conservation (Climate change)
Pannonian
Boreal
Continental
Share (%)
Covered
Not included / not covered
I don't know
No answer
Coverage rate (1 (low) - 7 (high))


Coverage rate (1 - 7)
Policy (problem)
Water quantity (Agriculture)
Water quality (Agriculture)
Nature conservation (Agriculture)
Climate change (Agriculture)
Water quantity (Water management)
Water quality (Water management)
Nature conservation (Water management)
Climate change (Water management)
Water quantity (Nature management)
Water quality (Nature management)
Climate change (Nature management)
Water quantity (Spatial planning)
Water quality (Spatial planning)
Nature conservation (Spatial planning)
Climate change (Spatial planning)
Water quantity (Climate change)
Water quality (Climate change)
Nature conservation (Climate change)
Pannonian
Boreal
Continental
Share (%)
High coverage (6, 7)
Intermediate coverage (3, 4, 5)
Low coverage (1, 2)
Not covered / not included
I don't know
No answer
Coverage rate (1 (low) - 7 (high))

12. Do you observe in policies any gaps in the inclusion of relevant environmental concerns (water quantity, water quality, nature conservation and climate changes) that are present at the CSS/local level? Give at least one example.

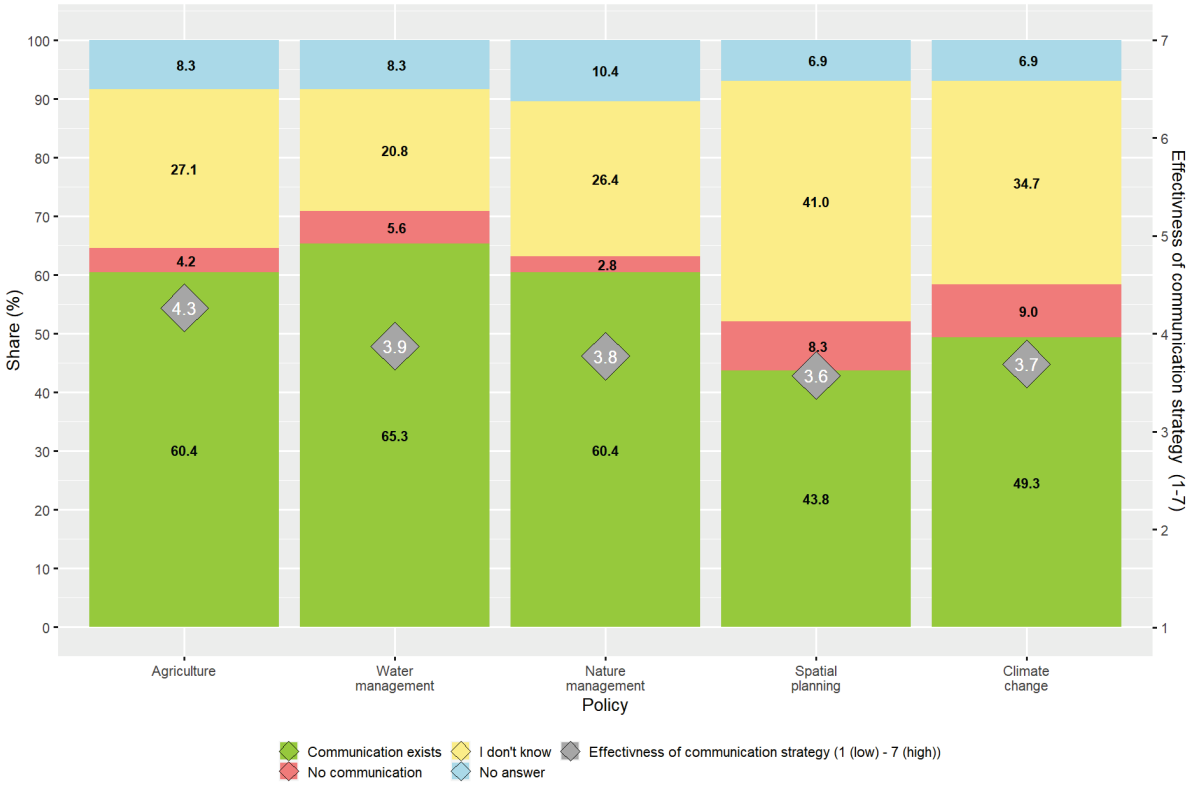
Answer:	I do not know (x)	No gaps (x)	Gaps (text)
Agriculture			Examples – text
Water management			Examples – text
Nature management			Examples – text
Spatial planning			Examples – text
Climate change			Examples - text

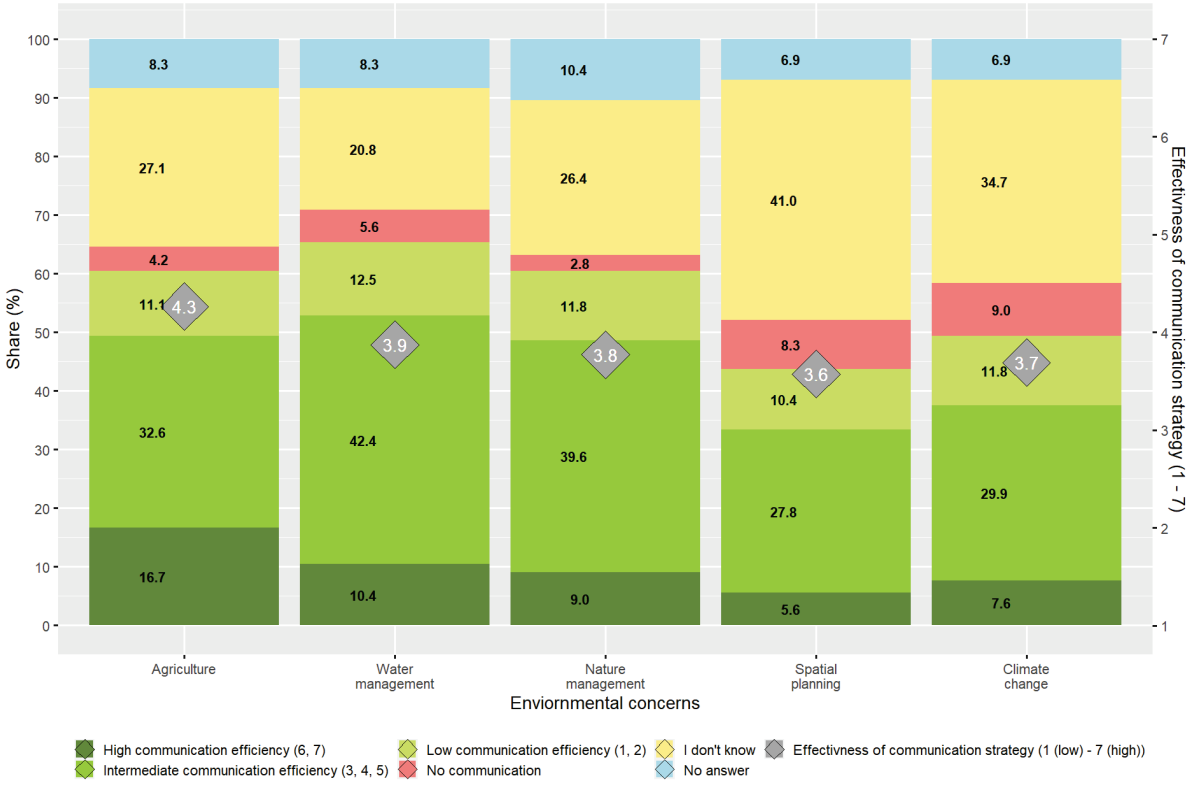
Only tables in the Report D6.2.

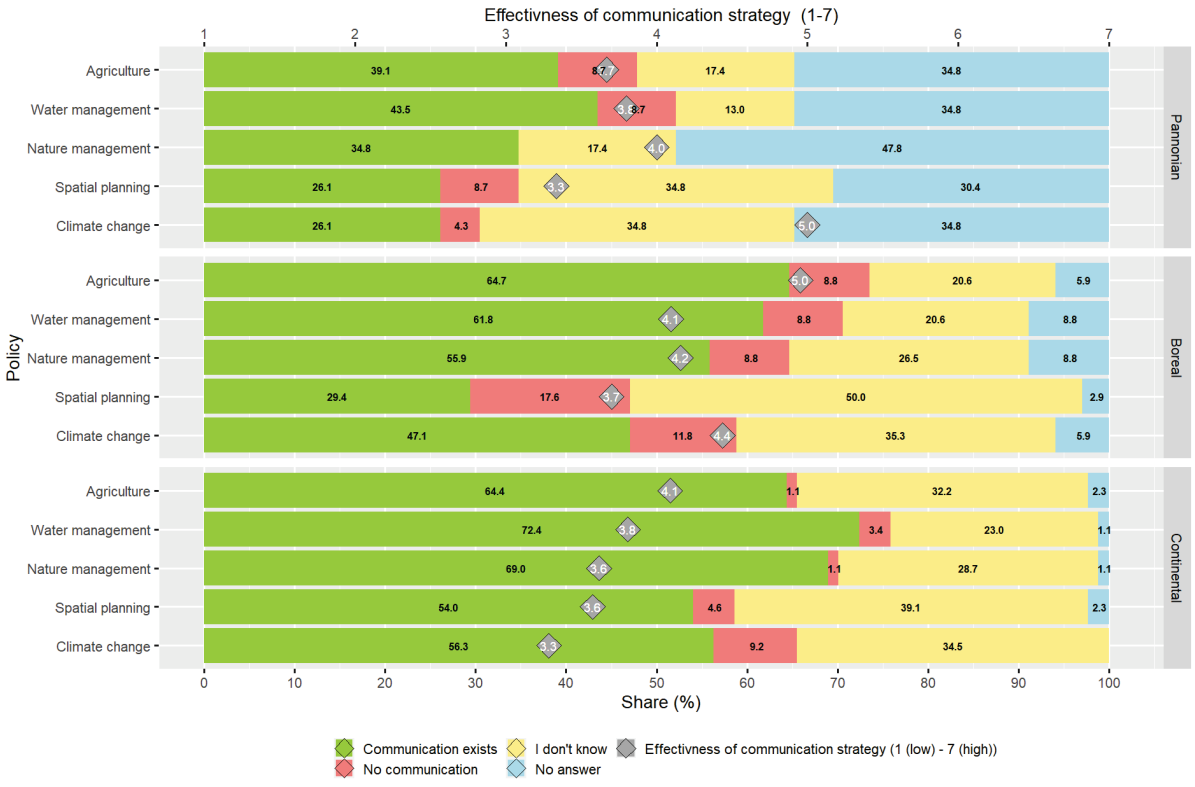
13.How are policies communicated to the end-user at the CSS/local level?

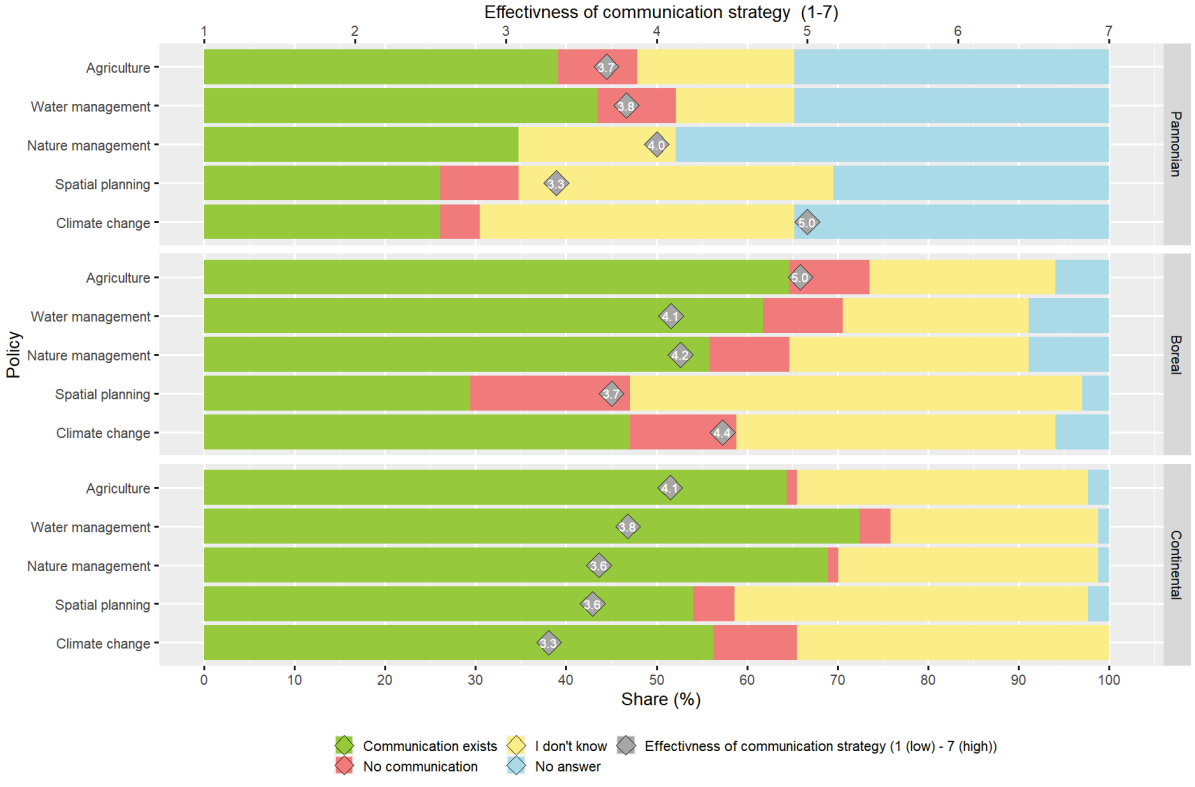
Rate communication (comm.) strategy (1-7).

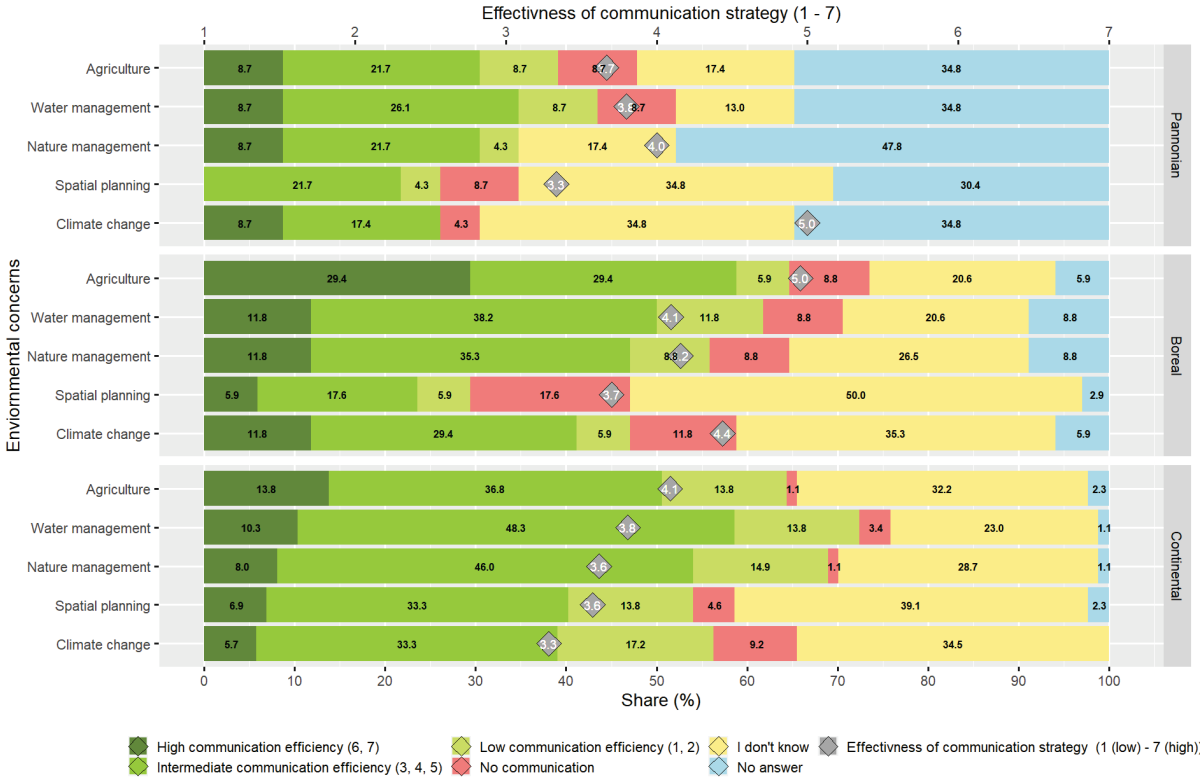
	I don't know	No comm. (x)	Individual comm. on request (x)	Active comm. from authorities (x)	Rate effectiveness of communication strategy							**Comment current situation**
Agriculture					1	2	3	4	5	6	7	
Water management					1	2	3	4	5	6	7	Examples (text)
Nature management					1	2	3	4	5	6	7	Examples (text)
Spatial planning					1	2	3	4	5	6	7	Examples (text)
Climate change					1	2	3	4	5	6	7	Examples (text)
	I don't know	No (x)	Individual (x)	Active (x)	low efficiency		intermediate			high efficiency		

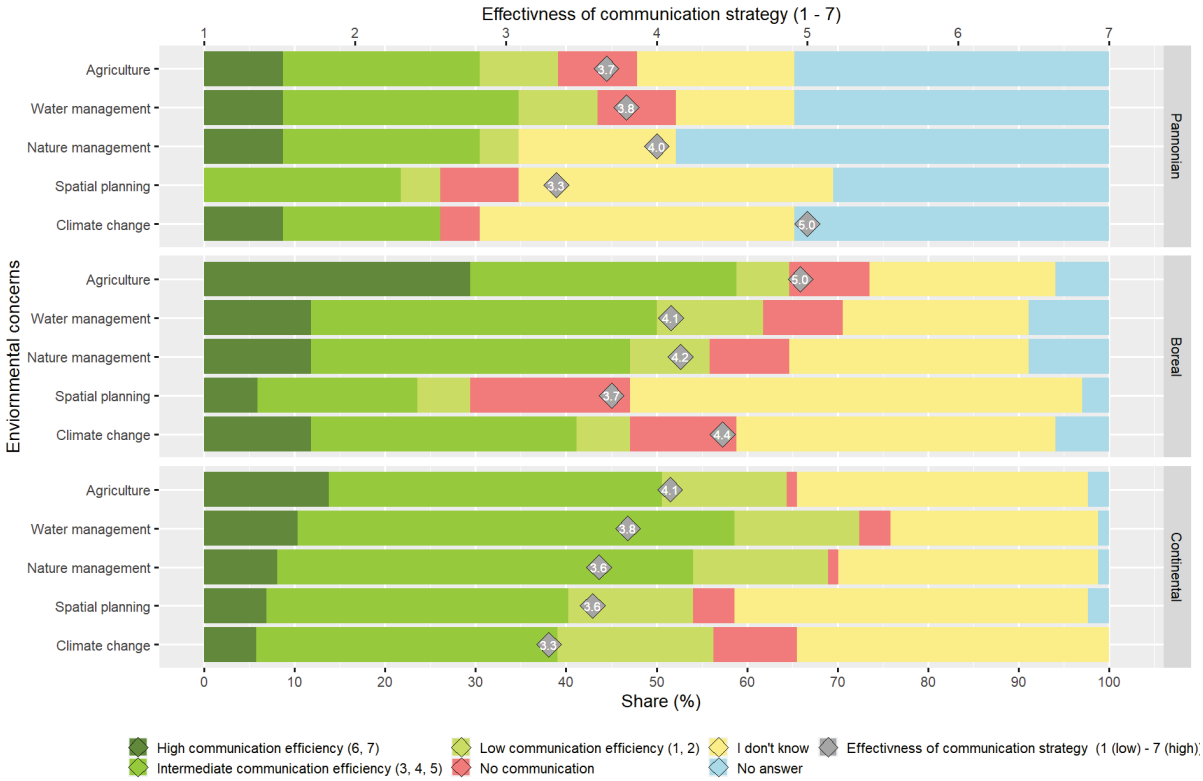



Share (%)
Effectivness of communication strategy (1 - 7)
Enviornmental concerns
Agriculture
Water management
Nature management
Spatial planning
Climate change
8.3
27.1
4.2
11.1
32.6
16.7
4.3
8.3
20.8
5.6
12.5
42.4
10.4
3.9
10.4
26.4
2.8
11.8
39.6
9.0
3.8
6.9
41.0
8.3
10.4
27.8
5.6
3.6
6.9
34.7
9.0
11.8
29.9
7.6
3.7
High communication efficiency (6, 7)
Intermediate communication efficiency (3, 4, 5)
Low communication efficiency (1, 2)
No communication
I don't know
No answer
Effectivness of communication strategy (1 (low) - 7 (high))


Effectivness of communication strategy (1-7)
Agriculture
Water management
Nature management
Spatial planning
Climate change
Policy
Pannonian
Boreal
Continental
39.1
8.7
17.4
34.8
43.5
13.0
34.8
34.8
17.4
47.8
26.1
8.7
34.8
30.4
26.1
4.3
34.8
34.8
64.7
8.8
20.6
5.9
61.8
8.8
20.6
8.8
55.9
8.8
26.5
8.8
29.4
17.6
50.0
2.9
47.1
11.8
35.3
5.9
64.4
1.1
32.2
2.3
72.4
3.4
23.0
1.1
69.0
1.1
28.7
1.1
54.0
4.6
39.1
2.3
56.3
9.2
34.5
Share (%)
Communication exists
No communication
I don't know
No answer
Effectivness of communication strategy (1 (low) - 7 (high))


Effectivness of communication strategy (1-7)
Agriculture
Water management
Nature management
Spatial planning
Climate change
Policy
Pannonian
Boreal
Continental
Share (%)
Communication exists
No communication
I don't know
No answer
Effectivness of communication strategy (1 (low) - 7 (high))


Effectivness of communication strategy (1 - 7)
Agriculture
Water management
Nature management
Spatial planning
Climate change
Pannonian
Boreal
Continental
Enviornmental concerns
Share (%)
High communication efficiency (6, 7)
Intermediate communication efficiency (3, 4, 5)
Low communication efficiency (1, 2)
No communication
I don't know
No answer
Effectivness of communication strategy (1 (low) - 7 (high)


Effectivness of communication strategy (1 - 7)
Agriculture
Water management
Nature management
Spatial planning
Climate change
Pannonian
Boreal
Continental
Enviornmental concerns
Share (%)
High communication efficiency (6, 7)
Intermediate communication efficiency (3, 4, 5)
Low communication efficiency (1, 2)
No communication
I don't know
No answer
Effectivness of communication strategy (1 (low) - 7 (high)

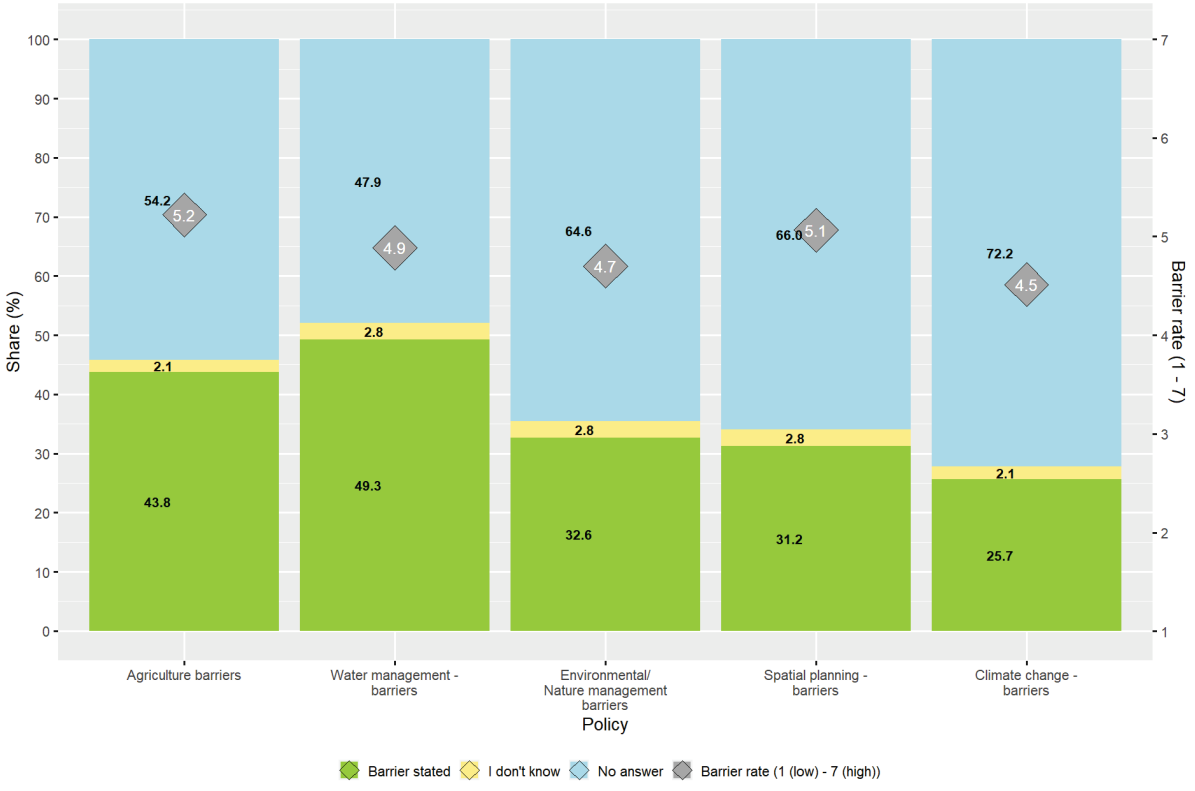
14. Comment: How could communication of policies be more effective at the CCS/local level to improve the implementation of measures? Give 1-3 examples from your field of expertise.

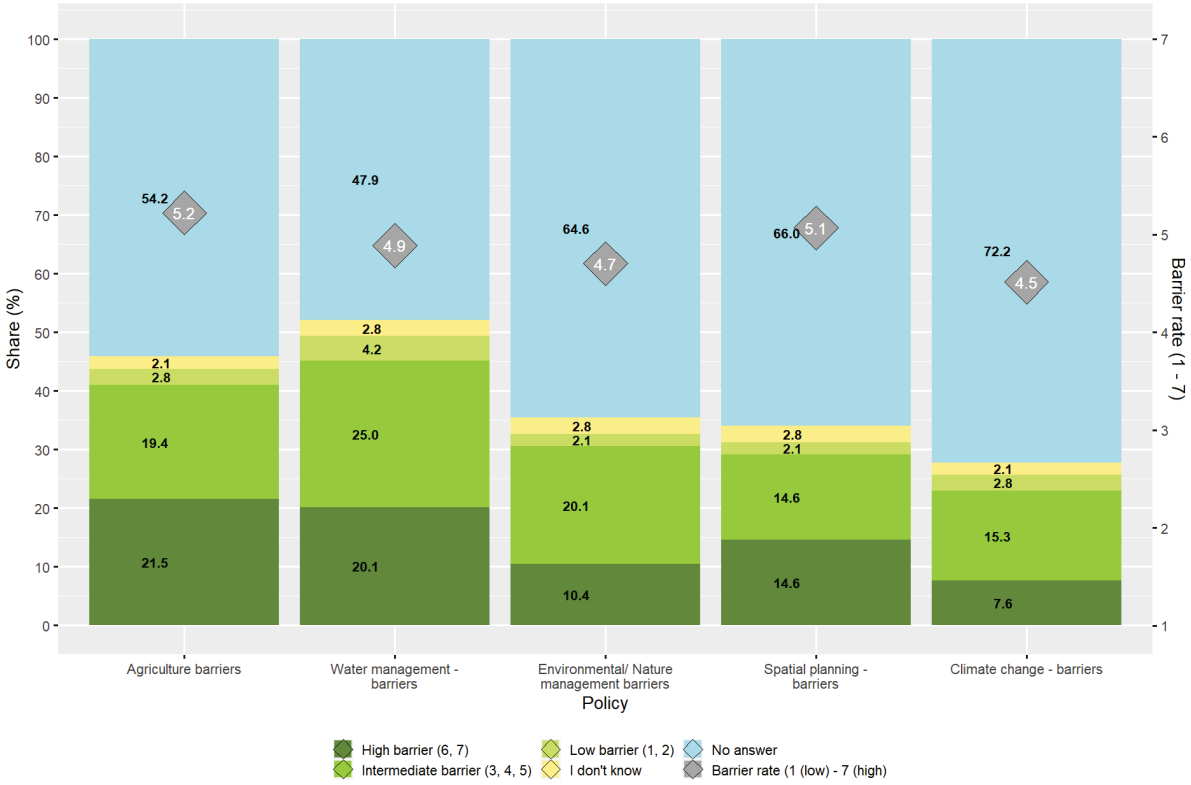
Answer:	*I do not know (x)*	**Comment possible improvement of communication strategy with examples** (Please, give 1-3 examples of how to improve the communication effectiveness of mentioned policies at the CSS/local level)
Agriculture		Examples - text
Water management		Examples - text
Environmental/Nature management		Examples - text
Spatial planning		Examples - text
Climate change		Examples - text

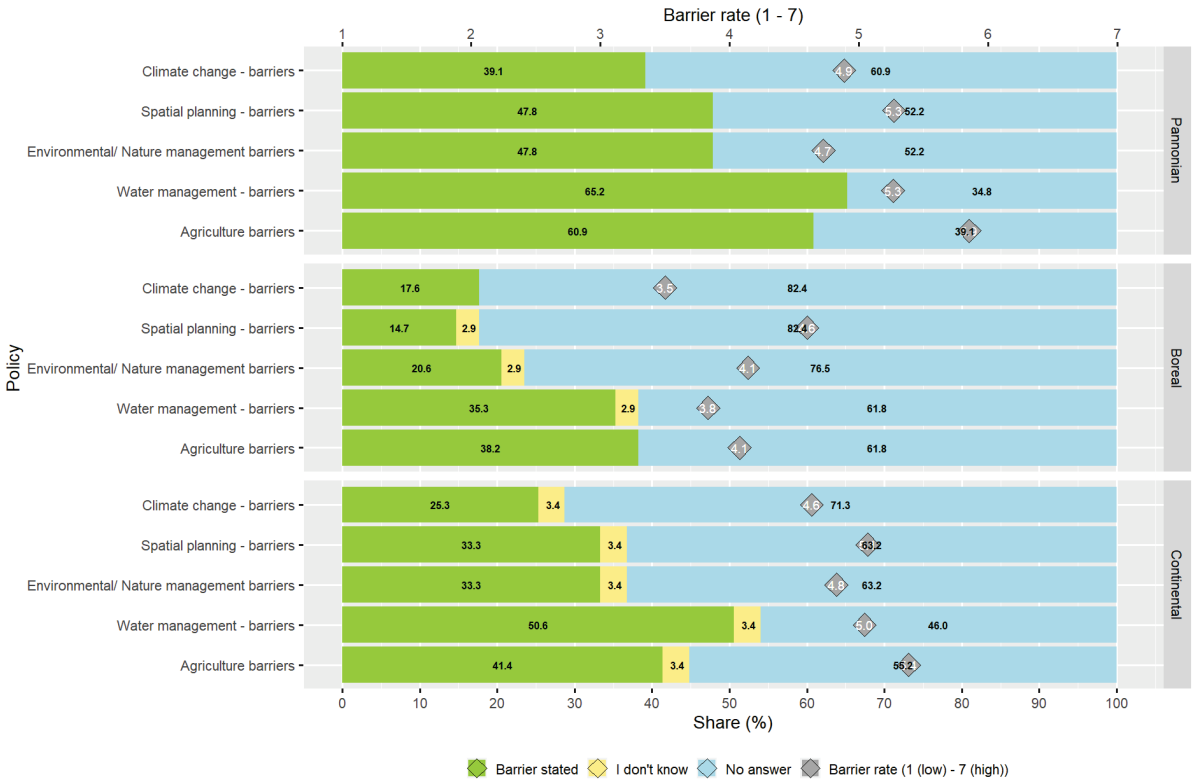
Only tables in the Report D6.2.

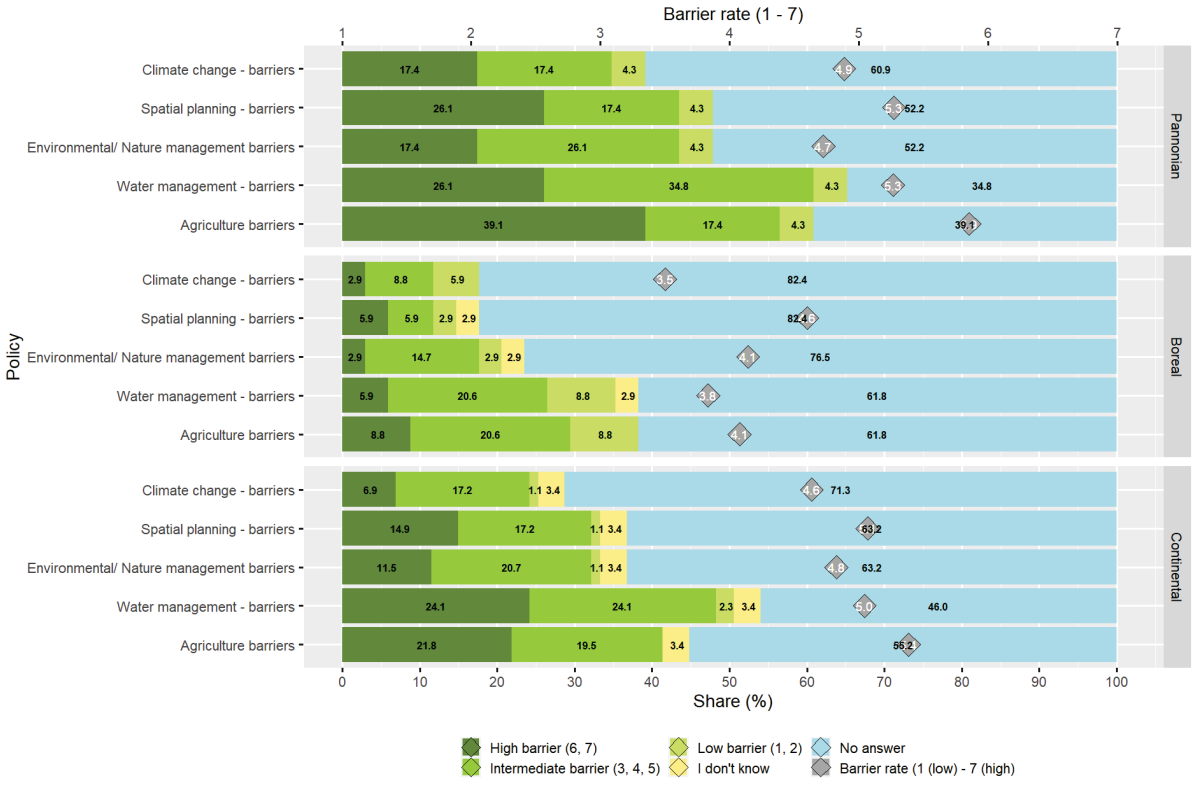
15. Which are the main barriers/issues in legislation that prevent better uptake of the water and nutrient retention management measures (water-use efficiency/use of tools and techniques for water and nutrient management/economic sustainability of technologies at farm and catchment level)? State 1-3 barriers/issues.

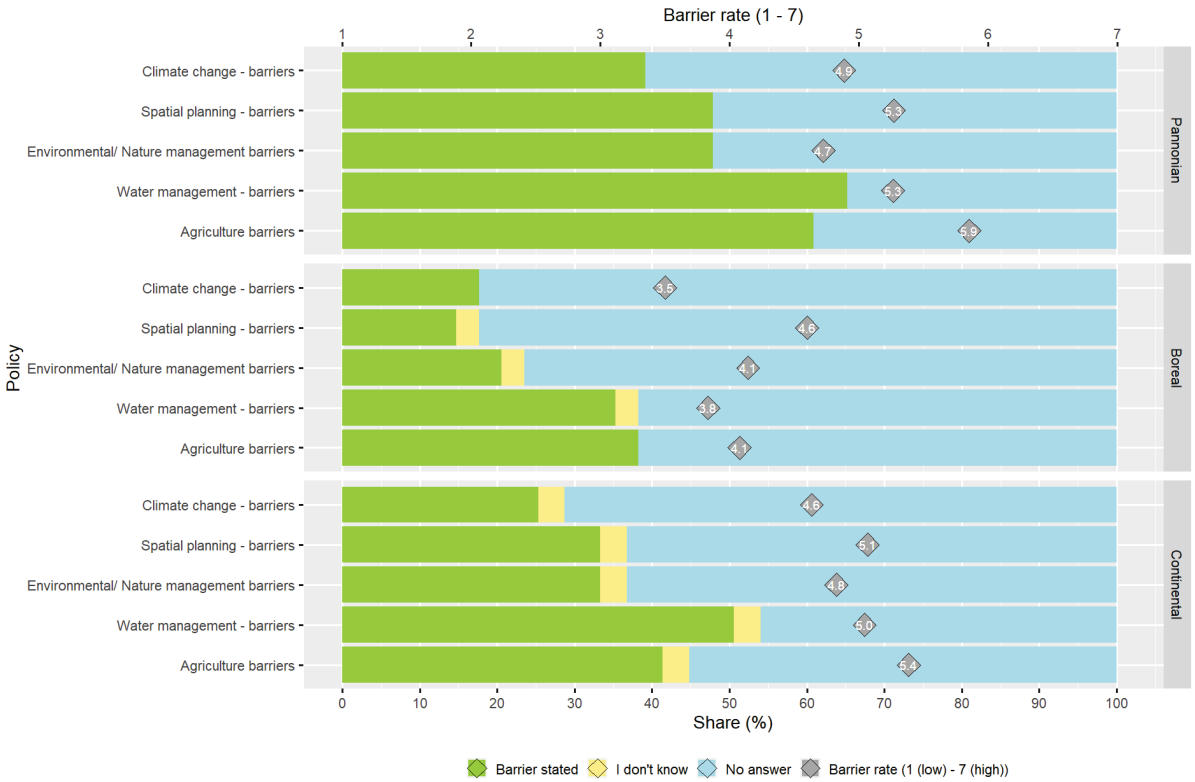
Policy	Barriers (Comment if needed)	Legal act (name/level)	Rate the magnitude of the barrier						
Agriculture	Barrier	text	1	2	3	4	5	6	7
Water management	Barrier	text	1	2	3	4	5	6	7
Environmental/ Nature management	Barrier	text	1	2	3	4	5	6	7
Spatial planning	Barrier	text	1	2	3	4	5	6	7
Climate change	Barrier	text	1	2	3	4	5	6	7
			low barrier		intermediate			high barrier	

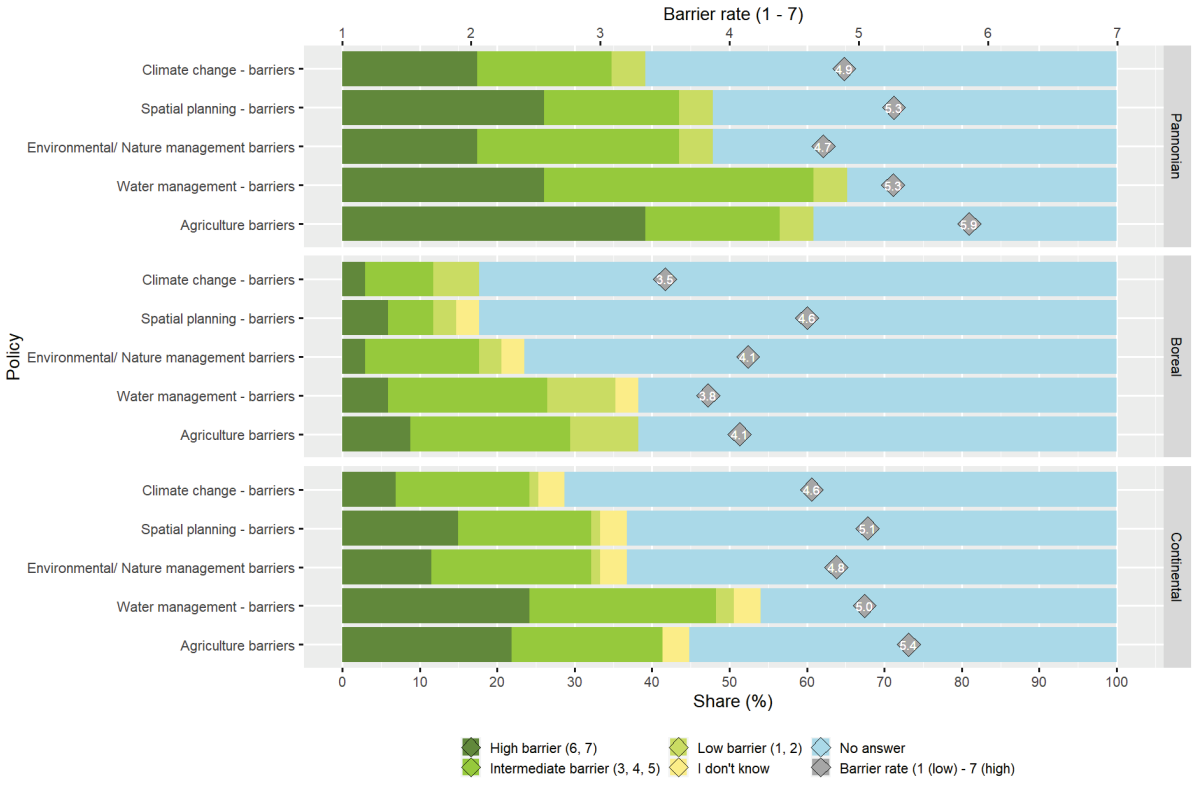



Share (%)
Barrier rate (1 - 7)
Policy
Agriculture barriers
Water management - barriers
Environmental/ Nature management barriers
Spatial planning - barriers
Climate change - barriers
54.2
5.2
2.1
2.8
19.4
21.5
47.9
4.9
2.8
4.2
25.0
20.1
64.6
4.7
2.8
2.1
20.1
10.4
66.0
5.1
2.8
2.1
14.6
14.6
72.2
4.5
2.1
2.8
15.3
7.6
High barrier (6, 7)
Intermediate barrier (3, 4, 5)
Low barrier (1, 2)
I don't know
No answer
Barrier rate (1 (low) - 7 (high)


Barrier rate (1 - 7)
Climate change - barriers
Spatial planning - barriers
Environmental/ Nature management barriers
Water management - barriers
Agriculture barriers
Pannonian
Boreal
Continental
Policy
Share (%)
Barrier stated
I don't know
No answer
Barrier rate (1 (low) - 7 (high))


Barrier rate (1 - 7)
Climate change - barriers
Spatial planning - barriers
Environmental/ Nature management barriers
Water management - barriers
Agriculture barriers
Pannonian
Boreal
Continental
Policy
Share (%)
High barrier (6, 7)
Intermediate barrier (3, 4, 5)
Low barrier (1, 2)
I don't know
No answer
Barrier rate (1 (low) - 7 (high)

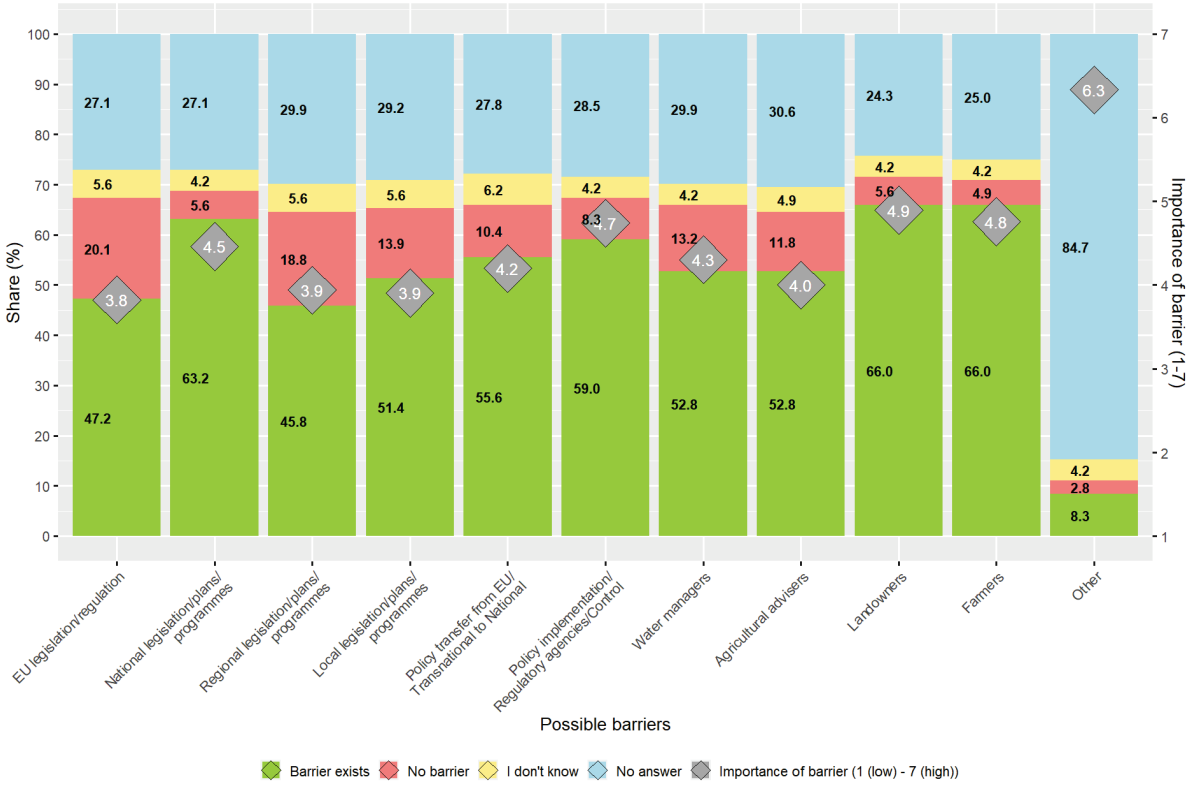

Barrier rate (1 - 7)
1
2
3
4
5
6
7
Climate change - barriers
Spatial planning - barriers
Environmental/ Nature management barriers
Water management - barriers
Agriculture barriers
Pannonian
Boreal
Continental
Policy
4.9
5.3
4.7
5.3
5.9
3.5
4.6
4.1
3.8
4.1
4.6
5.1
4.8
5.0
5.4
0
10
20
30
40
50
60
70
80
90
100
Share (%)
Barrier stated
I don't know
No answer
Barrier rate (1 (low) - 7 (high))

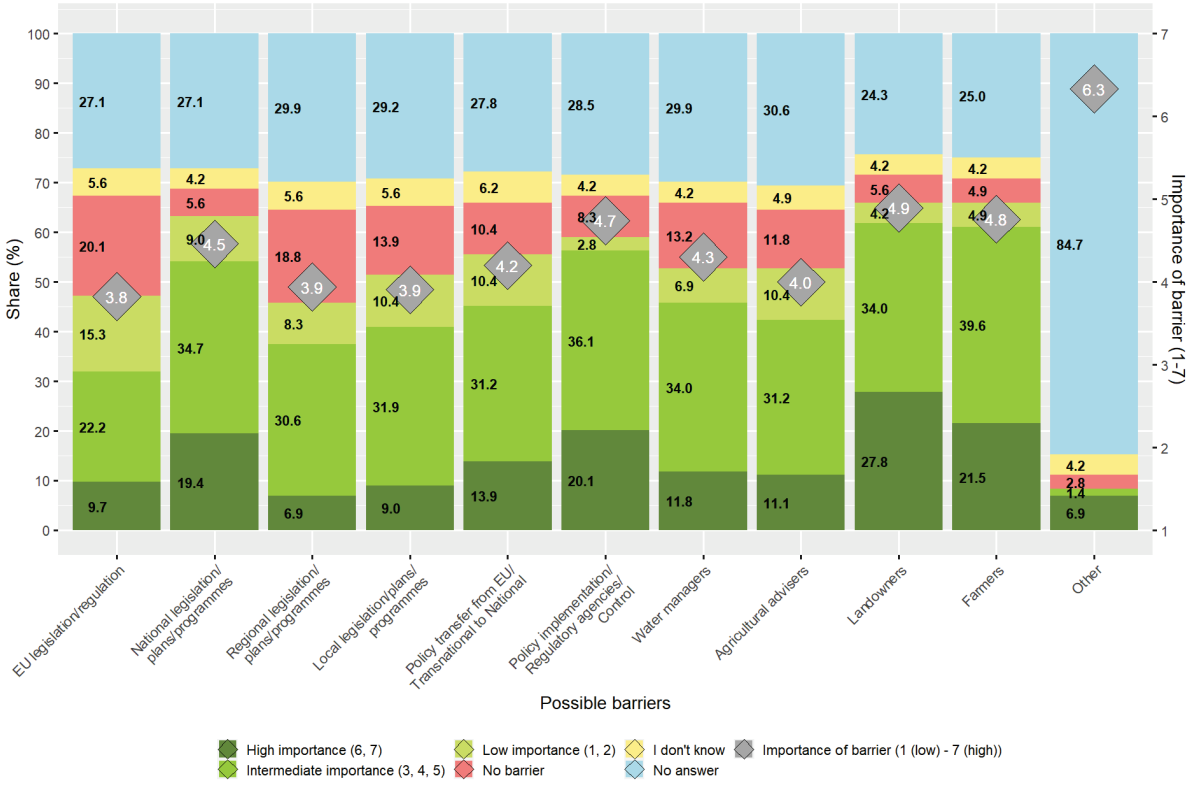

Barrier rate (1 - 7)
1
2
3
4
5
6
7
Climate change - barriers
Spatial planning - barriers
Environmental/ Nature management barriers
Water management - barriers
Agriculture barriers
Pannonian
Boreal
Continental
Policy
4.9
5.3
4.7
5.3
5.9
3.5
4.6
4.1
3.8
4.1
4.6
5.1
4.8
5.0
5.4
0
10
20
30
40
50
60
70
80
90
100
Share (%)
High barrier (6, 7)
Intermediate barrier (3, 4, 5)
Low barrier (1, 2)
I don't know
No answer
Barrier rate (1 (low) - 7 (high)

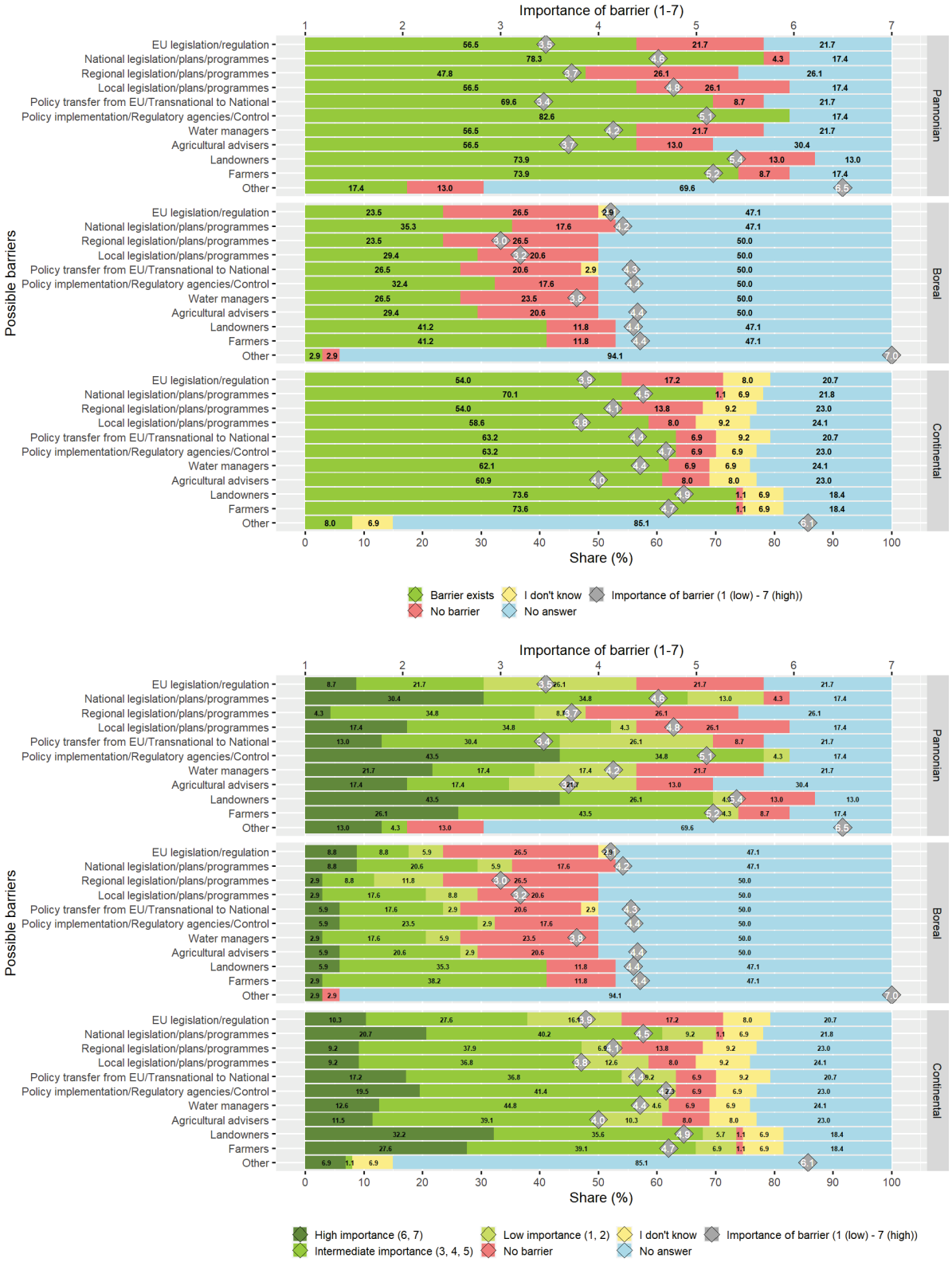
OPTAIN

16. In your expert opinion, where is the origin of the barriers? Rate the importance of each reason for the barrier (1-7).

Answer:	No	Yes							Comment
EU legislation/regulation	0	1	2	3	4	5	6	7	
National legislation/plans/programmes	0	1	2	3	4	5	6	7	
Regional legislation/plans/programmes	0	1	2	3	4	5	6	7	
Local legislation/plans/programmes	0	1	2	3	4	5	6	7	
Policy transfer from EU/Transnational to National	0	1	2	3	4	5	6	7	
Policy implementation/Regulatory agencies/Control	0	1	2	3	4	5	6	7	
Water managers	0	1	2	3	4	5	6	7	
Agricultural advisers	0	1	2	3	4	5	6	7	
Landowners	0	1	2	3	4	5	6	7	
Farmers	0	1	2	3	4	5	6	7	
other: _____	0	1	2	3	4	5	6	7	
	not important	low importance		intermediate			high importance		




Share (%)
Importance of barrier (1-7)
Possible barriers
EU legislation/regulation
National legislation/ plans/programmes
Regional legislation/ plans/programmes
Local legislation/plans/ programmes
Policy transfer from EU/ Transnational to National
Policy implementation/ Regulatory agencies/ Control
Water managers
Agricultural advisers
Landowners
Farmers
Other
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)
No barrier
I don't know
No answer
Importance of barrier (1 (low) - 7 (high))


Importance of barrier (1-7)
Possible barriers
Pannonian
Boreal
Continental
EU legislation/regulation
National legislation/plans/programmes
Regional legislation/plans/programmes
Local legislation/plans/programmes
Policy transfer from EU/Transnational to National
Policy implementation/Regulatory agencies/Control
Water managers
Agricultural advisers
Landowners
Farmers
Other
Share (%)
Barrier exists
No barrier
I don't know
No answer
Importance of barrier (1 (low) - 7 (high))
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)


Importance of barrier (1-7)
Possible barriers
EU legislation/regulation
National legislation/plans/programmes
Regional legislation/plans/programmes
Local legislation/plans/programmes
Policy transfer from EU/Transnational to National
Policy implementation/Regulatory agencies/Control
Water managers
Agricultural advisers
Landowners
Farmers
Other
Pannonian
Boreal
Continental
Share (%)
Barrier exists
No barrier
I don't know
No answer
Importance of barrier (1 (low) - 7 (high))
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)

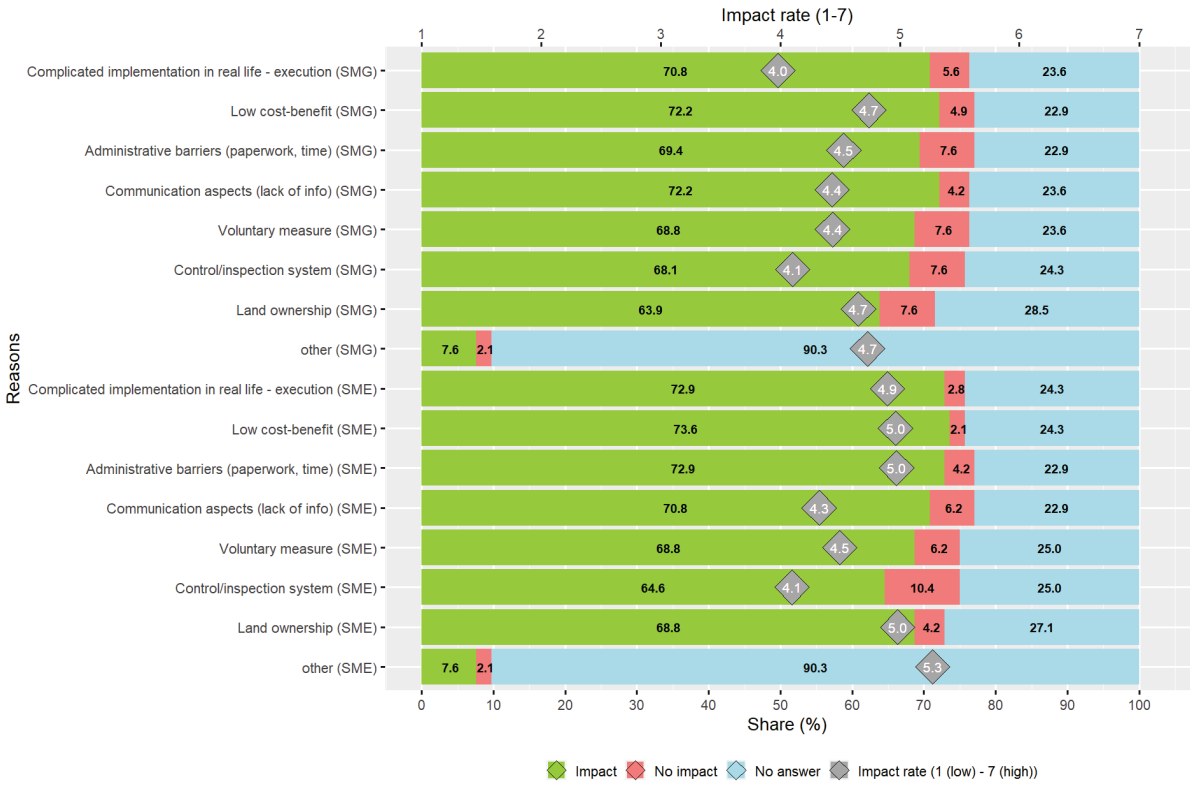
OPTAIN

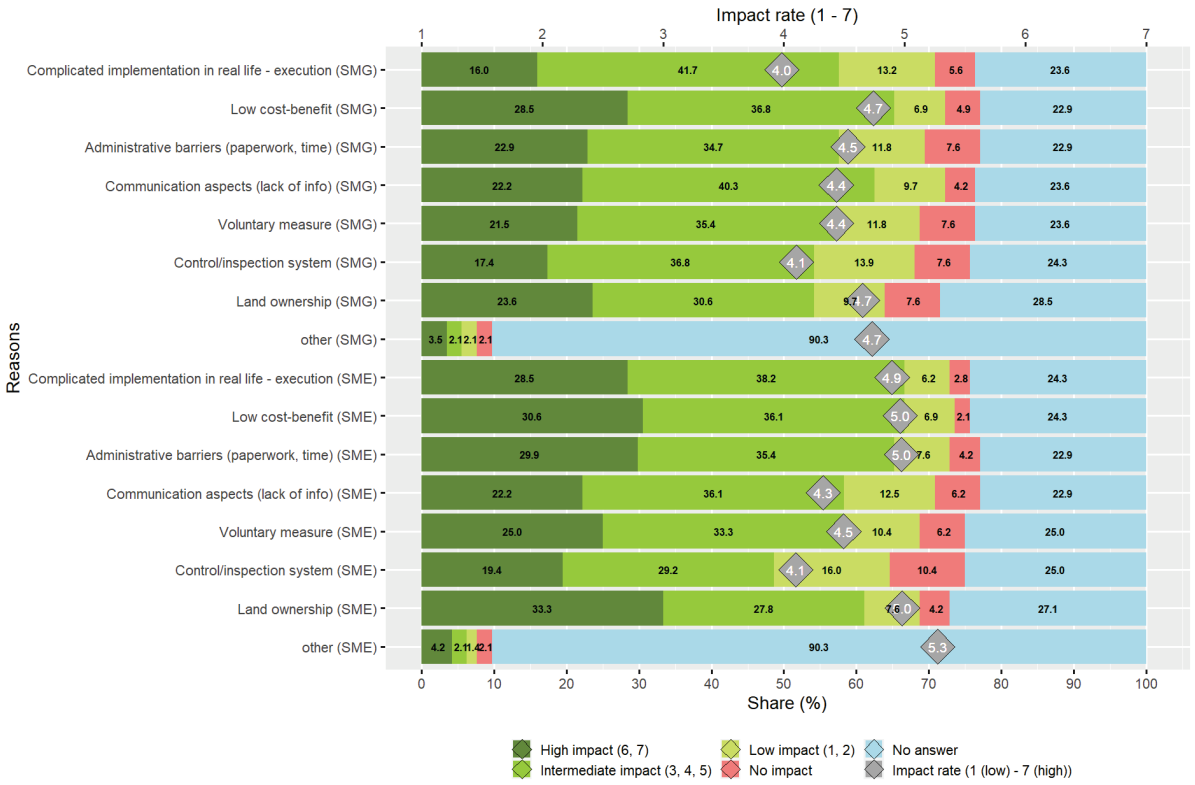
17. What are, in general, the reasons for the weak implementation of soil management and structural measures* by end-users?

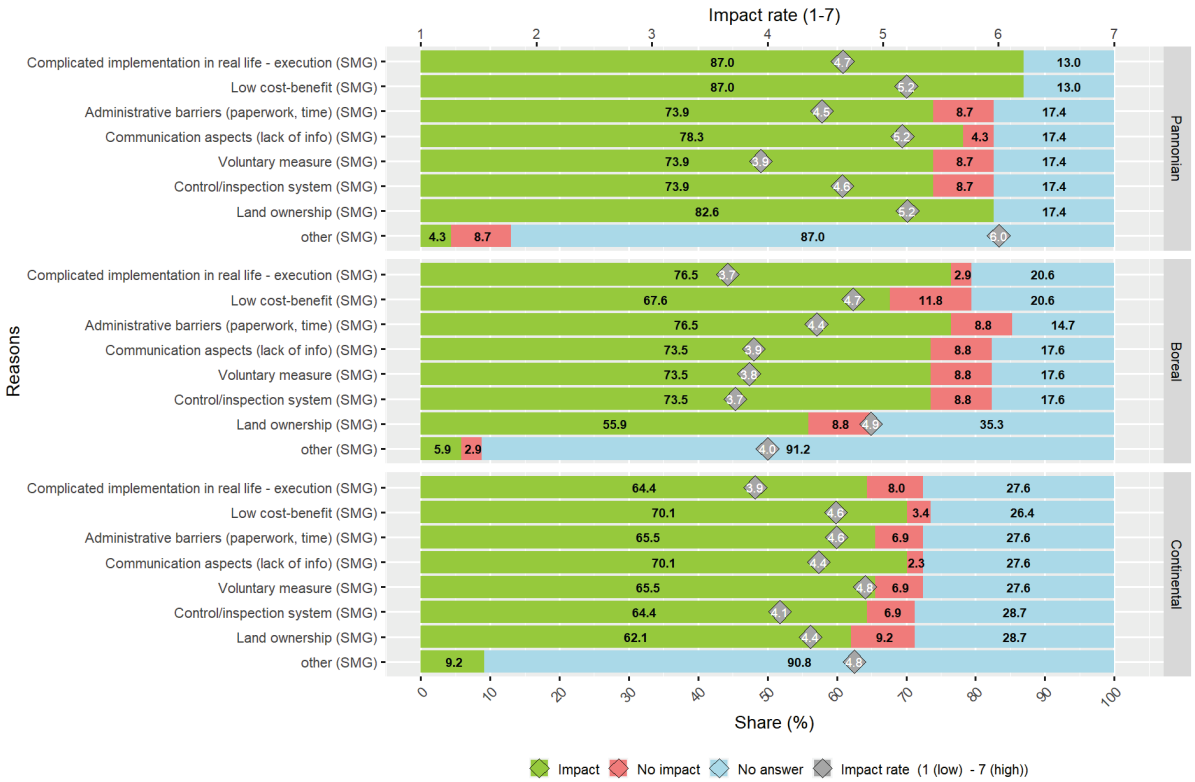
Answer:	No	Soil management measures - rate impact						
Complicated implementation in real-life - execution	0	1	2	3	4	5	6	7
Low cost-benefit	0	1	2	0	4	5	6	7
Administrative barriers (paperwork, time)	0	1	2	0	4	5	6	7
Communication aspects (lack of info)	0	1	2	0	4	5	6	7
Voluntary measure	0	1	2	0	4	5	6	7
Control/inspection system	0	1	2	3	4	5	6	7
Land ownership	0	1	2	3	4	5	6	7
other:_____	0	1	2	0	4	5	6	7
	No impact	low impact		intermediate			high impact	

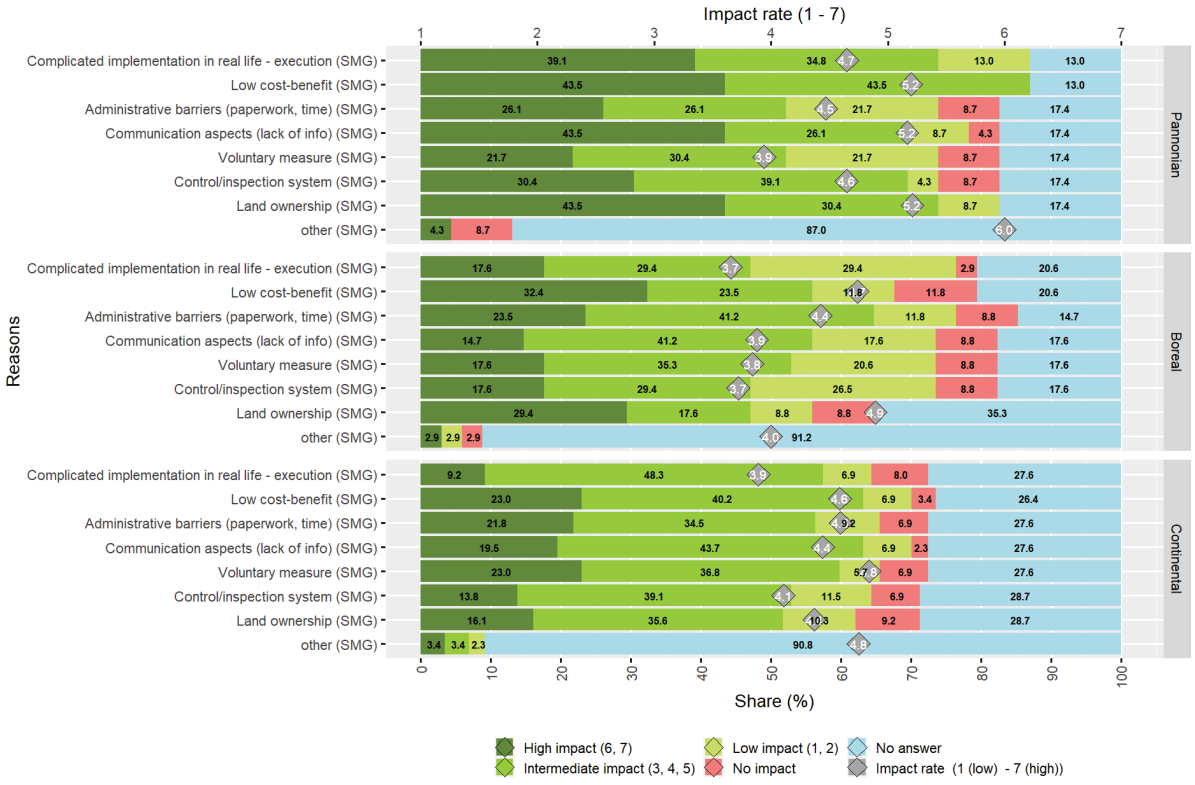
	No	Structural measures – rate impact						
Complicated implementation in real-life - execution		1	2	3	4	5	6	7
Low cost-benefit		1	2	3	4	5	6	7
Administrative barriers (paperwork, time)		1	2	3	4	5	6	7
Communication aspects (lack of info)		1	2	3	4	5	6	7
Voluntary measure		1	2	3	4	5	6	7
Control/inspection system		1	2	3	4	5	6	7
Land ownership		1	2	3	4	5	6	7
other:_____		1	2	3	4	5	6	7
	No impact	low impact		intermediate			high impact	

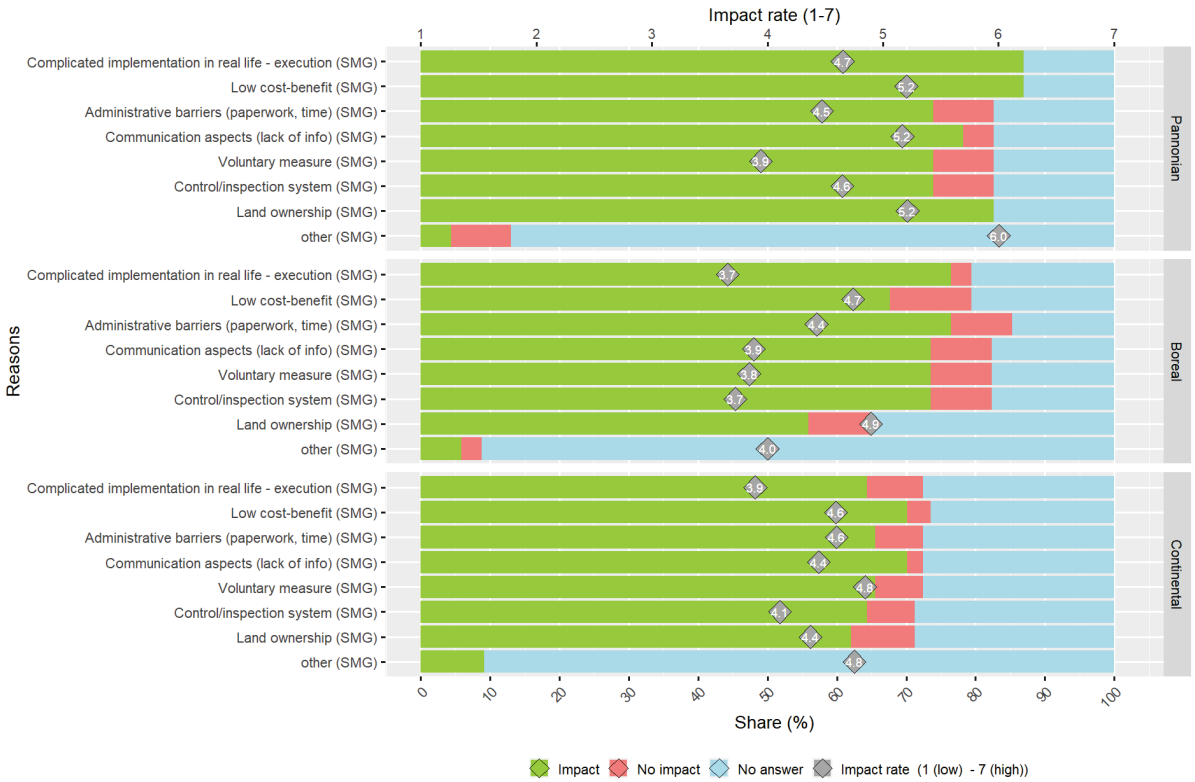
*soil management measures: the way that land/fields/soils are managed to have an impact at the field scale – no-till, cover crops, crop rotation, mulching, strip cropping,
*structural measure: the way the landscape is managed to change the processes and have an impact beyond the field scale (neighbouring fields, sub-catchment, catchment) – buffer strips, hedges, grassed waterways, terracing, wetland restoration, re-meandering

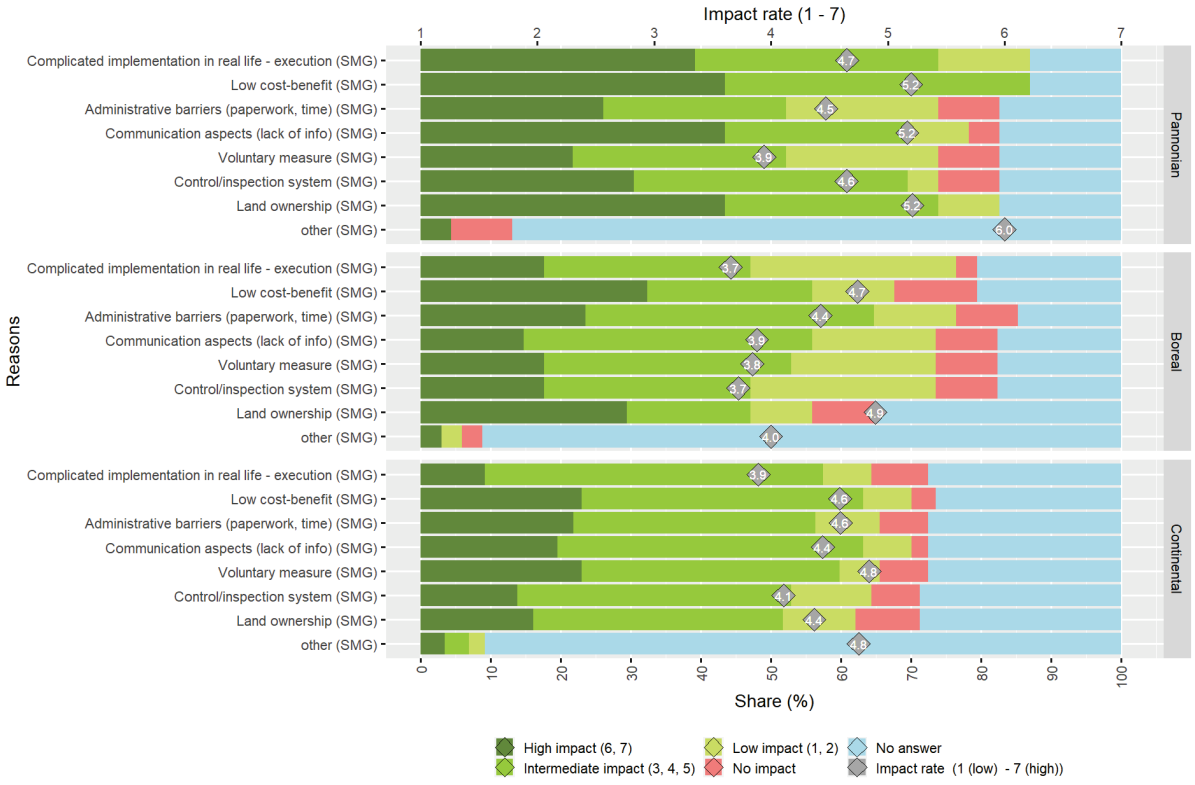



Impact rate (1 - 7)
1
2
3
4
5
6
7
Reasons
Complicated implementation in real life - execution (SMG)
Low cost-benefit (SMG)
Administrative barriers (paperwork, time) (SMG)
Communication aspects (lack of info) (SMG)
Voluntary measure (SMG)
Control/inspection system (SMG)
Land ownership (SMG)
other (SMG)
Complicated implementation in real life - execution (SME)
Low cost-benefit (SME)
Administrative barriers (paperwork, time) (SME)
Communication aspects (lack of info) (SME)
Voluntary measure (SME)
Control/inspection system (SME)
Land ownership (SME)
other (SME)
16.0
41.7
4.0
13.2
5.6
23.6
28.5
36.8
4.7
6.9
4.9
22.9
22.9
34.7
4.5
11.8
7.6
22.9
22.2
40.3
4.4
9.7
4.2
23.6
21.5
35.4
4.4
11.8
7.6
23.6
17.4
36.8
4.1
13.9
7.6
24.3
23.6
30.6
9.7
4.7
7.6
28.5
3.5
2.1
2.1
2.1
90.3
4.7
28.5
38.2
4.9
6.2
2.8
24.3
30.6
36.1
5.0
6.9
2.1
24.3
29.9
35.4
5.0
7.6
4.2
22.9
22.2
36.1
4.3
12.5
6.2
22.9
25.0
33.3
4.5
10.4
6.2
25.0
19.4
29.2
4.1
16.0
10.4
25.0
33.3
27.8
7.6
4.2
27.1
4.2
2.1
1.4
2.1
90.3
5.3
0
10
20
30
40
50
60
70
80
90
100
Share (%)
High impact (6, 7)
Intermediate impact (3, 4, 5)
Low impact (1, 2)
No impact
No answer
Impact rate (1 (low) - 7 (high))


Impact rate (1-7)
Complicated implementation in real life - execution (SMG)
Low cost-benefit (SMG)
Administrative barriers (paperwork, time) (SMG)
Communication aspects (lack of info) (SMG)
Voluntary measure (SMG)
Control/inspection system (SMG)
Land ownership (SMG)
other (SMG)
Pannonian
Boreal
Continental
Reasons
Share (%)
Impact
No impact
No answer
Impact rate (1 (low) - 7 (high))


Impact rate (1 - 7)
Complicated implementation in real life - execution (SMG)
Low cost-benefit (SMG)
Administrative barriers (paperwork, time) (SMG)
Communication aspects (lack of info) (SMG)
Voluntary measure (SMG)
Control/inspection system (SMG)
Land ownership (SMG)
other (SMG)
Pannonian
Boreal
Continental
Reasons
Share (%)
High impact (6, 7)
Intermediate impact (3, 4, 5)
Low impact (1, 2)
No impact
No answer
Impact rate (1 (low) - 7 (high))

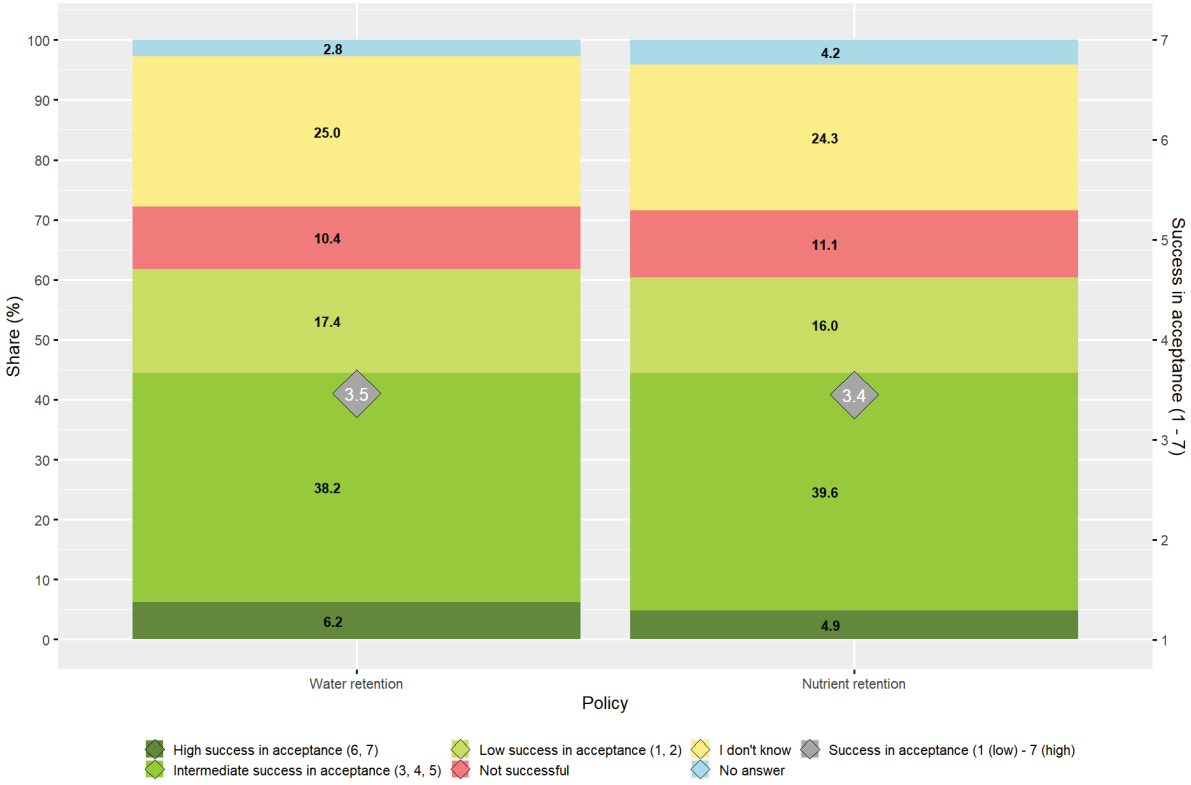

Impact rate (1-7)
Complicated implementation in real life - execution (SMG)
Low cost-benefit (SMG)
Administrative barriers (paperwork, time) (SMG)
Communication aspects (lack of info) (SMG)
Voluntary measure (SMG)
Control/inspection system (SMG)
Land ownership (SMG)
other (SMG)
Pannonian
Boreal
Continental
Reasons
Share (%)
Impact
No impact
No answer
Impact rate (1 (low) - 7 (high))

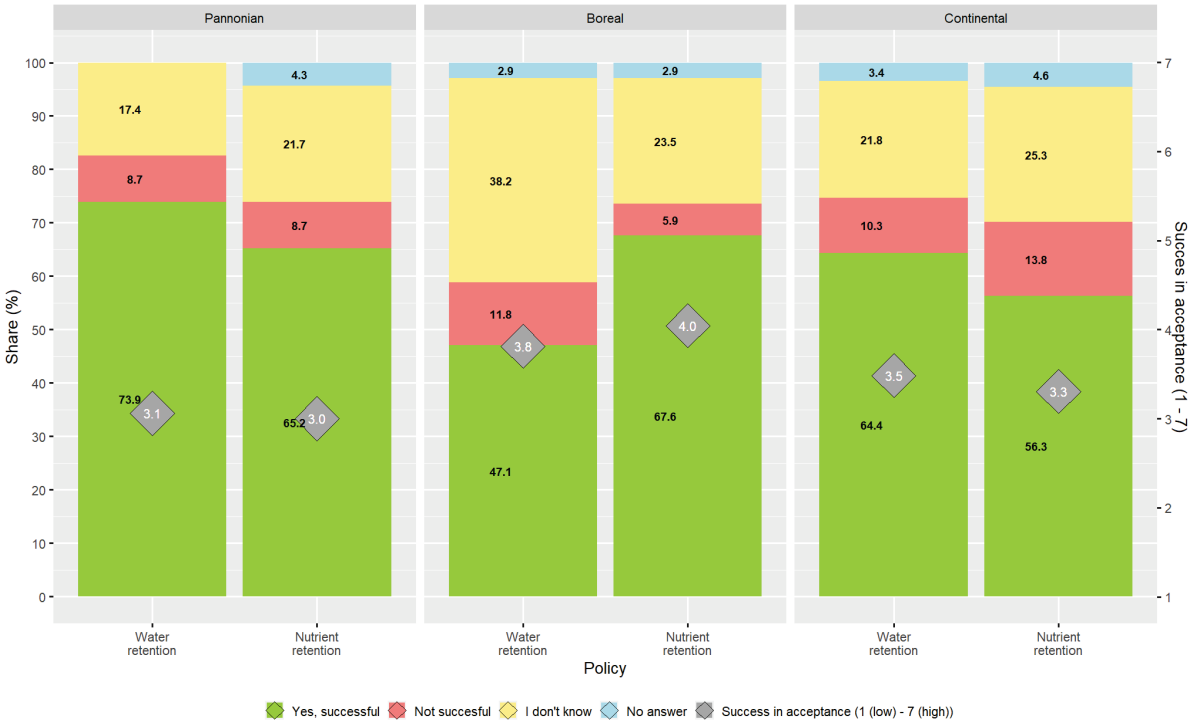

Impact rate (1 - 7)
Complicated implementation in real life - execution (SMG)
Low cost-benefit (SMG)
Administrative barriers (paperwork, time) (SMG)
Communication aspects (lack of info) (SMG)
Voluntary measure (SMG)
Control/inspection system (SMG)
Land ownership (SMG)
other (SMG)
Pannonian
Boreal
Continental
Reasons
Share (%)
High impact (6, 7)
Intermediate impact (3, 4, 5)
Low impact (1, 2)
No impact
No answer
Impact rate (1 (low) - 7 (high))

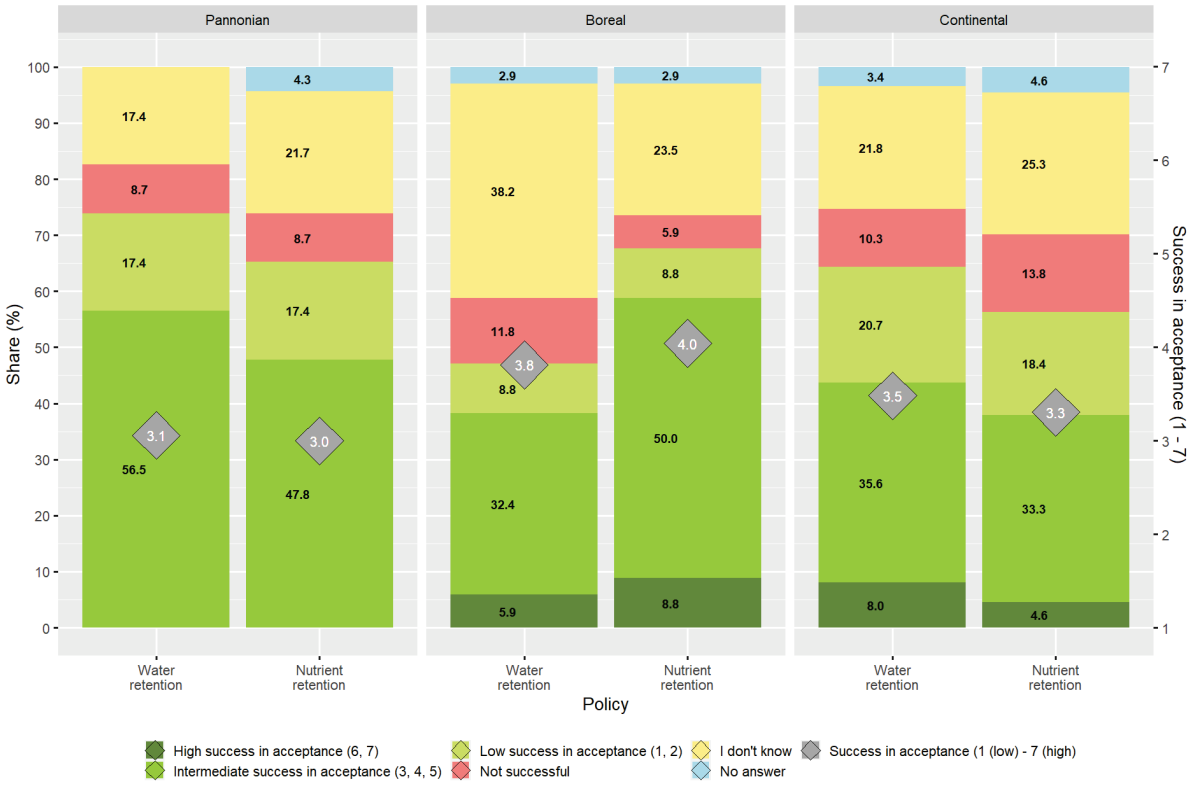
18. Is policy/legislation successful in accomplishing practical acceptance and implementation of measures by landowners/farmers through the use of tools and techniques for water and nutrient retention management?

Answer:	*I do not know (x)*	No	Yes (rate the success in acceptance)						
Water retention		0	1	2	3	4	5	6	7
Nutrient retention		0	1	2	3	4	5	6	7
		not	low		intermediate			high	
Give a successful example of measure implementation from your field of expertise	*Text*								

*Tools: A tool is **any instrument or a simple piece of equipment you hold in your hands and use to do a particular work**. For example, spades, hammers, and knives are all tools. You can refer to anything that you use for a particular purpose as a particular type of tool.
*Techniques and technologies: A technique is **a particular method of doing an activity**, usually involving practical skills. The technology of farming, the system of practices followed in crop growing. The object of agricultural technique is to assure high crop yield with minimal investment of labour and capital per unit of realised product.


2.8
25.0
10.4
17.4
3.5
38.2
6.2
4.2
24.3
11.1
16.0
3.4
39.6
4.9
Share (%)
Success in acceptance (1 - 7)
Water retention
Nutrient retention
Policy
High success in acceptance (6, 7)
Intermediate success in acceptance (3, 4, 5)
Low success in acceptance (1, 2)
Not successful
I don't know
No answer
Success in acceptance (1 (low) - 7 (high)


Pannonian
Boreal
Continental
Share (%)
Succes in acceptance (1 - 7)
Water retention
Nutrient retention
Policy
17.4
8.7
73.9
3.1
4.3
21.7
8.7
65.2
3.0
2.9
38.2
11.8
47.1
3.8
2.9
23.5
5.9
67.6
4.0
3.4
21.8
10.3
64.4
3.5
4.6
25.3
13.8
56.3
3.3
Yes, successful
Not succesful
I don't know
No answer
Success in acceptance (1 (low) - 7 (high))

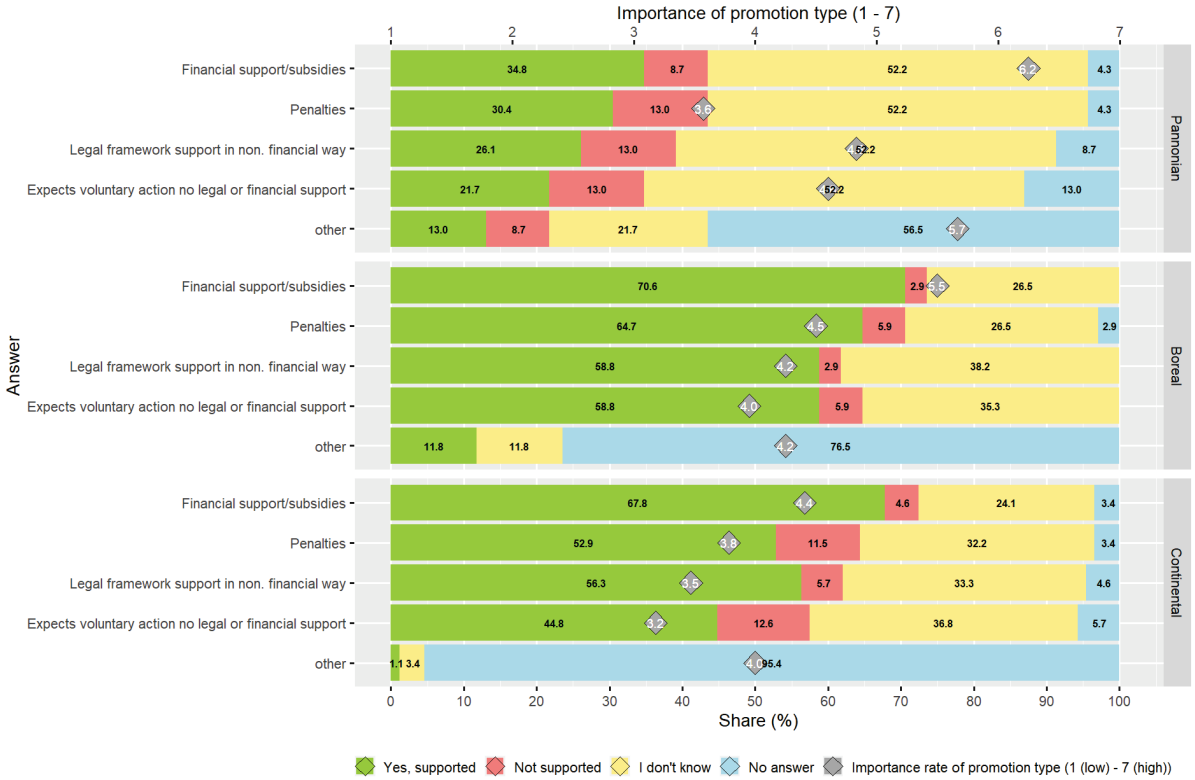

Pannonian
Boreal
Continental
Share (%)
Succes in acceptance (1 - 7)
Water retention
Nutrient retention
Policy
17.4
8.7
17.4
56.5
3.1
4.3
21.7
8.7
17.4
47.8
3.0
2.9
38.2
11.8
8.8
32.4
5.9
3.8
2.9
23.5
5.9
8.8
50.0
8.8
4.0
3.4
21.8
10.3
20.7
35.6
8.0
3.5
4.6
25.3
13.8
18.4
33.3
4.6
3.3
High success in acceptance (6, 7)
Intermediate success in acceptance (3, 4, 5)
Low success in acceptance (1, 2)
Not successful
I don't know
No answer
Success in acceptance (1 (low) - 7 (high)

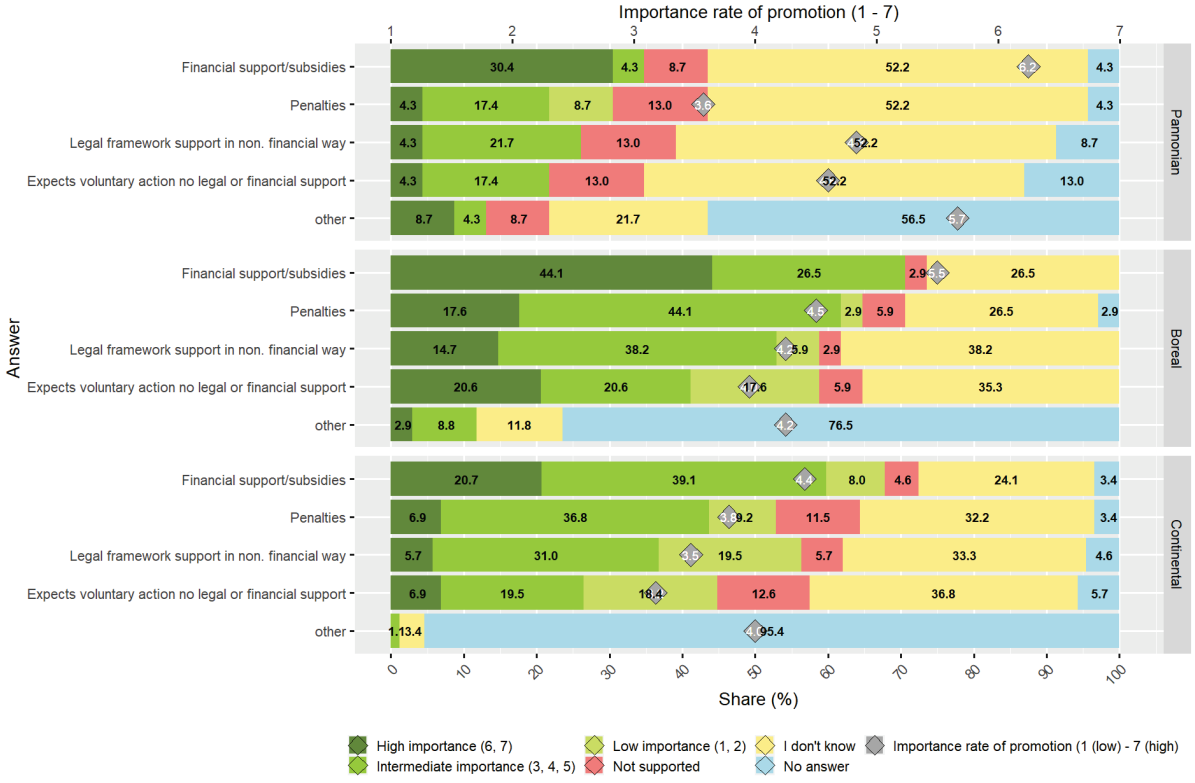
19. Is by your knowledge the economic sustainability of technologies on farms and small agricultural catchment level supported by promotion in the policy/legislation? Rate the importance of promotion types (1-7).

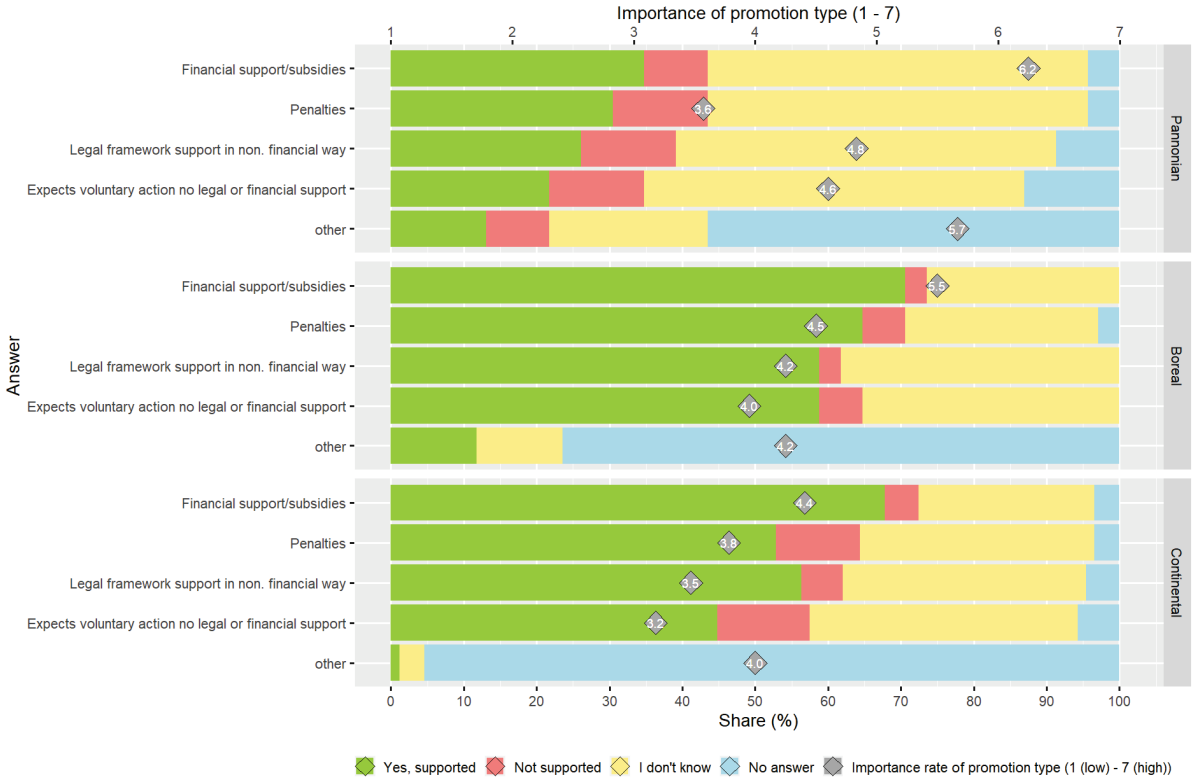
Answer:	*I do not know (x)*	No	Yes - Rate the importance of each promotion type						
Financial support/subsidies		0	1	2	3	4	5	6	7
Penalties		0	1	2	3	4	5	6	7
Legal framework support in non. financial way		0	1	2	3	4	5	6	7
Expects voluntary action, no legal or financial support		0	1	2	3	4	5	6	7
other:_____		0	1	2	3	4	5	6	7
		not	low		intermediate			high	
Give an example from your field of expertise	*Text*								

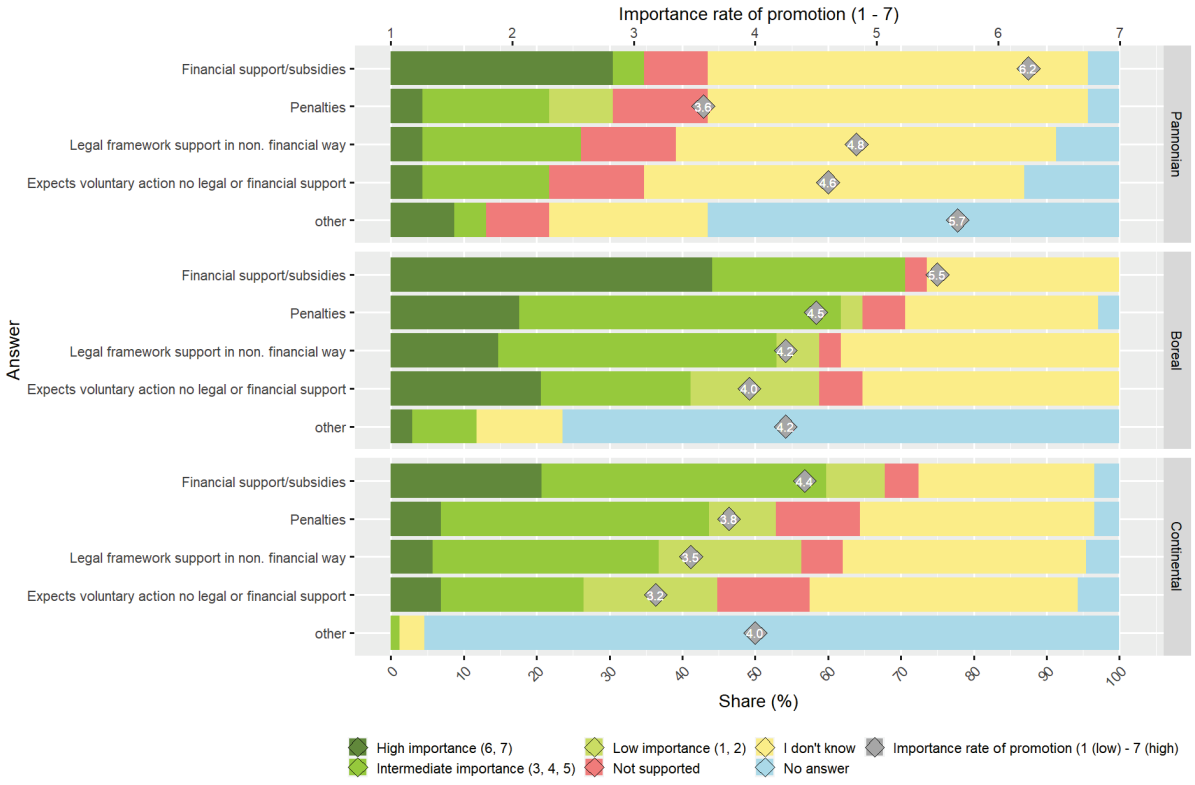

Share (%)
Importance rate of promotion (1 - 7)
Answer
Financial support/ subsidies
Penalties
Legal framework support in non. financial way
Expects voluntary action no legal or financial support
other
2.8
29.2
4.9
4.9
30.6
27.8
4.9
3.5
34.0
10.4
7.6
35.4
9.0
4.0
4.2
37.5
6.2
13.2
31.2
7.6
3.8
5.6
38.9
11.1
15.3
19.4
9.7
3.5
84.7
8.3
1.4
3.5
2.1
4.8
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)
Not supported
I don't know
No answer
Importance rate of promotion (1 (low) - 7 (high)

OPTAIN


Importance of promotion type (1 - 7)
Financial support/subsidies
Penalties
Legal framework support in non. financial way
Expects voluntary action no legal or financial support
other
Pannonian
Boreal
Continental
Answer
Share (%)
Yes, supported
Not supported
I don't know
No answer
Importance rate of promotion type (1 (low) - 7 (high))

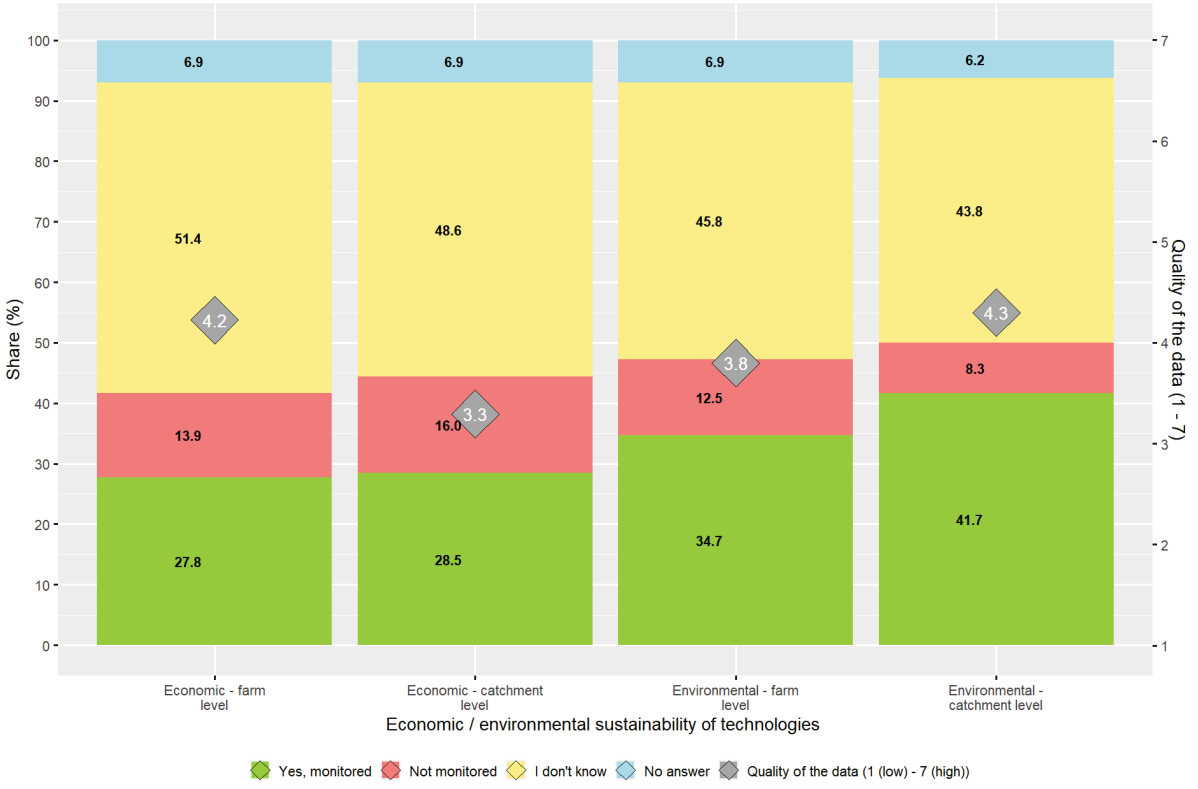

Importance rate of promotion (1 - 7)
Financial support/subsidies
Penalties
Legal framework support in non. financial way
Expects voluntary action no legal or financial support
other
Pannonian
Boreal
Continental
Answer
Share (%)
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)
Not supported
I don't know
No answer
Importance rate of promotion (1 (low) - 7 (high)

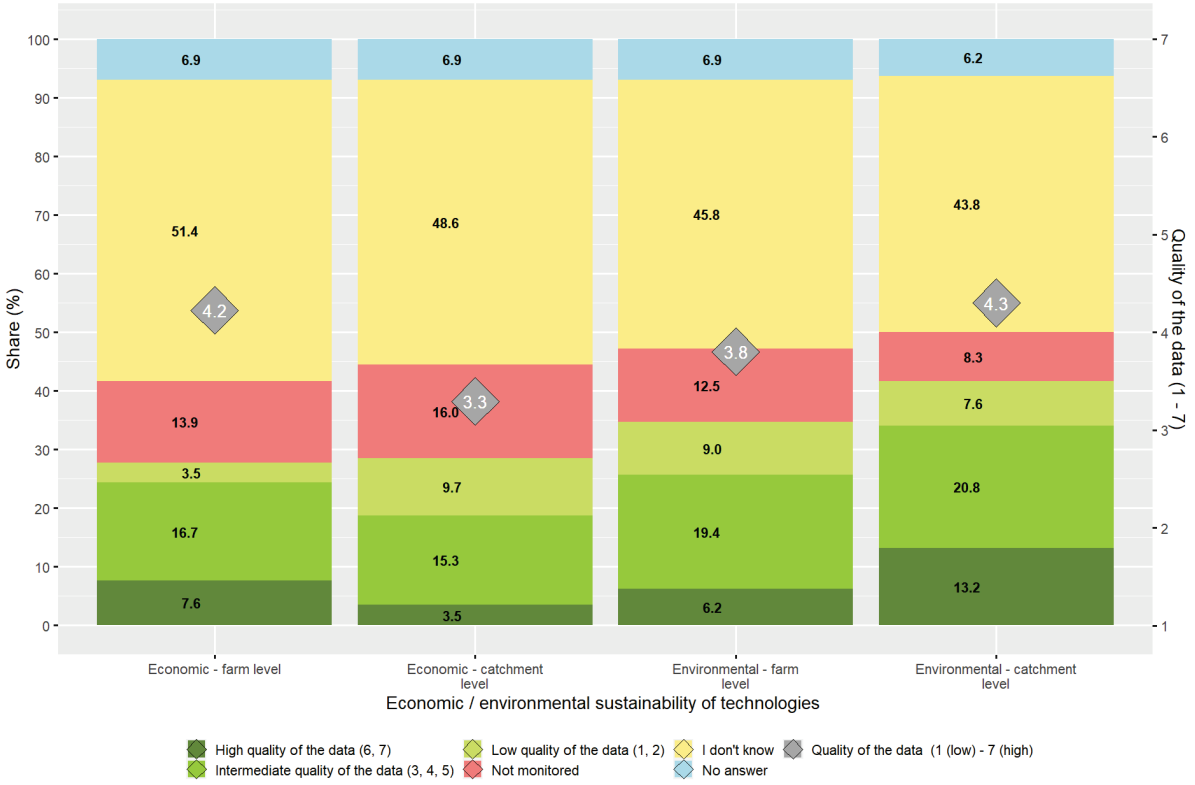

Importance of promotion type (1 - 7)
Financial support/subsidies
Penalties
Legal framework support in non. financial way
Expects voluntary action no legal or financial support
other
Answer
Pannonian
Boreal
Continental
3.2
3.6
4.8
4.6
5.7
5.6
4.5
4.2
4.0
5.2
4.4
3.8
3.5
3.2
4.0
0 10 20 30 40 50 60 70 80 90 100
Share (%)
Yes, supported
Not supported
I don't know
No answer
Importance rate of promotion type (1 (low) - 7 (high))

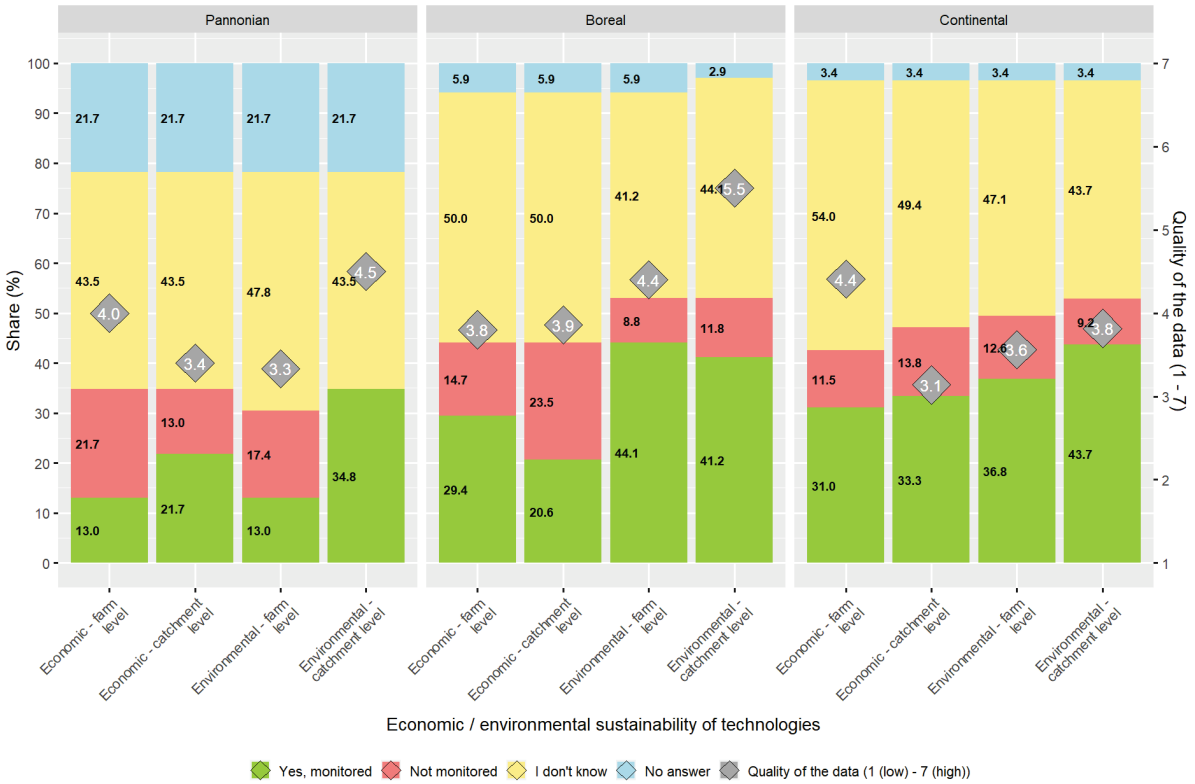

Importance rate of promotion (1 - 7)
Financial support/subsidies
Penalties
Legal framework support in non. financial way
Expects voluntary action no legal or financial support
other
Answer
Pannonian
Boreal
Continental
3.2
3.6
4.8
4.6
5.7
5.6
4.5
4.2
4.0
5.2
4.4
3.8
3.5
3.2
4.0
0 10 20 30 40 50 60 70 80 90 100
Share (%)
High importance (6, 7)
Intermediate importance (3, 4, 5)
Low importance (1, 2)
Not supported
I don't know
No answer
Importance rate of promotion (1 (low) - 7 (high)

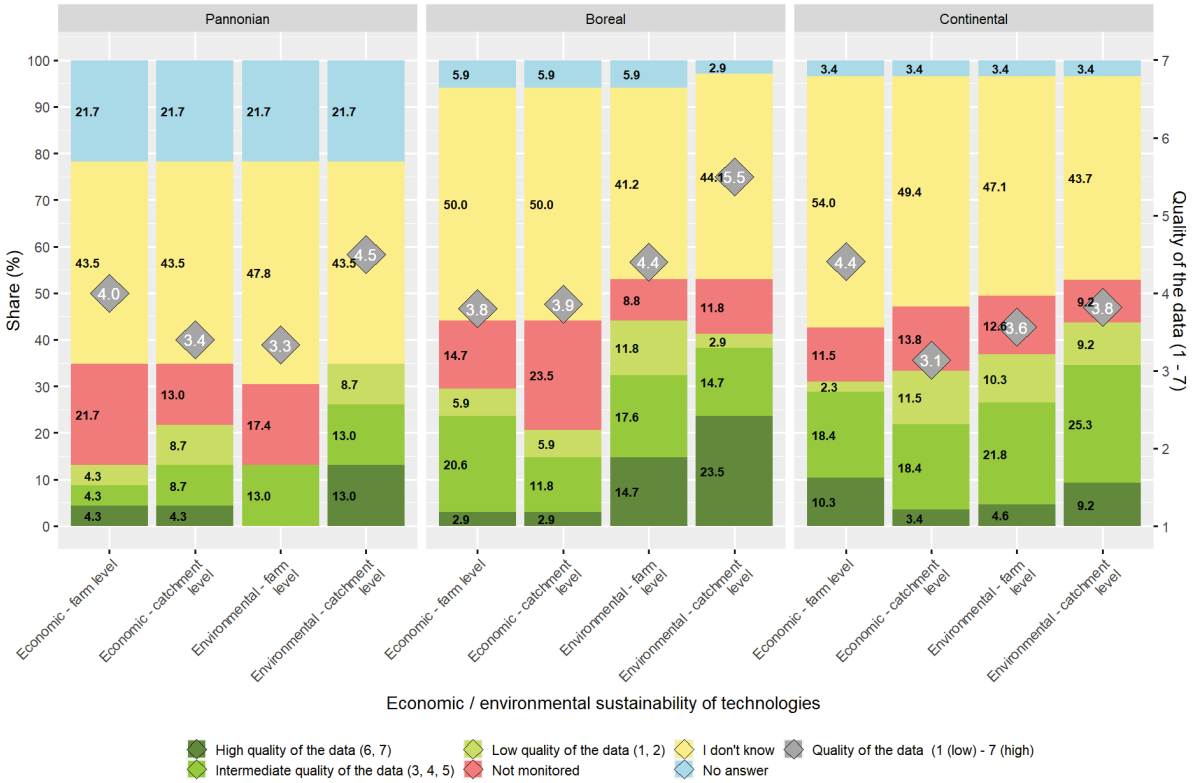
20. Is the economic or environmental sustainability of technologies recorded/monitored at the farm or small catchment level?

Answer:	*I do not know (x)*	No	Yes (rate the quality of data)						
Economic – farm level		0	1	2	3	4	5	6	7
Economic – catchment level		0	1	2	3	4	5	6	7
Environmental – farm level		0	1	2	3	4	5	6	7
Environmental – catchment level		0	1	2	3	4	5	6	7
		not	low		intermediate			high	
Give an example from your field of expertise	*Text*								



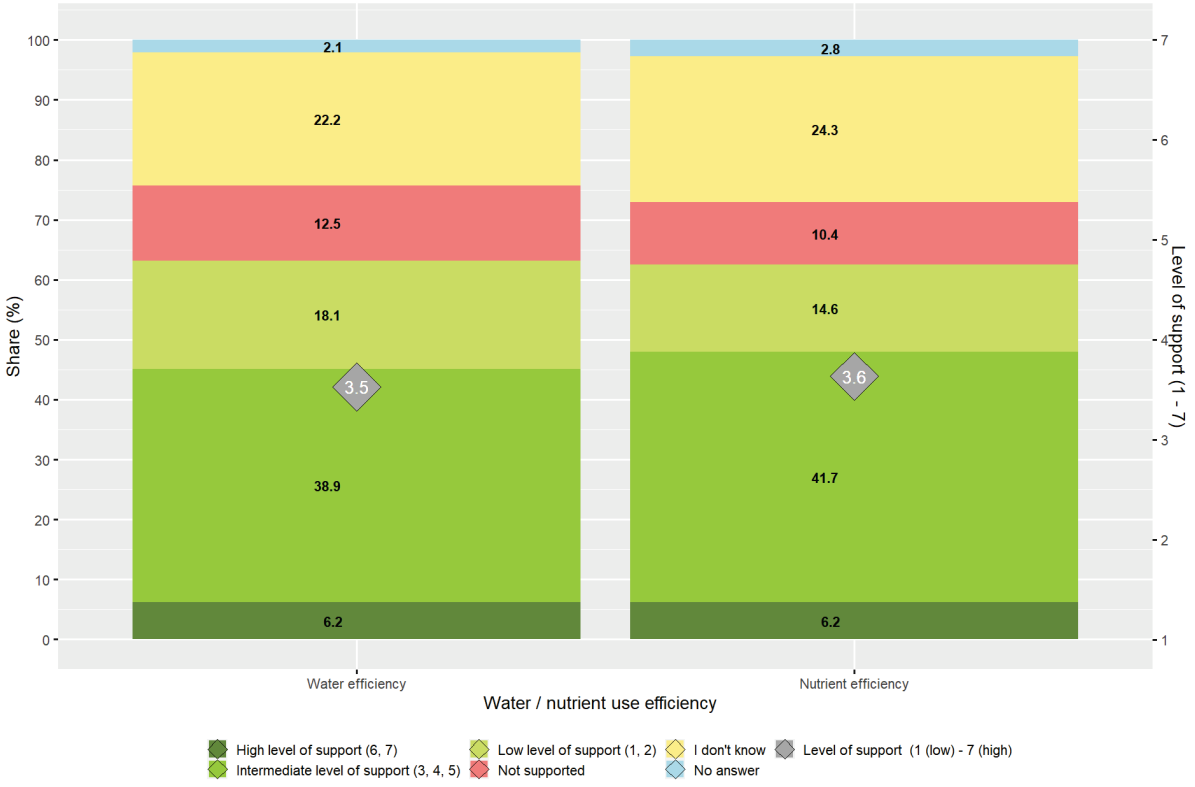

Share (%)
Quality of the data (1 - 7)
6.9
51.4
13.9
3.5
16.7
7.6
4.2
6.9
48.6
16.0
9.7
15.3
3.5
3.3
6.9
45.8
12.5
9.0
19.4
6.2
3.8
6.2
43.8
8.3
7.6
20.8
13.2
4.3
Economic - farm level
Economic - catchment level
Environmental - farm level
Environmental - catchment level
Economic / environmental sustainability of technologies
High quality of the data (6, 7)
Intermediate quality of the data (3, 4, 5)
Low quality of the data (1, 2)
Not monitored
I don't know
No answer
Quality of the data (1 (low) - 7 (high)


Pannonian
Boreal
Continental
Share (%)
Quality of the data (1 - 7)
Economic - farm level
Economic - catchment level
Environmental - farm level
Environmental - catchment level
Economic / environmental sustainability of technologies
Yes, monitored
Not monitored
I don't know
No answer
Quality of the data (1 (low) - 7 (high))

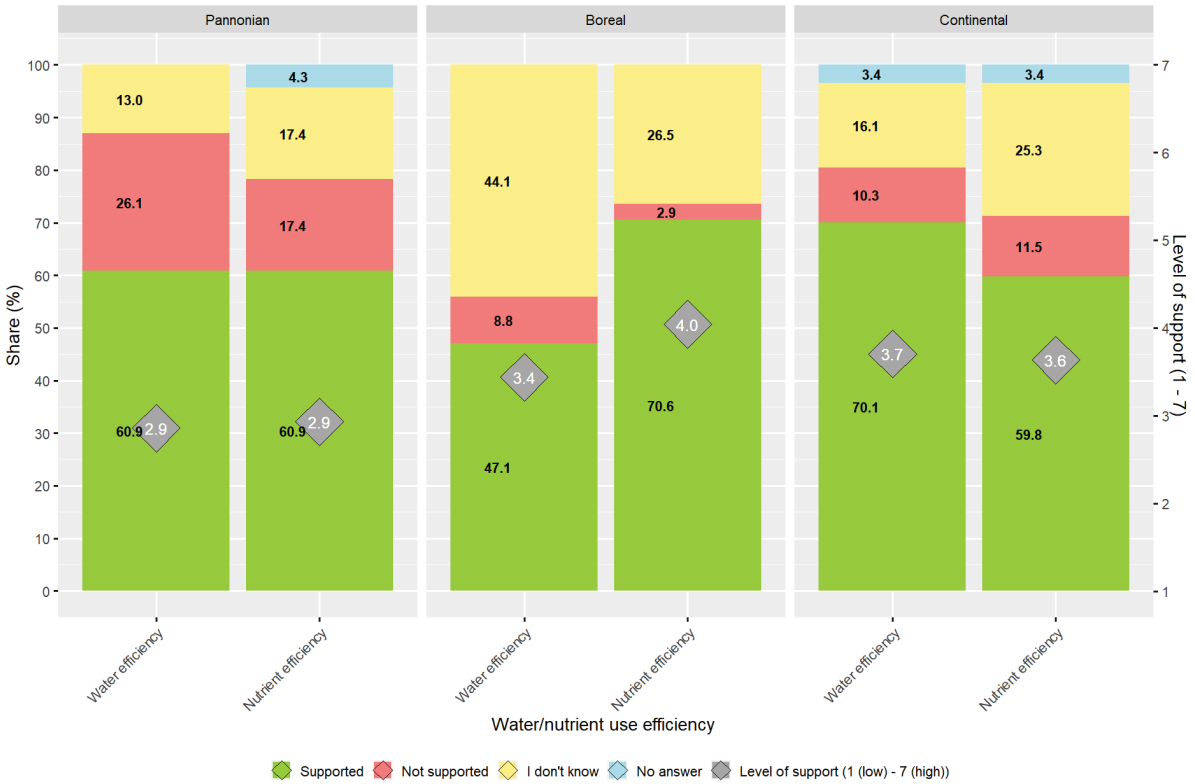

Pannonian
Boreal
Continental
Share (%)
Quality of the data (1 - 7)
Economic - farm level
Economic - catchment level
Environmental - farm level
Environmental - catchment level
Economic / environmental sustainability of technologies
High quality of the data (6, 7)
Intermediate quality of the data (3, 4, 5)
Low quality of the data (1, 2)
Not monitored
I don't know
No answer
Quality of the data (1 (low) - 7 (high)

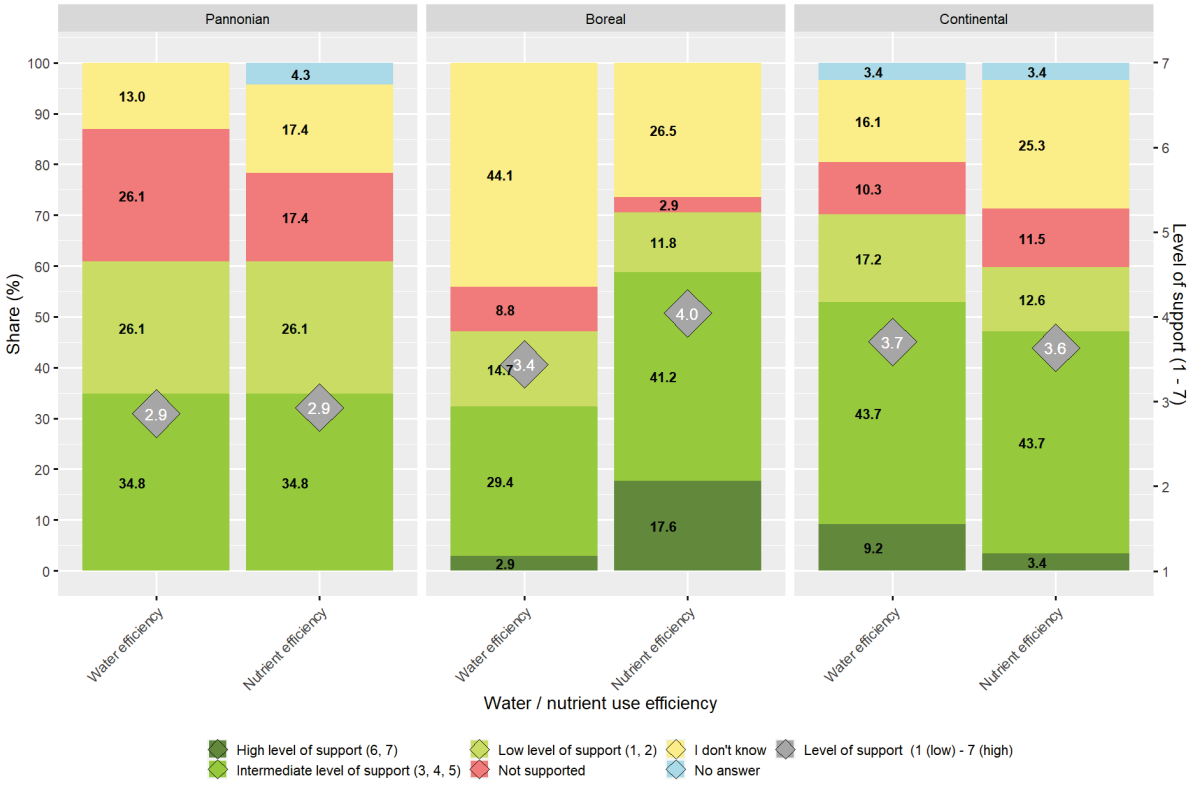
21. Is, to your knowledge, water/nutrient use efficiency supported in your national policy/legislation?

Answer:	*I do not know (x)*	No	Yes – (rate the level of support)						
Water efficiency		0	1	2	3	4	5	6	7
Nutrient efficiency		0	1	2	3	4	5	6	7
		not	low support		intermediate			high support	
Give a practical example from your field of expertise	*Text*								



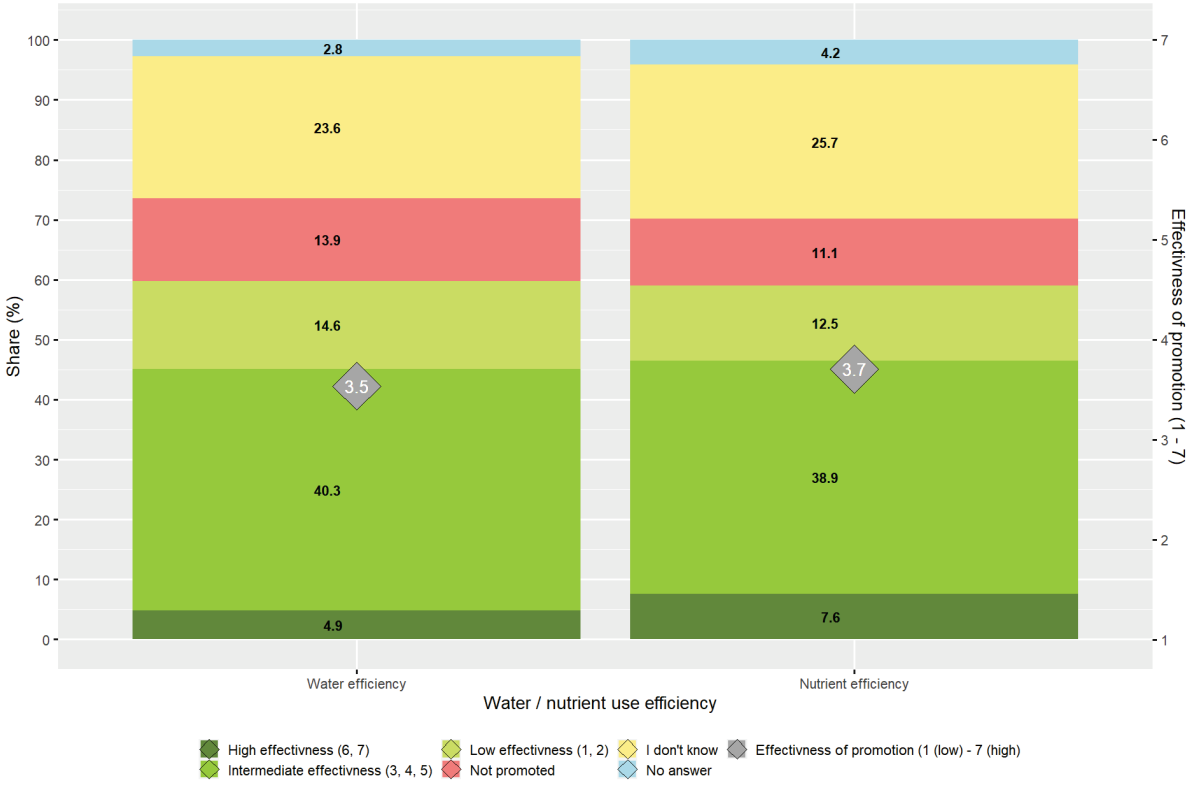

2.1
22.2
12.5
63.2
3.5
2.8
24.3
10.4
62.5
3.6
Share (%)
Level of support (1 - 7)
Water efficiency
Nutrient efficiency
Water/nutrient use efficiency
Supported
Not supported
I don't know
No answer
Level of support (1 (low) - 7 (high))

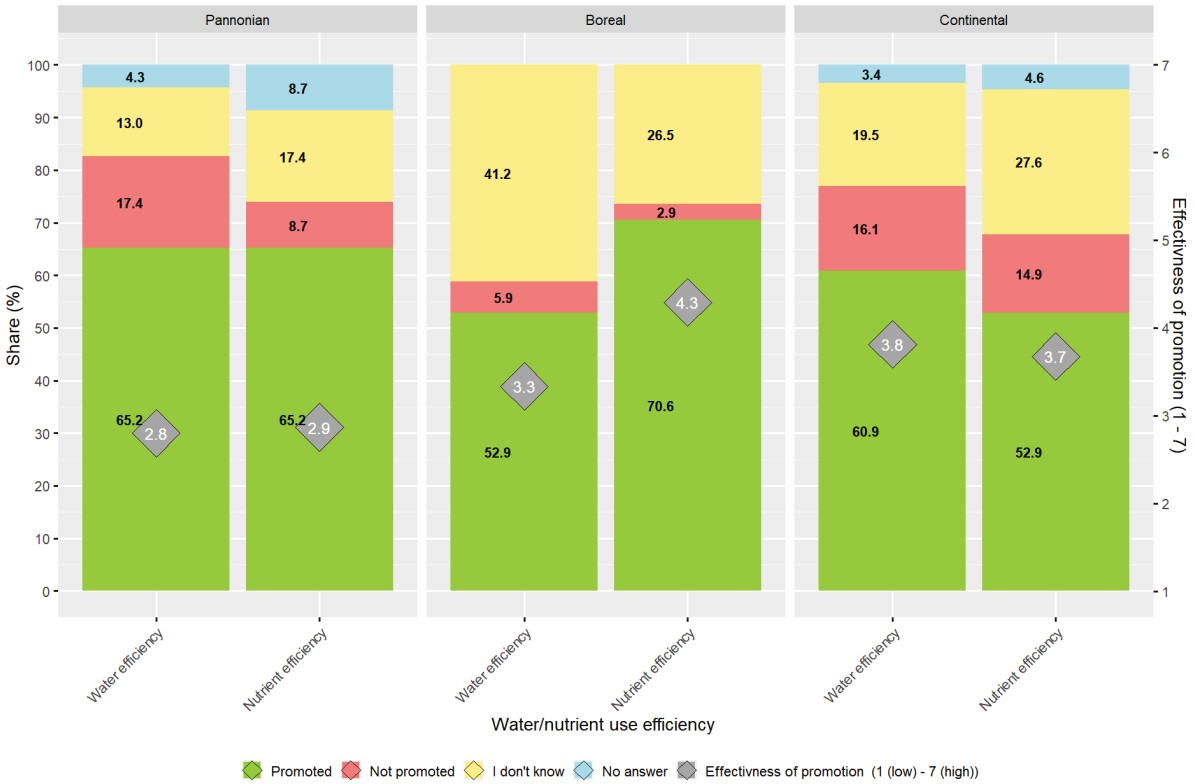

Pannonian
Boreal
Continental
Share (%)
Level of support (1 - 7)
13.0
26.1
60.9
2.9
4.3
17.4
17.4
60.9
2.9
44.1
8.8
47.1
3.4
26.5
2.9
70.6
4.0
3.4
16.1
10.3
70.1
3.7
3.4
25.3
11.5
59.8
3.6
Water efficiency
Nutrient efficiency
Water/nutrient use efficiency
Supported
Not supported
I don't know
No answer
Level of support (1 (low) - 7 (high))

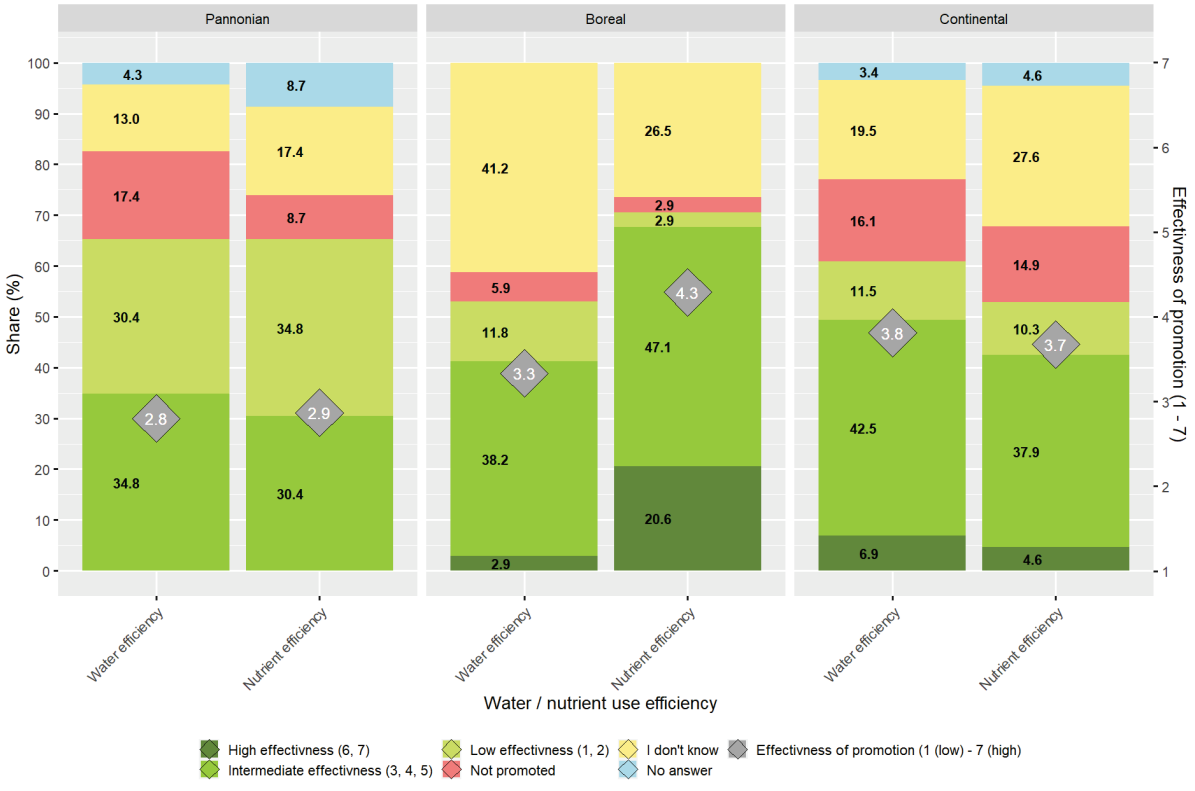

Pannonian
Boreal
Continental
Share (%)
Level of support (1 - 7)
13.0
26.1
26.1
2.9
34.8
4.3
17.4
17.4
26.1
2.9
34.8
44.1
8.8
14.7
3.4
29.4
2.9
26.5
2.9
11.8
4.0
41.2
17.6
3.4
16.1
10.3
17.2
3.7
43.7
9.2
3.4
25.3
11.5
12.6
3.6
43.7
3.4
Water efficiency
Nutrient efficiency
Water / nutrient use efficiency
High level of support (6, 7)
Intermediate level of support (3, 4, 5)
Low level of support (1, 2)
Not supported
I don't know
No answer
Level of support (1 (low) - 7 (high)

22. Is water/nutrient use efficiency effectively promoted among end-users?

Answer:	*I do not know (x)*	No	Yes (rate the effectiveness of promotion)						
Water efficiency		0	1	2	3	4x	5	6	7
Nutrient efficiency		0	1	2	3	4x	5	6	7
		not	low		intermediate			high	
Give an example from your field of expertise	*Text*								

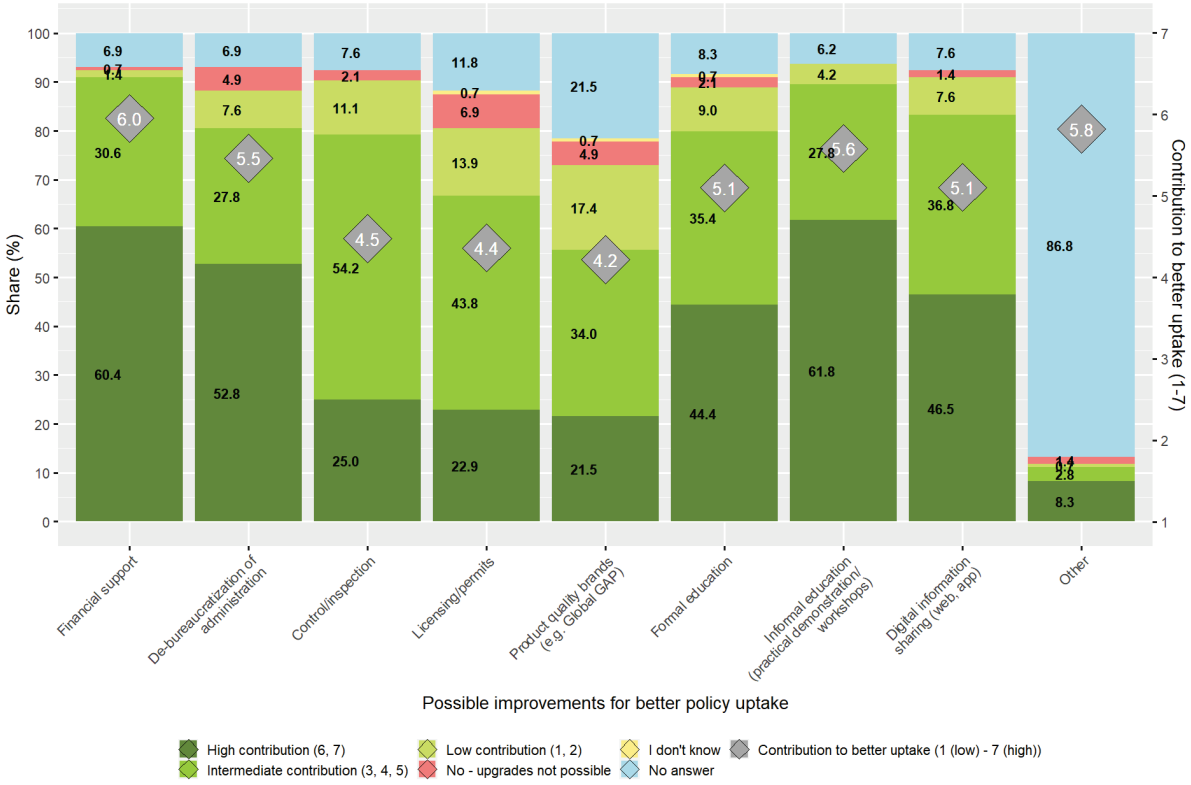

Share (%)
Effectivness of promotion (1 - 7)
2.8
23.6
13.9
14.6
3.5
40.3
4.9
4.2
25.7
11.1
12.5
3.7
38.9
7.6
Water efficiency
Nutrient efficiency
Water / nutrient use efficiency
High effectivness (6, 7)
Intermediate effectivness (3, 4, 5)
Low effectivness (1, 2)
Not promoted
I don't know
No answer
Effectivness of promotion (1 (low) - 7 (high)

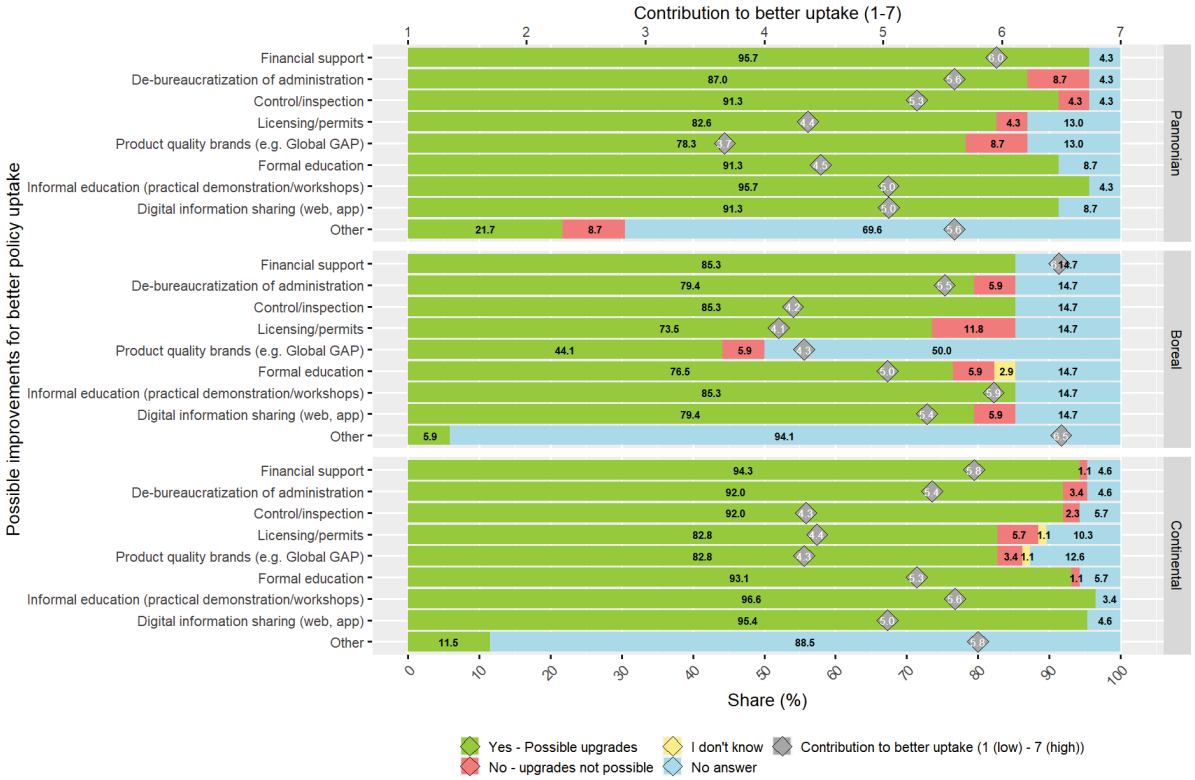

Pannonian
Boreal
Continental
Share (%)
Effectivness of promotion (1 - 7)
Water efficiency
Nutrient efficiency
Water/nutrient use efficiency
Promoted
Not promoted
I don't know
No answer
Effectivness of promotion (1 (low) - 7 (high))

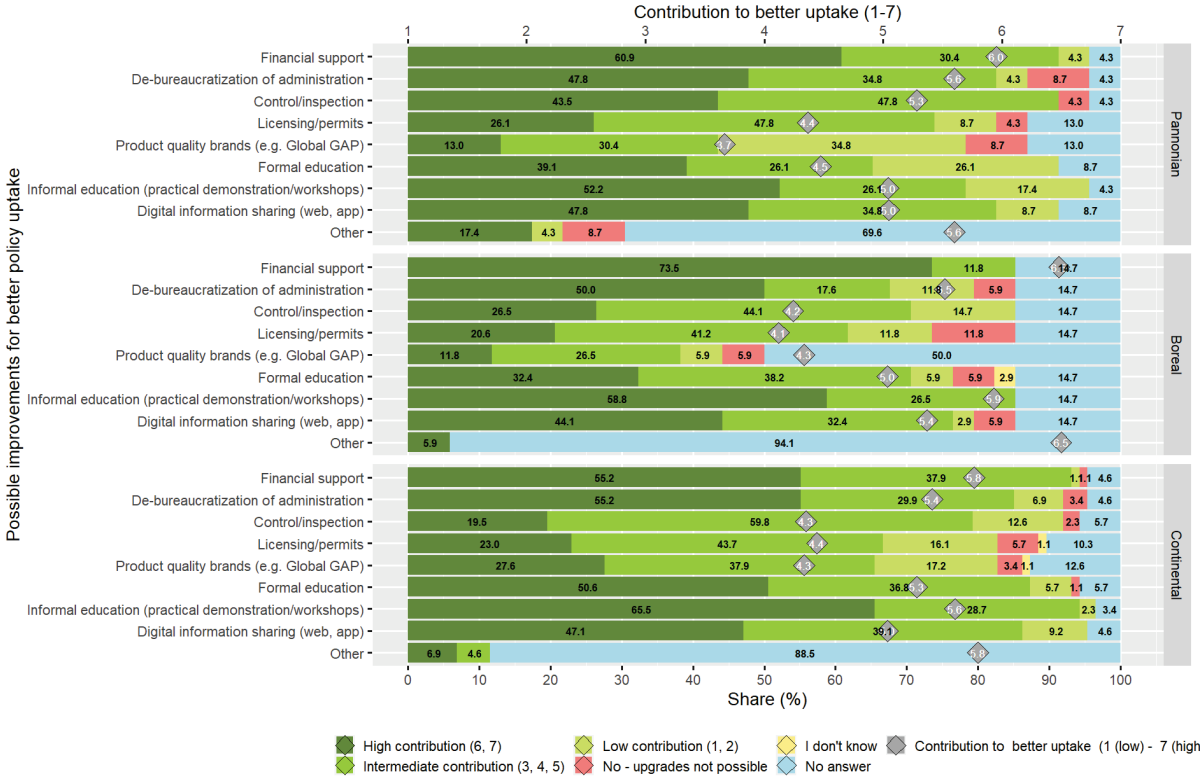

Pannonian
Boreal
Continental
Share (%)
Effectivness of promotion (1 - 7)
Water efficiency
Nutrient efficiency
Water / nutrient use efficiency
High effectivness (6, 7)
Intermediate effectivness (3, 4, 5)
Low effectivness (1, 2)
Not promoted
I don't know
No answer
Effectivness of promotion (1 (low) - 7 (high)

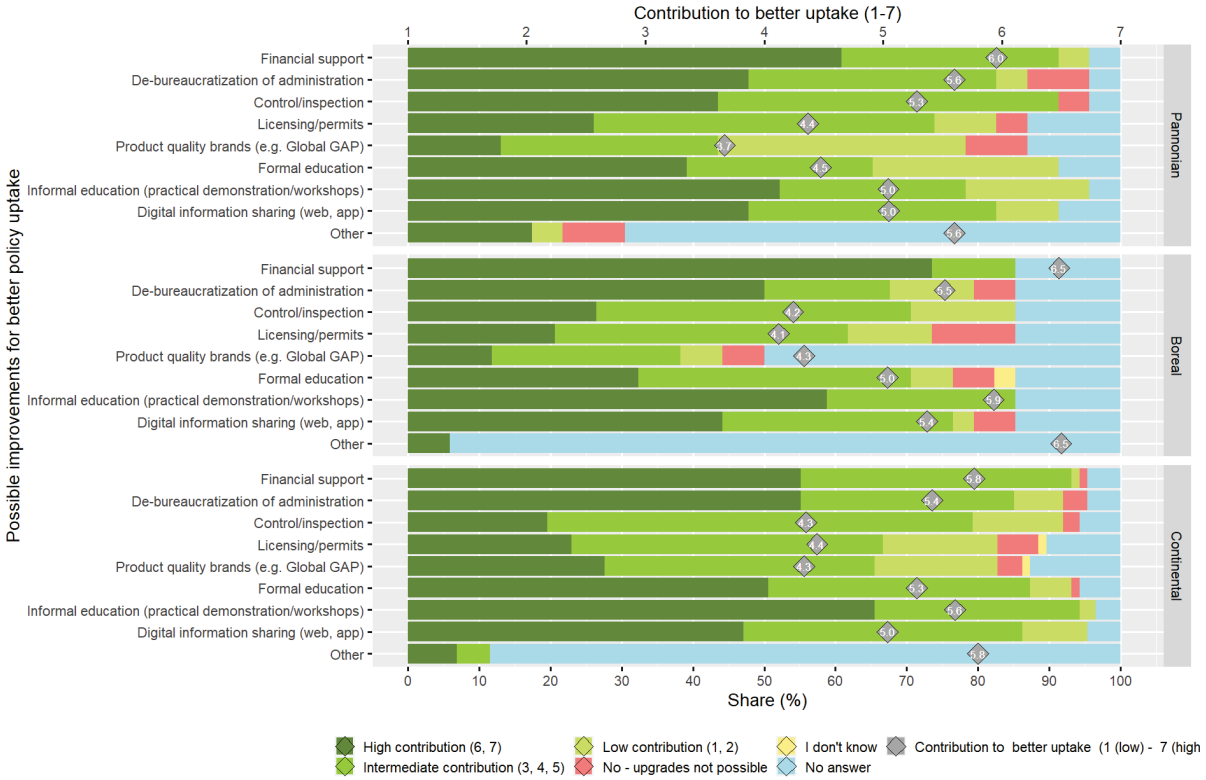
23. How should be the policy/legislation (in general) upgraded to improve uptake/implementation of water and nutrient retention measures? If any?

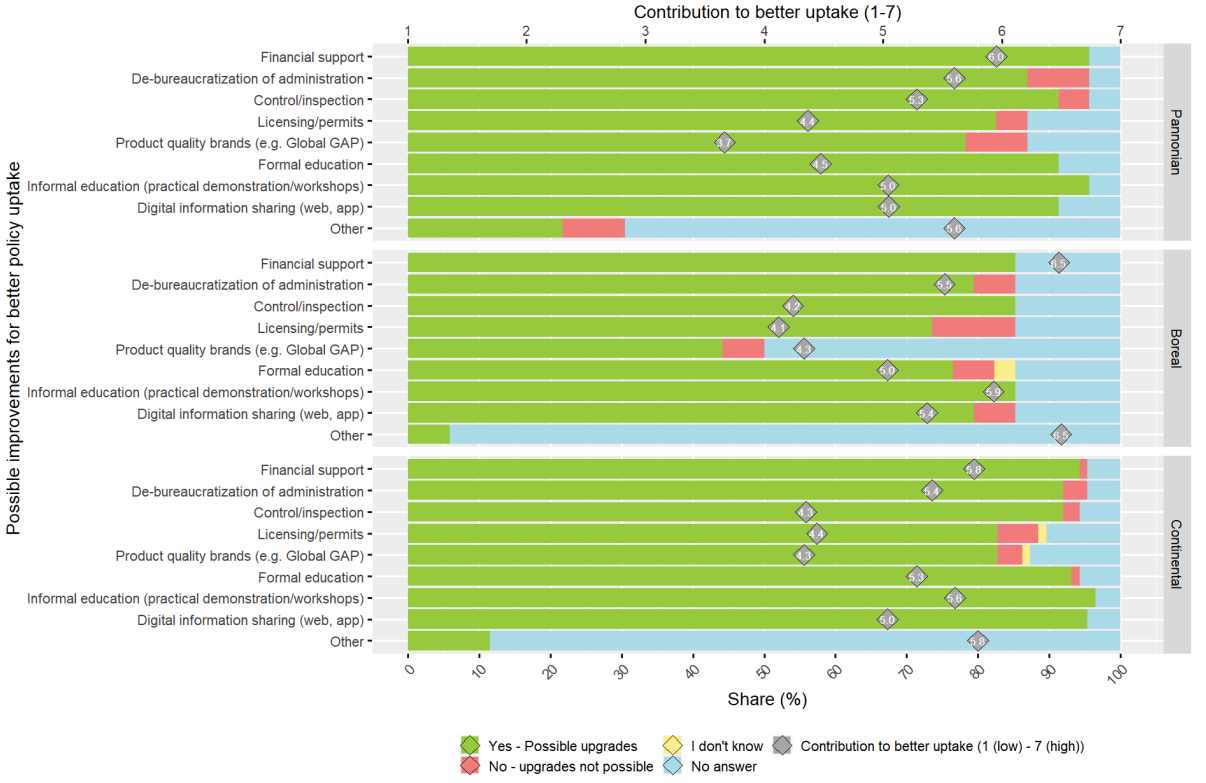
Type of support	No	Yes (rate the contribution to better uptake/implementation)						
financial support	0	1	2	3	4	5	6	7
de-bureaucratisation of administration	0	1	2	3	4	5	6	7
control/inspection	0	1	2	3	4	5	6	7
licensing/permits	0	1	2	3	4	5	6	7
product quality brands (e.g. Global GAP)	0	1	2	3	4	5	6	7
formal education	0	1	2	3	4	5	6	7
informal education (practical demonstration/workshops)	0	1	2	3	4	5	6	7
digital information sharing (web, app)	0	1	2	3	4	5	6	7
other:_____	0	1	2	3	4	5	6	7
	No	low		intermediate			high	


Share (%)
Contribution to better uptake (1-7)
Financial support
De-bureaucratization of administration
Control/inspection
Licensing/permits
Product quality brands (e.g. Global GAP)
Formal education
Informal education (practical demonstration/ workshops)
Digital information sharing (web, app)
Other
Possible improvements for better policy uptake
High contribution (6, 7)
Intermediate contribution (3, 4, 5)
Low contribution (1, 2)
No - upgrades not possible
I don't know
No answer
Contribution to better uptake (1 (low) - 7 (high))


Contribution to better uptake (1-7)
Possible improvements for better policy uptake
Financial support
De-bureaucratization of administration
Control/inspection
Licensing/permits
Product quality brands (e.g. Global GAP)
Formal education
Informal education (practical demonstration/workshops)
Digital information sharing (web, app)
Other
Pannonian
Boreal
Continental
Share (%)
Yes - Possible upgrades
No - upgrades not possible
I don't know
No answer
Contribution to better uptake (1 (low) - 7 (high))


Contribution to better uptake (1-7)
Possible improvements for better policy uptake
Financial support
De-bureaucratization of administration
Control/inspection
Licensing/permits
Product quality brands (e.g. Global GAP)
Formal education
Informal education (practical demonstration/workshops)
Digital information sharing (web, app)
Other
Pannonian
Boreal
Continental
Share (%)
High contribution (6, 7)
Intermediate contribution (3, 4, 5)
Low contribution (1, 2)
No - upgrades not possible
I don't know
No answer
Contribution to better uptake (1 (low) - 7 (high


Contribution to better uptake (1-7)
Possible improvements for better policy uptake
Financial support
De-bureaucratization of administration
Control/inspection
Licensing/permits
Product quality brands (e.g. Global GAP)
Formal education
Informal education (practical demonstration/workshops)
Digital information sharing (web, app)
Other
Pannonian
Boreal
Continental
Share (%)
High contribution (6, 7)
Intermediate contribution (3, 4, 5)
Low contribution (1, 2)
No - upgrades not possible
I don't know
No answer
Contribution to better uptake (1 (low) - 7 (high


Contribution to better uptake (1-7)
Possible improvements for better policy uptake
Financial support
De-bureaucratization of administration
Control/inspection
Licensing/permits
Product quality brands (e.g. Global GAP)
Formal education
Informal education (practical demonstration/workshops)
Digital information sharing (web, app)
Other
Pannonian
Boreal
Continental
Share (%)
Yes - Possible upgrades
No - upgrades not possible
I don't know
No answer
Contribution to better uptake (1 (low) - 7 (high))

24. How should implementing measures addressing environmental concerns be supported in policy/legislation by policy-policy makers in your country (Environmental mainstreaming)? *Options: financial support to landowners, education of policy, makers-students-farmers-general population, governmental strategy etc*

	I do not know (x)	Current support is not adequate (x)	Current support is adequate (x)	**Comment and Propose support type**
water quantity - managing excess (flood protection)				Text
water quantity - shortages of water (drought-irrigation)				Text
water quantity – in-field water retention measures				Text
water quality – in-field nutrient retention measures				Text
water quality - nutrients recovery from streams				Text
climate change – mitigation/adaptation measures				Text
nature conservation				Text

Only tables in the Report D6.2.

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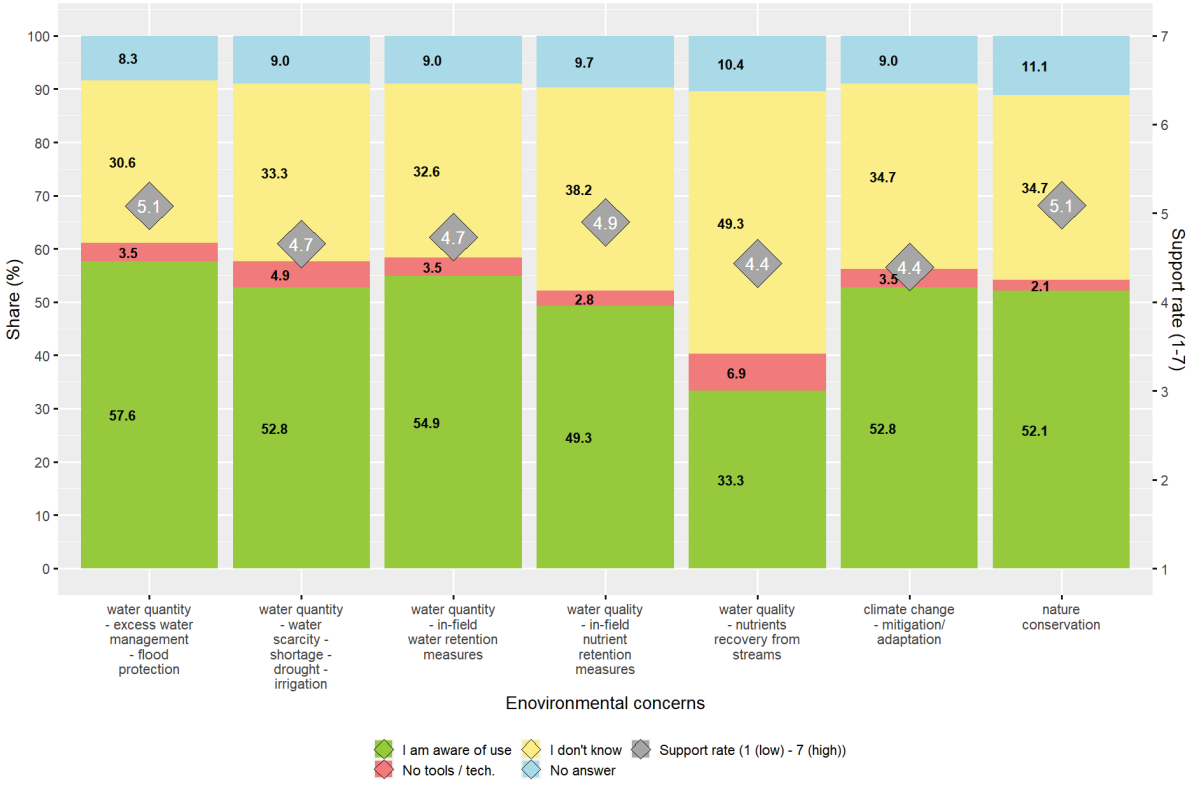
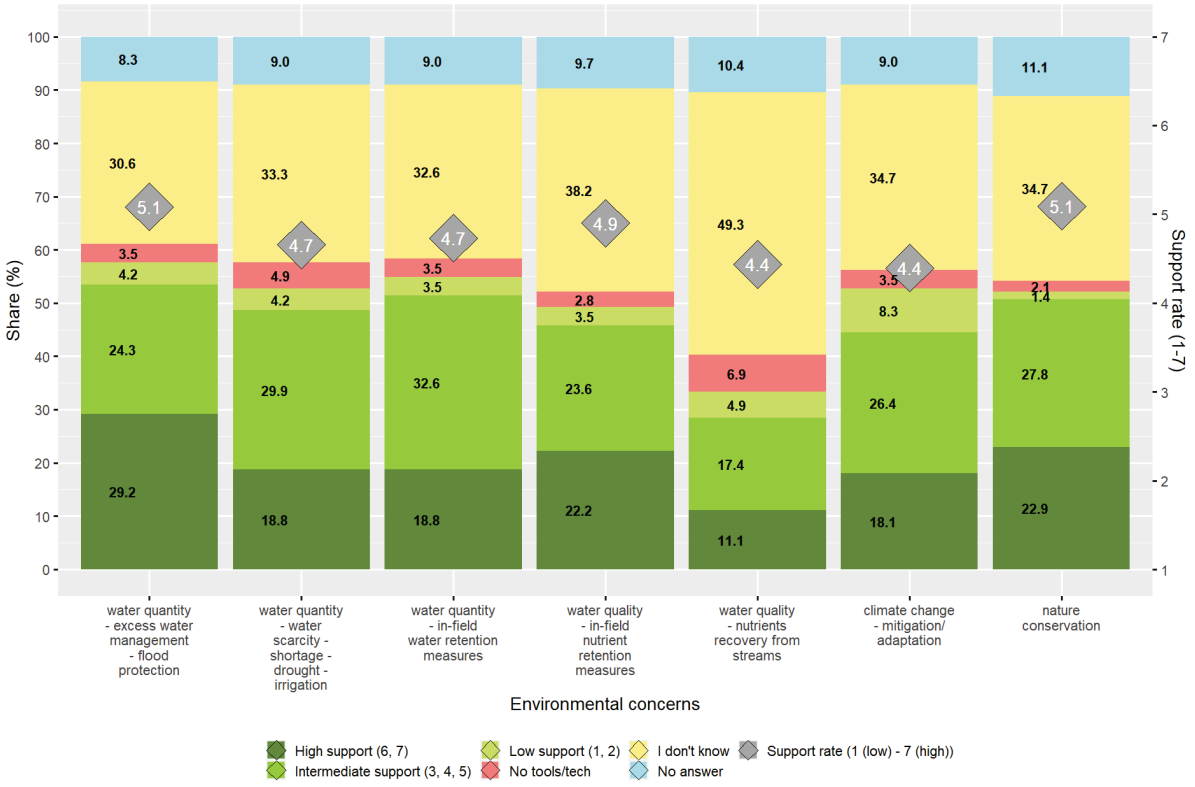
25. **Give examples of tools* or techniques* for presented environmental concerns if you are aware of their use in country/region/CSS. Rate the level of its support in solving presented environmental concerns.**

	I do not know (x)	NO tool/tech.	Rate the support							Give examples from your field of expertise
water quantity - excess water management – flood protection			1	2	3	4	5	6	7	*Text*
water quantity – water scarcity - shortage – drought - irrigation			1	2	3	4	5	6	7	*Text*
water quantity – in-field water retention measures			1	2	3	4	5	6	7	*Text*
water quality – in-field nutrient retention measures			1	2	3	4	5	6	7	*Text*
water quality - nutrients recovery from streams			1	2	3	4	5	6	7	*Text*
climate change – mitigation/adaptation			1	2	3	4	5	6	7	*Text*
nature conservation			1	2	3	4	5	6	7	*Text*
	I do not know (x)	NO	low		intermediate			high		

***Tools**: A tool is any instrument or a simple piece of equipment you hold in your hands and use to do a particular work. For example, spades, hammers, and knives are tools, as well as computer programs and apps. You can refer to anything that you use for a particular purpose as a particular type of tool.

***Techniques and technologies**: A technique is a particular method of doing an activity, usually involving practical skills. The technology of farming, the system of practices followed in crop growing. The object of agricultural technique is to assure high crop yield with minimal investment of labour and capital per unit of realised


Share (%)
Support rate (1-7)
8.3
9.0
9.0
9.7
10.4
9.0
11.1
30.6
33.3
32.6
38.2
49.3
34.7
34.7
5.1
4.7
4.7
4.9
4.4
4.4
5.1
3.5
4.9
3.5
2.8
6.9
3.5
2.1
57.6
52.8
54.9
49.3
33.3
52.8
52.1
water quantity - excess water management - flood protection
water quantity - water scarcity - shortage - drought - irrigation
water quantity - in-field water retention measures
water quality - in-field nutrient retention measures
water quality - nutrients recovery from streams
climate change - mitigation/ adaptation
nature conservation
Enovironmental concerns
I am aware of use
No tools / tech.
I don't know
No answer
Support rate (1 (low) - 7 (high))


Share (%)
Support rate (1-7)
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9.0
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4.4
5.1
3.5
4.9
3.5
2.8
6.9
3.5
2.1
4.2
4.2
3.5
3.5
3.5
1.4
24.3
29.9
32.6
23.6
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8.3
27.8
29.2
18.8
18.8
22.2
17.4
26.4
22.9
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climate change - mitigation/ adaptation
nature conservation
Environmental concerns
High support (6, 7)
Intermediate support (3, 4, 5)
Low support (1, 2)
No tools/tech
I don't know
No answer
Support rate (1 (low) - 7 (high))

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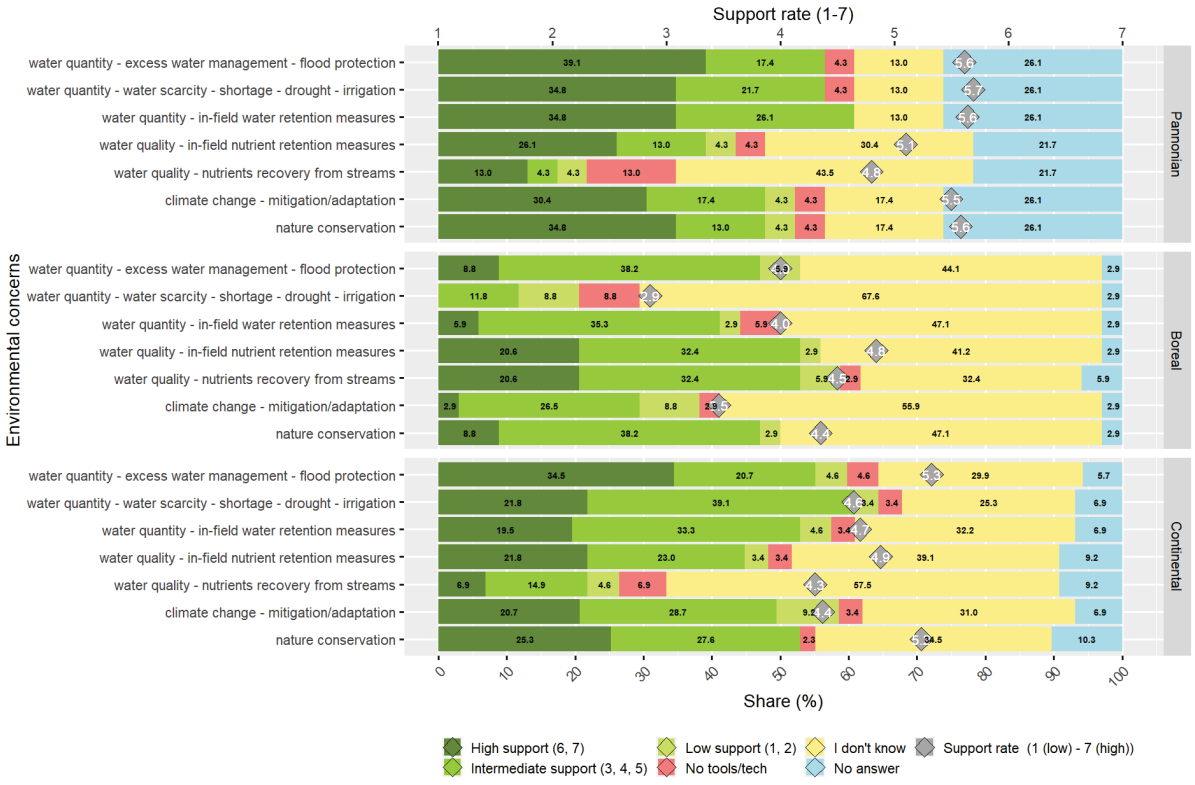
Support rate (1-7)
Enovironmental concerns
water quantity - excess water management - flood protection
water quantity - water scarcity - shortage - drought - irrigation
water quantity - in-field water retention measures
water quality - in-field nutrient retention measures
water quality - nutrients recovery from streams
climate change - mitigation/adaptation
nature conservation
Pannonian
Boreal
Continental
Share (%)
I am aware of use
No tools / tech.
I don't know
No answer
Support rate (1 (low) - 7 (high))


Support rate (1-7)
Environmental concerns
water quantity - excess water management - flood protection
water quantity - water scarcity - shortage - drought - irrigation
water quantity - in-field water retention measures
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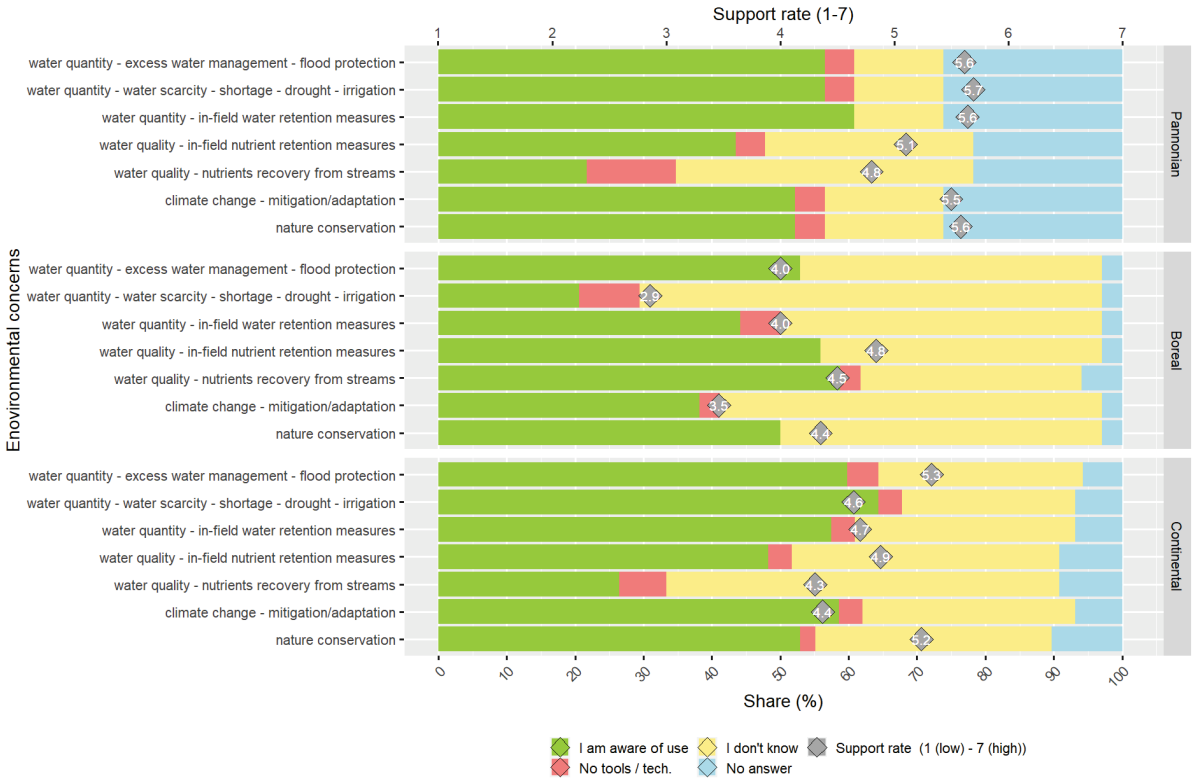
climate change - mitigation/adaptation
nature conservation
Pannonian
Boreal
Continental
Share (%)
High support (6, 7)
Intermediate support (3, 4, 5)
Low support (1, 2)
No tools/tech
I don't know
No answer
Support rate (1 (low) - 7 (high))


Support rate (1-7)
1
2
3
4
5
6
7
water quantity - excess water management - flood protection
water quantity - water scarcity - shortage - drought - irrigation
water quantity - in-field water retention measures
water quality - in-field nutrient retention measures
water quality - nutrients recovery from streams
climate change - mitigation/adaptation
nature conservation
Pannonian
Boreal
Continental
Environmental concerns
0
10
20
30
40
50
60
70
80
90
100
Share (%)
High support (6, 7)
Intermediate support (3, 4, 5)
Low support (1, 2)
No tools/tech
I don't know
No answer
Support rate (1 (low) - 7 (high))


Support rate (1-7)
1
2
3
4
5
6
7
water quantity - excess water management - flood protection
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climate change - mitigation/adaptation
nature conservation
Pannonian
Boreal
Continental
Enovironmental concerns
0
10
20
30
40
50
60
70
80
90
100
Share (%)
I am aware of use
No tools / tech.
I don't know
No answer
Support rate (1 (low) - 7 (high))