FAIRWAY
Farm System Management and Governance
for Good Water Quality and Drinking Water Supplies

FAIRWAY REPORT series

Scientific support for policies aiming at reducing diffuse nitrates and pesticides pollution of drinking water in Europe; synthesis report

Authors: Rozalija CVEJIĆ[1], Marina PINTAR[1], Gerard Velthof[1]

[1]University of Ljubljana (UL)

[2]Wageningen Research (WUR)

Nov., 29th, 2021

Version n. 1

Series: D7.4

This report was written in the context of the FAIRWAY project

www.fairway-project.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727984

DOCUMENT SUMMARY	
Project Information	
Project Title	Scientific support for policies aiming at reducing diffuse nitrates and pesticides pollution of drinking water in Europe; synthesis report
Project Acronym	FAIRWAY
Call identifier	H2020-RUR-2016-2
Topic	RUR-04-2016 Water farms – improving farming and its impact on the supply of drinking water
Grant agreement no	727984
Dates	2017-06-01 to 2021-05-31
Project duration	48 months
Website addresses	www.fairway-project.eu www.fairway-is.eu
Project coordination	Stichting Wageningen Research, NL
EU project representative & coordinator	Tatiana Tallarico (REA)
Project scientific coordinator	Gerard Velthof
EU project officer	Marta Iglesias (DG Agri)
Milestone information	
Title	
Authors	Rozalija CVEJIĆ, Marina PINTAR
Author email	rozalija.cvejic@bf.uni-lj.si
Deliverable number	D7.4
Workpackage	WP7
WP Lead	Marina Pintar
Type and dissemination level	
Editor	Rozalija CVEJIĆ
Due date	46
Publication date	
Copyright	© FAIRWAY project and partners

Version History		
Number & date	**Author**	**Revision**
November 29th, 2021	Rozalija CVEJIĆ	Marina Pintar, Gerard Velthof

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ADP	agricultural diffuse pollution with nitrates and pesticides
AG	action group
AWDI	agri-drinking water indicators
DST	decision support tool
EIP	European Innovation Partnership
FE	field examples
FG	focus Group
M	milestone
MAP	multi-actor approach
WP	work package
WP	work package

Scientific support for policies aiming at reducing diffuse nitrates and pesticides pollution of drinking water in Europe; synthesis report

Rozalija CVEJIĆ, Marina PINTAR

1. INTRODUCTION

FAIRWAY project (https://www.fairway-is.eu/index.php/results-in-brief/key-messages) reviewed approaches to protect drinking water resources against **agricultural diffuse pollution by nitrate and pesticides** (ADP), and identified, and further developed innovative measures and governance approaches for a more effective drinking water protection, together with stakeholders (Figure 1).

Deliverable (D) D7.4 is FAIRWAY synthesis report that focuses iterative process of knowledge and practice exchange between case studies and policy during the FAIRWAY project, resulting in an integrated scientific support. The aim of D7.4 is to report on exchange of knowledge and experience from case studies, multi-actor platforms and policy during the execution of the different tasks and work packages (WP2-6) of FAIRWAY, which are synthesized in an integrated scientific support for relevant EU-policies related to drinking water quality, i.e. the Drinking Water Directive, Nitrates Directive, Water Framework Directive, and Directive on the Sustainable Use of Pesticides, as well the Common Agricultural Policy.

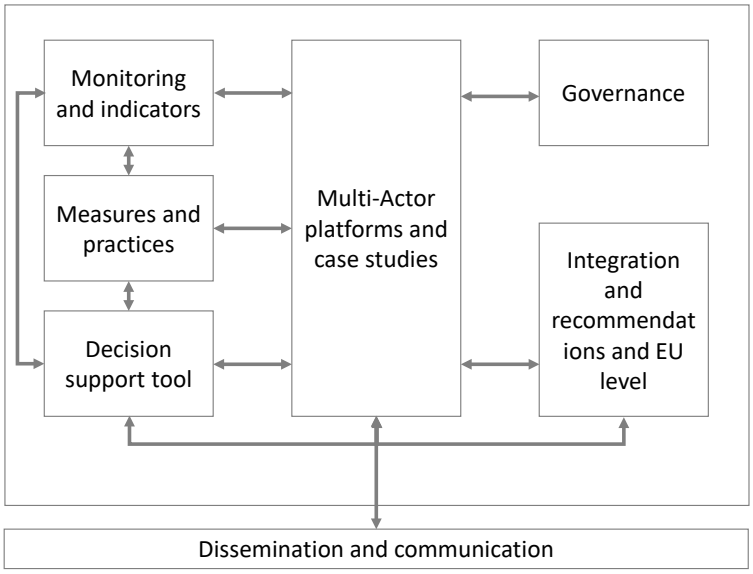

Figure 1: The FAIRWAY approach to advancing protection of drinking water resources against agricultural diffuse pollution by nitrate and pesticides.

In Europe we have a clear need and a goal to produce adequate quantities of safe and healthy foods using sustainable practices that protect human-health and environment. Controlling ADP is a complex task involving not only technical on-field measures, but ranges from improving genetic resources, establishing high value biological sites, reducing the use, processing to reduce the content in by-products, ensuring continued monitoring programmes, and supporting multi-actor platforms to accelerate measures

implementation in real life. Limiting ADP is a prerequisite to significantly contribute to reaching drinking water quality targets, and is an investment to improving public health, by also protecting biodiversity, promoting local businesses, and increasing climate change resilience of the rural and urban Europe.

There is an increasing agreement that advancing approaches and tools to reducing ADP requires stronger collaboration between science, policy and practice. In the EU the strong policy support to limit ADP reflect in numerous directives, transposed in national laws, including the Water Framework Directive (2000/60/EC, WFD), Drinking Water Directive (98/83/EC; 2020/2184/EC, DWD), Ground Water Directive (2006/118/EC, GWD), Nitrates Directive (91/676/EC, ND), and the Directive on Sustainable Use of Pesticides (2009/128/EC, SUD). Within Europe, the Common Agricultural Policy lays down the instruments for on-farm advancement of practices to protect the drinking water quality by reducing ADP, and streamlines agricultural practices that help improve ecosystem functions of rural areas and for promoting the uptake of best agricultural practices to promote “sustainable agricultural water management” (DG AGRI, 2021) on voluntarily bases.

Despite the comprehensive legislative endeavours, monitoring, and control mechanism, vast array of decision support tools (DSTs) on various decision-making levels, and high community engagement, protection of drinking water from diffused nitrates and pesticides pollution remain challenging in several aspects (see also the results of FAIRWAY WP6 on policy and governance and their key messages; https://www.fairway-is.eu/index.php/results-in-brief/key-messages). Important obstacles relate to continued provision of resources (time, finances, and facilitation) to enable meaningful engagement of stakeholder in multi-actor platforms to help connect stakeholder for advancing strategies related to limiting ADP (Nesheim et al., 2020). There is a lack of consistent databases to link pollution and mitigation measures that are required to monitor water quality (Laurencelle, M. et al 2021: D3.3). Our knowledge in relation to understanding of pollution swapping risks in setting up mitigation strategies still needs advancing (Ros, M. et al. 2020. D4.3). Furthermore unavailability or low use of DSTs for nitrogen and pesticides management on farms that include water quality is a significant obstacle to limiting ADP (Laursen et al.; 2019: D5.2).

A shared understanding on how water and agricultural governance cascades down from the EU to farm level and how this reflects in characteristics of governance and efficiency of policies is also low, and improved cross-referencing between policies is required to improve policy efficiency in the future (Boekhold et al., 2021: D6.5). Apart from that, low political will and scarce shared understanding of mechanism limit policy implementation which in turn increases policy implementation deficit in relation to limiting ADP (Železnikar et al., 2021: D7.1; Rudolf et al., 2021: D7.2; Glavan et al., 2019).

Further, there are constraints of general uniform payments and greening schemes in delivering environmental benefits (Boekhold et al., 2021: D6.5). The most effective on-field measures to reduce nitrate leaching to groundwater drinking water resources are balanced nitrogen fertilization (timing, method, rate, and source of application), reduced tillage, and cover and catch crops (Ros, M. et al. 2020. D4.3). While on-farm measures to reduce pesticides pollution (e.g. vegetative buffers, tillage practices) are effective at reducing off-site pollution, they are costly to install and maintain. And, although, such on-field measures contribute to reduced pesticides pollution for overland flow they are not sufficient to mitigate pesticides pollution. A combination of various measures is required to significantly reduce ADP (Commelin et al., 2018: D4.2), and should be based on local-adaptation and result-based action (Boekhold et al., 2021: D6.5). This is not a simple task and probably goes beyond the reach of many multi-actor platforms. Meaning local uptake of the “right combination” of measures will still heavily reply on cooperation of farmers with the agricultural extension service, and close cooperation of relevant local stakeholders in scientific multi-actor research-project projects (such as FAIRWAY, WATER PROTECT, SPRINT, etc.), but also through national research programmes and supported participation mechanism to foster co-innovation (such as European Innovation Partnerships).

Multi-actor platforms to support science policy practice interface are European Innovation Partnerships (EIPs). EIP-AGRI Focus Group (FG) provide in depth analysis of enabling factors to many of the measures for reducing ADP. However, the work of FG needs to be further advanced by looking also at measured measures efficiency, and the appropriate combination of measures in a given hydrological area that should

be couple with agri-environmental indicators and consistent water quality monitoring programmes (Cvejić and Pintar, 2021).

In this report we aim to synthesise main findings from FAIWRAY concerning (a) multi-actor platforms and their future role in reducing ADP, (b) policy implementation responsibility and how can science and policy better support stakeholder networks and individuals; (c) promising governance strategies and how can coherence and consistency of EU legislation and policy be improved to effectively protect drinking water resources at the local scale; (d) tracking the change and which are the good baselines for monitoring and indicators for future actions; promising measures and practices that we need to push forward to advance ADP, and (e) advancement and promotion of DSTs to help us on ground.

D7.4 synthesis report is especially relevant to those scientist, policy makers and practitioner that are looking into possible combination of strategies to reduce defuse pollution with nitrate and pesticides in agricultural drinking water catchments.

2. METHODS

2.1 THEORETICAL BACKGROUND

In framing the questions for the D7.4 synthesis report, we adopted the approach of Moore et al. (2015) who distinct between three types of scaling strategies that drive the system change. These include "scaling up" referring to institutional change, "scaling out" emphasizing replication in different social settings, and "scaling deep" referring to change triggered by changing participants' minds, values, and cultural practices.

The multi-actor approach (EC, 2020), that embodied FAIRWAY project in period 2017-2021, aimed at a more demand-driven innovation process that goes beyond just wide dissemination of the project results, with particular emphasis on inclusions of a wide array of stakeholders and their views with adequate involvement of various actors, especially end-users of project result.

Following the Moore et al. (2015) system change framework, the following three main questions raised by the synthesis report were:

- **Scale Deep:** How impactful was FAIRWAY project in terms of reaching cultural roots through multi-actor platforms; and how did this mechanism of participation change relationships, values and beliefs with respect to reducing diffuse agricultural pollution with nitrogen and pesticides at the local level?
- **Scale Up:** What are the main scientific findings of the FAIRWAY project and what is their relevance for laws and policies aiming at reducing diffuse agricultural pollution with nitrogen and pesticides at different levels (e.g. EU, river basin, catchment scale, regional, and municipal scale)?
- **Scale Out:** What impact did the Fairway project reach in terms of replication and dissemination, and which target groups and communities did it influence the most?

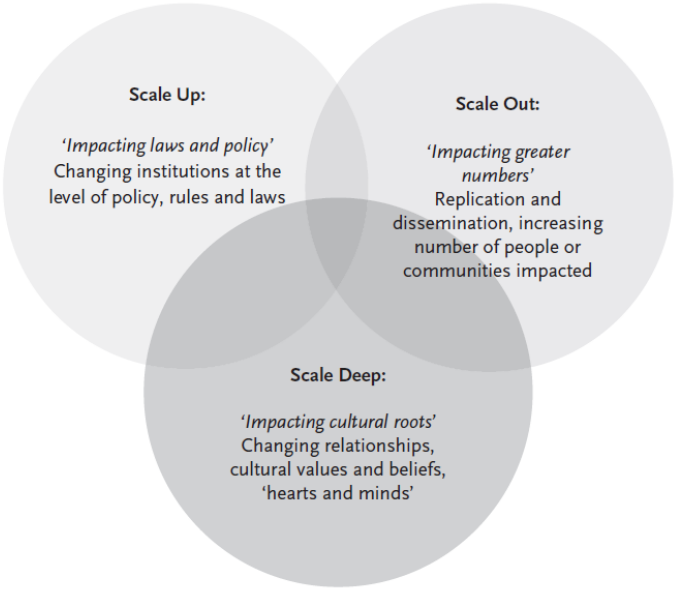

Figure 2: Scaling out, scaling up and scaling deep for social innovation (Adopted from Moore et al., 2015).

2.2 INTEGRATION FRAMEWORK

With reference to Figure 2, Table 1 provides the integration framework of project FAIRWAY outputs for constructing the synthesis report (for full authorship of sources used, see REFERENCES). All milestones, deliverables, key messages, and scientific publications were reviewed. Selected outputs were included in development of synthesis report on project outcomes and were used to identify the challenges to limiting ADP that lie ahead.

Table 1: The integration framework of project FAIRWAY outputs for constructing the synthesis report (for full authorship of sources used see chapter 4. References).

Scaling strategy:	Deliverable (D), milestone (MS), key messages (KM) or articles used
Scale Deep	Nesheim et al., 2021; MS 2.1; MS 2.2; D2.1, D2.2, D2.3, M3.1., KM
Scale Up	D3.1, D3.2, MS 4.1, MS 4.2, D4.1, 4.2, D5.1, D5.2, D5.3, D6.1, D6.2, M7.2, D7.1, D7.2; D7.3, Kim et al., 2020; Klages et al., 2020; Nicholson et al., 2020; Wuijts et al., 2021, Rowbottom et al. (in preparation); Cervalho et al., 2019; Graversgaard et al., 2018, KM
Scale Out	D7.1, D7.2, Glavan et al., 2019, KM, FAIRWAY evaluation indicators

2.3 CONSULTING ON END RESULT FINDINGS

In this synthesis report a special attention was given to consulting end-users on the end project findings. A multi-layered approach using several methods and tools was adopted to achieve wide dissemination on various levels.

To target specifically the EU level policy makers and organisations, a workshop with the EU-level actors was organised together with WP8 to present the final result of the WP2-7 and validate and cross-check the results on possibilities of integrating science as a support for relevant EU policies. The workshop entitled **"Reducing diffuse agricultural pollution with nitrogen and pesticides on farms: what can we do together?"** within the project FAIRWAY as a part of the work D7.4 was planned for the 23rd November 2021 at the Permanent Representation of the Republic of Slovenia in Brussels, Boulevard du Regent 45-46, 1000 Brussel, Belgium, and a chairman was confirmed. The rapid increase of covid-19 cases that

started at the beginning of November 2021 in practically all European countries was the main reason for cancelling the physical meeting in Brussels and continuing with an online workshop instead.

We successfully ensured the attendance of several key EU-level organisations (EIP AGRI and industry association CropLife Europe). However, despite several attempts, we were unable to confirm the presence of higher EU level policymakers, such as DGs ENV and AGRI or DG RTD, for a digital meeting (reasons stated: no resources or no relation to the topic).

Next, to target an international groups of experts and practitioners, a webinar was organised between WP2 and WP7 on the 24th November 2021, entitled **"Stakeholder engagement and governance arrangements in European agricultural drinking water catchments"** where some of the key findings of the FAIRWAY were discussed with representatives from EurEau, the European Federation of National Associations of Water Services, and COPA-COGECA, the united voice of farmers and agri-cooperatives in the EU. There were 80 participants. The findings were used to validate the results on possibilities of integrating science to support relevant EU policies targeting to diffuse agricultural pollution with nitrogen and pesticides as one of the main obstacles in achieving drinking water quality targets.

Additionally, **an online survey** for reaching out to EU policy makers, EU organisations, and others interested (such as scientist, national decision makers, farmer's advisors service, etc.) was launched on 17th November 2021. Of 97 clicks on the survey introduction, 44 clicked on the survey, and 32 at least partially finished the survey (see SURVEY ON END RESULT FINDINGS). Although the number of responses was relatively small and cannot represent a statistically representative sample of any of the key-stakeholder groups identified in the survey, summary results are presented in the appendix and give an indication of how useful the end findings are for the respondents.

3. SYNTHESIS

This chapter provide synthesis of the findings from FARIWAY with policy recommendations.

3.1 SCALE DEEP: SCIENCE TO LOCAL CHANGE RELEVANCE

Multi-actor approach (MAP) "promotes demand-driven innovation" of actors with "complementary" knowledge by engaging them in all phases of projects. The MAPs go beyond dissemination. The indication of their value is in "quantity and quality of knowledge exchange" that is crucial for co-innovation (EC, 2015).

FAIRWAY studied 13 case studies in 11 countries (MS 2.1; MS 2.2). Nesheim, et al. (2021) analysed in depth the functioning of 9 MAPs from 8 European countries (Denmark, England, Germany, Netherlands, Northern Ireland, Norway, Portugal and Slovenia).

Moreover, engagement in MAPs should improve possibility of mainstreaming solutions that are more likely to be applied as a result of collaboration that fosters co-design of ideas, which result in a feeling of co-ownership for eventual results (EC, 2015). However, one of the key messages from the FAIRWAY is that MAPSs are important for setting up joint strategies in cross-sectoral decision-making but not necessarily sufficient to achieve desired impacts (Nesheim, et al., 2021), which is an important indication for current policy challenge of MAPs in future.

MAPs included in the project FAIRWAY varied in terms of their engagement history and included MAPs in initial stage, to MAP with ongoing, and long history of engagement. Table 2 summarises how impactful was FAIRWAY project in terms of reaching cultural roots through MAPS, and how did this mechanism of participation change relationships, values and beliefs with respect to reducing diffuse agricultural pollution with nitrogen and pesticides at the local level.

Table 2: How did MAPs affect cultural roots and how did this mechanism of participation change relationships, values and beliefs with respect to reducing diffuse agricultural pollution with nitrogen and pesticides at the local level: experience from 9 MAPs from 8 European countries (derived based on the findings of Nesheim, et al., 2021).

For the stakeholders (stkh.) of recently established MAPs the most important outcomes of participation were Impact (Strong impact ✓✓; Some impact ✓; No impact)	**MAP history of engagement**		
	initial	**ongoing**	**long-term**
- Enable dialogue	✓✓	✓✓	✓
- Promote continuing dialogue	✓	✓	✓✓
- Better understand different perspectives	✓✓	✓✓	✓
- Support farmers bringing the change	✓	✓✓	✓
- Identify different views	✓✓	✓✓	✓
- Recognise main objectives of local stkh.	✓✓	✓✓	✓
- Identify further advancement needed	✓✓	✓✓	✓✓
- Identify the missing stkh.	✓✓	✓	✓
- Identify stkh. roles	✓✓	✓	✓
- Suggesting strategies for stkh. engagement	✓✓	✓✓	✓
- Increasing top-down support and recognition	✓	✓	✓
- Building on trust	✓✓	✓✓	✓
- New collaborations, field demonstrations and trials	○	✓✓	✓✓
- Understanding of scientific background to measures	✓✓	✓✓	✓✓
- Strengthen relationships	✓✓	✓✓	✓✓
- Evaluation and recognition of past engagement	○	✓	✓✓

The expectations were that stakeholders involved in recently established MAPs (such as in Greece and Romania) had the potential to benefit the most, and that the change would be the biggest in young MAPs. However the research showed that welcoming external facilitators and new actors (such as associated member that joined through the FAIRWAY project) into exiting network provided benefits also for MAPs with a longer history of involvement. The strong impact of science to local change through MAPs with a long history of involvement concentrates around promoting continues dialogue, identifying further advancements needed, establishing new collaboration, field demonstrations and trial, and evaluation and recognition of past engagement. Whereas the strong impact through MAPs that were just established or have a shorter history of engagement is more concentrated around for example enabling dialogue, promoting development of shared understanding, and suggesting strategies for future stakeholder engagement.

Improved understanding of scientific background to measures and their efficiency that was reported in all MAPs was promoted by engaging MAP members evaluating project findings (WP7), and evaluating concrete measures (WP4), agri-environmental indicators (WP3), DSSs (WP4) and governance arrangements (WP6). Current challenges of multi-actor platforms predefine its future role in contributing to limiting ADP. There are positive contributions of MAPs to solving complex socio-environmental problems if their functioning is supported on the long-term basis by skilled facilitators, and adequate financial resources (Nesheim, et al., 2021; MS 2.1; MS 2.2). Therefore, MAPs establishment is necessary in European agricultural drinking water catchments where water quality monitoring has indicated significant negative contribution of agricultural practices to diffuse nitrates and pesticides pollution. The focus should not be only on MAPs establishment and their functioning with the aim of establishing a share understanding of a problem and finding possible solutions, but should also be directed towards a change on the ground. Policy should therefore focus linking MAP activities to implementation of concrete measures clearly defining implementation mechanisms to reach the environmental change.

3.2 SCALE UP: SCIENCE TO POLICY RELEVANCE

FAIRWAY focused tracking the change and explored which are the good baselines for monitoring and indicators for future actions. Comprehensive list of it-/sensors and automatic sample techniques for pesticide and nitrate sampling is available (D3.1). FAIRWAY made an inventory of use, the need for and awareness of 55 agri-drinking water indicators (pressure, state) in all case studies (MS3.1) (AWDIs). The research from Kim et al. (2019) concludes that ADWIs need to be “scientifically-sound, straightforward and

simple". Their use depends on the actors and their focus in the water protection plan and the purpose, e.g. evaluation of mitigations measures on farm scale, catchment scale, time scale of protection plan, or evaluation of current conditions for water quality. The lag time between agricultural pressure and drinking water state was recognised as a key indicator to connect actors in shared understanding of the problem. Consistent databases to link pollution and mitigation measures are required to protect water quality, as it can take more than 10 years for the measures to reflect in groundwater quality monitoring depending on the type of catchment (D3.2). Agri-drinking water indicators are useful at all spatial levels from farm to EU (D3.1). It was identified that the N surplus indicator is the most effective and easy to use indicator regarding nitrate contamination of water, but there are considerable differences in how N budgets are calculated in different countries. The differences relate to whether the calculation uses the real or the standard values, which has consequences for comparing the calculations between regions, or let alone countries (Klages et al., 2020). On the contrary, expression pesticides is characterised by "over authorised 250 active substances" which is why simple index setup is more difficult and the ADWIs rely on treatment Frequency Index and Pesticide Load Index, and need to be supported by DPSLIR-model (driving force, pressure, state, link, impact, response) (D3.1).

FAIRWAY looked into the most promising measures, and which advanced measures and practices do we need to push forward. The most effective on-field measures to reduce nitrate leaching to groundwater drinking water resources are balanced nitrogen fertilization (timing, method, rate, and source of application), reduced tillage, and cover and catch crops (D4.1). Most promising measures with respect to pesticide pollution, which requires a combination of input reduction, farms system redesign, and point source mitigation. On-field measures (e.g. vegetative buffers, tillage practices) for reducing pesticide pollution are effective at reducing off-site pollution, but costly to install and maintain. Such on-field measures contribute to reduced pesticides pollution for overland flow but are not sufficient to mitigate pesticides pollution (D4.2). Some of the measures to reduce nitrate losses to ground and surface waters may increase the emission of the greenhouse gas nitrous oxide. It is important to consider pollution swapping risks in setting up mitigation strategies (D7.3).

To link the implementation of measures, with monitoring and efficiency of measures, the FAIRWAY concentrated DSTs and elaborated which we can use to help us on ground and how effective are they. Many useful DSTs are available for nitrogen and pesticide management of farms, but only few consider the effect on water quality is lacking (D5.1). Further development and research are needed to enhance the existing or develop new DSTs that target improving the efficiency of the resources used on-farm and measures directed to reducing losses to water (D5.2). In general, the benefits of using DSSs significantly outweigh the costs of using DSSs (D5.3).

The legislative framework that mainstreams limiting ADP is fragmented and complex (D6.2). Drinking Water Directive, Nitrates Directive, Water Framework Directive, and Directive on the Sustainable Use of Pesticides, and the Common Agricultural Policy frame a policy structure that has a unique governance cascade in each FAIRWAY case-study country. The impressions as developed in FAIRWAY visualize how water and agricultural governance cascades down from the EU to farm level. They may help: (1) Determine weaknesses of governance and policies; (2) Contribute to actions; (3) Enhance delivering the core messages across sectors and actors. The method takes a bottom-up approach, stakeholder perceptions, and includes active engagement with local actors. Further CAP revisions should focus on result-based schemes directed at implementing clear objectives (D6.2). These indicate better effects and cost-effectiveness than the uniform payments and greening schemes that have shown to be ineffective in delivering environmental benefits. Increased cross-referencing to protect drinking water resources will improve policy effectiveness and cost-effectiveness across different directives and policies aiming to protect drinking water resources (D6.1). A more facilitated cross-sectoral approach should be adopted to improve stakeholder networks, between institutional levels and hydrological scales, to attain policy objectives at local level (Wuijts et al., 2021).

3.3 SCALE OUT: SCIENCE TO SOCIAL REACH RELEVANCE

Research of Rudolf et al. (2019) shows that EU research project dissemination is not followed through to the highest decision making level due to several reasons (D7.2), most often related to loss of key messages, the use of too academic terminology, poor communication, and lack of uptake of bottom-up approaches. Among less exposed but nonetheless important reasons are also a lack of time from DG representatives. To bridge some of these gaps, FAIRWAY project was set up with high ambitions in term of products and digital platforms established, approaches undertaken facilitate cooperation between actors, and maximising the science-policy-practice impact (Figure 3).

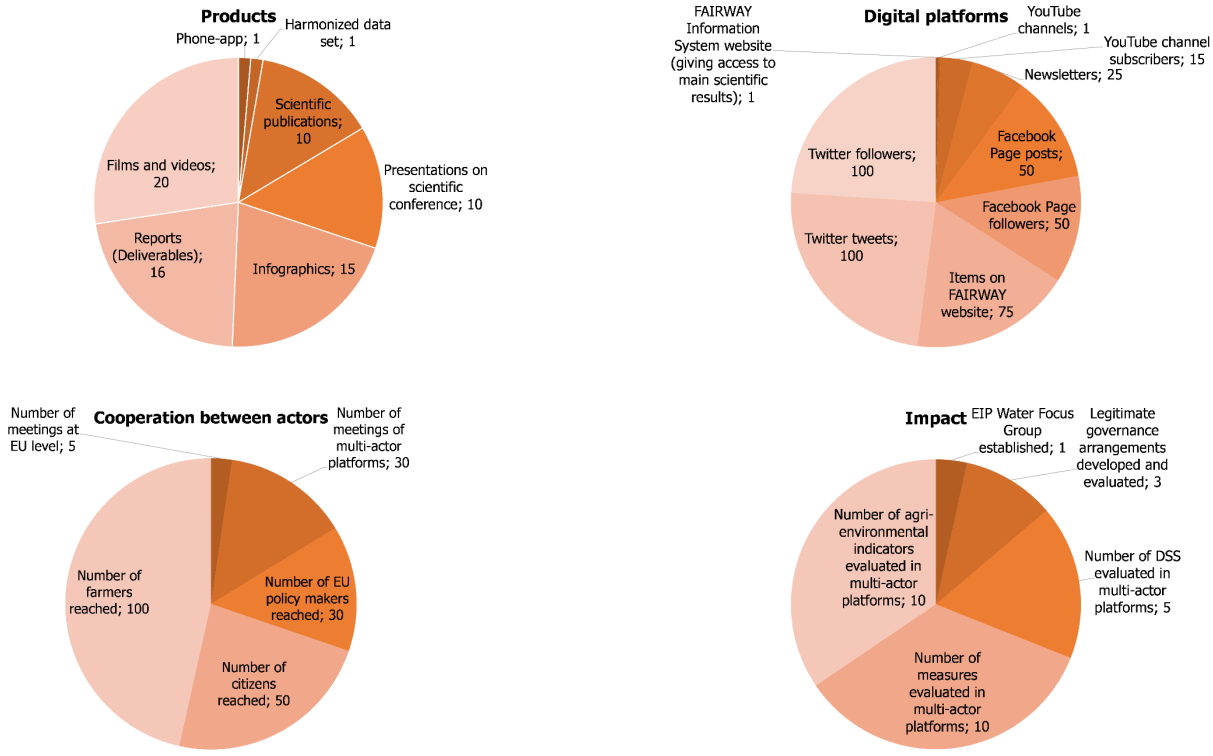

Figure 3: Scale out of the Fairway project: science to social reach relevance in terms of replication and dissemination, and which target groups and communities did it influence the most (https://www.fairway-project.eu/index.php/impact).

More information on the end achievement of the FAIRWAY can be found in the Final Periodic Report.

The FAIRWAY project explored the barriers to protecting water quality in the EU by involving stakeholders from various levels. The main obstacles are observed at the national or regional levels and relate to a lack of political will and scarce instruction on legislation implementation.

Project clustering (science, policy, stakeholders, and citizens) was recognised as a solution to enhance the role of science in the EU integrated policy-making process. The aim is to establish longer-term relationships and communication flows between scientists and policy makers, which will contribute to achieving more sustainable management of ecosystem (water, food) services.

Apart from that project FAIRWAY additionally included 32 respondent of research institutions, national decision makers, non-government organisations, and industry representatives (SURVEY ON END RESULT FINDINGS). The results of the survey indicate the selected key findings are mostly useful for the respondents, especially in relation to the role of the multi-actor platforms, the need for consistency of water quality monitoring databases, most promising nitrate reduction measures, the most effective on-field measures to reduce nitrate leaching to groundwater, and the findings on the barriers to protecting water quality in the EU by involving stakeholders from various levels (80% or more respondent indicated the findings are useful).

4. OUTLOOK

FAIRWAY project (https://www.fairway-is.eu/index.php/results-in-brief/key-messages) studied approaches to protect drinking water resources against ADP, and identified, and further developed innovative measures and governance approaches for a more effective drinking water protection, together with stakeholders.

Both Nitrates directive report (2022) and the European environment – state and outlook (2020) indicates agricultural nitrates pollution remain a considerable burden to the drinking water quality in Europe. Additionally, the European environment. More structural changes in farm models might be required for complying with the requirement of the Water Framework Directive. Moreover, Farm to Fork Strategy (EU Green Deal) aims at reduction of the use and risk of chemical and more hazardous pesticides by 50%, reduction of the use of fertilizers by 20%, reduction of nutrient loss by 50% with no deterioration on soil fertility. To achieve this, further strong collaboration between stakeholder networks (science-policy-practice) will be crucial.

It was recognized during the FAIRWAY project that the multi-actor networks established under different research projects stopped functioning after the end of the project. Considering the fact that success of multi-actor networks to continue connecting people for achieving environmental improvement in relation to agricultural practice require stable investments in terms of time, money and facilitation, the challenge is to search for options how multi-actor networks could continue their collaboration and continue to co-innovate and knowledge exchange after the research projects end. To provide for this project FAIRWAY has submitted a proposal for a new EIP AGRI FG to continue to link with the existing 13 case studies using to monitor the case study development and provide scientific support to the EU via the EIP instrument. EIP AGRI has shown to be a promising international tool to bridge the gap between science, policy and practice in relation to ADP. Reducing ADP for protecting drinking water quality is an important theme running through half 43 EIP AGRI FGs. While FGs do deep in individual strategies for reducing ADP and the related enabling factors and limitations, the focus on expected measure efficiency and the possible combinations of measures is still lacking. A more systematic and uniform approach needs to be undertaken with a clear indication which measures can be applied by whom and to what extent (stakeholder responsibility). EIP AGRI FGs have not yet addressed diffuse agricultural pollution with nitrogen and pesticides from the viewpoint of strengthening science-policy-practice interface by using agri-environmental indicators.

5. APPENDIX

5.1 SURVEY ON END RESULT FINDINGS

5.1.1 Survey

Introduction

FAIRWAY project (https://www.fairway-is.eu/index.php/results-in-brief/key-messages) reviewed approaches to protect drinking water resources against pollution by pesticides and nitrate, and identified, and further developed innovative measures and governance approaches for a more effective drinking water protection.

With this survey, we kindly ask you to express your opinion on the selected end findings of the FAIRWAY project. The survey takes approx. 12 minutes of your time.

Page 1
Q1

Please choose the type of institution you represent

Multiple answers possible

Research institution
Small or Medium size enterprise (SME)
Non-governmental organization (NGO)
EU institutions and bodies
Industry
Farmer
Other

Page 2
Q2

How useful are the below-listed FAIRWAY findings on MULTI-ACTOR PLATFORMS for your professional work?

	useful	neutral	not relevant
Multi-actor platforms connect actors, improve dialogue, increase awareness, enable knowledge transfer and enable inclusive policy-making. Therefore, it is necessary to support them long-term in terms of time, resources, and facilitation.			
Water Safety Plans support the multi-actor platforms by undertaking a gradual approach to ensure the safety of drinking water.			

Q3

How will you use the FAIRWAY findings on MULTI-ACTOR PLATFORMS for your professional work?

Enter answe

Page 3
Q4

How useful are the below-listed FAIRWAY findings on MONITORING WATER QUALITY for your professional work?

	useful	neutral	not relevant
Consistent databases to link pollution and mitigation measures are required to protect water quality. It can take more than 10 years to reflect in groundwater quality monitoring depending on the type of catchment.			
Some of the measures to reduce nitrate losses to ground and surface waters may increase the emission of the greenhouse gas nitrous oxide. It is important to consider pollution swapping risks in setting up mitigation strategies.			

Q5

How will you use the FAIRWAY findings on MONITORING WATER QUALITY for your professional work?

Enter answe

Page 4
Q6

How useful are the below-listed FAIRWAY findings on MEASURES FOR REDUCING AGRICULTURAL DIFFUSE NITRATE AND PESTICIDES POLLUTION for your professional work?

	useful	neutral	not relevant
The most effective on-field measures to reduce nitrate leaching to groundwater drinking water resources are balanced nitrogen fertilization (timing, method, rate, and source of application), reduced tillage, and cover and catch crops.			
On-field measures (e.g. vegetative buffers, tillage practices) for reducing pesticide pollution are effective at reducing off-site pollution, but costly to install and maintain. Such on-field measures contribute to reduced pesticides pollution for overland flow but are not sufficient to mitigate pesticides pollution.			

Q7

How will you use the FAIRWAY findings on MEASURES FOR REDUCING AGRICULTURAL DIFFUSE NITRATE AND PESTICIDES POLLUTION for your professional work?

Enter answe

Page 5
Q8

How useful are the below-listed FAIRWAY findings on DECISION SUPPORT SYSTEMS for your professional work?

	useful	neutral	not relevant
Many useful decision support tools are available for nitrogen and pesticide management of farms, but that the effect on water quality is lacking. Further development and research is needed to enhance the existing or develop new decision support tools that target improving the efficiency of the resources used on-farm			

	useful	neutral	not relevant
and measures directed to reducing losses to water.			

Q9

How will you use the FAIRWAY findings on DECISION SUPPORT SYSTEMS for your professional work?

Enter answe

Page 6
Q10

How useful are the below-listed FAIRWAY findings on GOVERNANCE AND POLICY for your professional work?

	useful	neutral	not relevant
The impressions as developed in FAIRWAY visualise how water and agricultural governance cascades down from the EU to farm level. They may help: (1) Determine weaknesses of governance and policies ; (2) Contribute to actions; (3) Enhance delivering the core messages across sectors and actors.			
Further CAP revisions should focus on result-based schemes directed at implementing clear objectives. These indicate better effects and cost-effectiveness than the uniform payments and greening schemes that have shown to be ineffective in delivering environmental benefits.			
Increased cross-referencing to protect drinking water resources will improve policy effectiveness and cost-effectiveness across different directives and policies aiming to protect drinking water resources			

Q11

How will you use the FAIRWAY findings on GOVERNANCE AND POLICY for your professional work?

Enter answe

Page 7
Q12

How useful are the below-listed FAIRWAY findings on SCIENCE AND POLICY SUPPORT for your professional work?

	useful	neutral	not relevant
The FAIRWAY project explored the barriers to protecting water quality in the EU by involving stakeholders from various levels. The main obstacles are observed at the national or regional levels and relate to a lack of political will and scarce instruction on legislation implementation.			
Project clustering (science, policy, stakeholders, and citizens) was recognised as a solution to enhance the role of science in the EU integrated policy-making process.			

Q13

How will you use the FAIRWAY findings on SCIENCE AND POLICY SUPPORT for your professional work?

Enter answe

Page 8
Q14

The Fairway project will be completed in November 2021.

After that, we will distribute the e-materials created as part of the project:
- Key Messages (https://www.fairway-is.eu/index.php/results-in-brief/key-messages),
- Links to reports and articles, and
- Contact address for detailed questions.

If you wish to receive the links to the final package of e-materials, please leave with us your email address.

Final Page

You have answered all the questions in this survey. Thank you for your engagement.

5.1.2 Selected survey results

Q1	Please choose the type of institution you represent	no.	%
Q1a	Research institution	12	38%
Q1b	Small or Medium size enterprise (SME)	1	3%
Q1c	Non-governmental organization (NGO)	4	13%
Q1d	EU institutions and bodies	3	9%
Q1e	Industry	1	3%

Q1f	Farmer	0	0%
Q1g	Other	12	38%
	SUM	32	100%

Q2	How useful are the below-listed FAIRWAY findings on MULTI-ACTOR PLATFORMS for your professional work?	useful	neutral	not relevant	SUM
Q2a	Multi-actor platforms connect actors, improve dialogue, increase awareness, enable knowledge transfer and enable inclusive policy-making. Therefore, it is necessary to support them long-term in terms of time, resources, and facilitation.	19	3	0	22
		86%	14%	0%	100%
Q2b	Water Safety Plans support the multi-actor platforms by undertaking a gradual approach to ensure the safety of drinking water.	11	9	3	23
		48%	39%	13%	100%

Q4	How useful are the below-listed FAIRWAY findings on MONITORING WATER QUALITY for your professional work?	useful	neutral	not relevant	SUM
Q4a	Consistent databases to link pollution and mitigation measures are required to protect water quality. It can take more than 10 years to reflect in groundwater quality monitoring depending on the type of catchment.	19	1	0	20
		95%	5%	0%	100%
Q4b	Some of the measures to reduce nitrate losses to ground and surface waters may increase the emission of the greenhouse gas nitrous oxide. It is important to consider pollution swapping risks in setting up mitigation strategies.	12	8	0	20
		60%	40%	0%	100%

Q6	How useful are the below-listed FAIRWAY findings on MEASURES FOR REDUCING AGRICULTURAL DIFFUSE NITRATE AND PESTICIDES POLLUTION for your professional work?	useful	neutral	not relevant	SUM
Q6a	The most effective on-field measures to reduce nitrate leaching to groundwater drinking water resources are balanced nitrogen fertilization (timing, method, rate, and source of application), reduced tillage, and cover and catch crops.	16	4	0	20
		80%	20%	0%	100%
Q6b	On-field measures (e.g. vegetative buffers, tillage practices) for reducing pesticide pollution are effective at reducing off-site pollution, but costly to install and maintain. Such on-field measures contribute to reduced pesticides pollution for overland flow but are not sufficient to mitigate pesticides pollution.	10	7	3	20
		50%	35%	15%	100%

Q8	How useful are the below-listed FAIRWAY findings on DECISION SUPPORT SYSTEMS for your professional work?	useful	neutral	not relevant	SUM
Q8a	Many useful decision support tools are available for nitrogen and pesticide management of farms, but that the effect on water quality is lacking. Further development and research is needed to enhance the existing or develop new decision support tools that target improving the efficiency of the resources used on-farm and measures directed to reducing losses to water.	15	3	1	19
		79%	16%	5%	100%

Q10	How useful are the below-listed FAIRWAY findings on GOVERNANCE AND POLICY for your professional work?	useful	neutral	not relevant	SUM

Q10a	The impressions as developed in FAIRWAY visualise how water and agricultural governance cascades down from the EU to farm level. They may help: (1) Determine weaknesses of governance and policies ; (2) Contribute to actions; (3) Enhance delivering the core messages across sectors and actors.	11	8	0	19
		58%	42%	0%	100%
Q10b	Further CAP revisions should focus on result-based schemes directed at implementing clear objectives. These indicate better effects and cost-effectiveness than the uniform payments and greening schemes that have shown to be ineffective in delivering environmental benefits.	13	5	1	19
		68%	26%	5%	100%
Q10c	Increased cross-referencing to protect drinking water resources will improve policy effectiveness and cost-effectiveness across different directives and policies aiming to protect drinking water resources	9	10	0	19
		47%	53%	0%	100%

Q12	How useful are the below-listed FAIRWAY findings on SCIENCE AND POLICY SUPPORT for your professional work?	useful	neutral	not relevant	SUM
Q12a	The FAIRWAY project explored the barriers to protecting water quality in the EU by involving stakeholders from various levels. The main obstacles are observed at the national or regional levels and relate to a lack of political will and scarce instruction on legislation implementation.	16	3	0	19
		84%	16%	0%	100%
Q12b	Project clustering (science, policy, stakeholders, and citizens) was recognised as a solution to enhance the role of science in the EU integrated policy-making process.	12	6	1	19
		63%	32%	5%	100%

5.2 MILESTONE 22

5.3 INTEGRATED SCIENTIFIC SUPPORT VIA THE EIP INSTRUMENT

5.3.1 INTRODUCTION

Agricultural production emissions continue to decrease drinking water quality through diffused nitrates and pesticides pollution throughout Europe. High levels of nitrates and pesticides in drinking water pose a threat to human-health (Golaki et al., 2022) and are the source of many environmental problems. ADP negatively effects biodiversity, water quality and contributes to climate change.

Agricultural diffuse pollution with nitrogen and pesticides (ADP) is one of the main obstacles to meeting drinking water quality targets. State-of-the-art review of approaches and tools indicates that coordination of participation among different level stakeholders to connect science, with policy and practice is crucial for progressing towards more effective and timely implementation of measures for reducing ADP (Glavan et al., 2019).

Field examples (FE) of applied measures for reducing ADP promote knowledge-exchange. FEs are the living labs for projects, it is where important bottom-up co-innovation originates from, and have an added value if they continue to exist beyond the lifetime of projects. Whereas knowledge-exchange on a given FE or between FEs is viable to some extent during the lifetime of research projects, this interaction is likely to stop after projects.

Milestone 22 (M22) is a part of the project FAIRWAY work package (WP) 7, deliverable 7.4 (D7.4) that focuses iterative process of knowledge and practice exchange between case studies and policy during the FAIRWAY project, resulting in an integrated scientific support for relevant EU policies.

M22 provides a report on FAIRWAY project activities for ensuring a continued integrated scientific support to the EU beyond the lifetime of the FAIRWAY project via the EIP instrument.

The M22 **initially focused** on the task of “trying to establish an EIP-Water Action Group at the end of the project” (DOW, 2017) for a continued provision of integrated scientific support beyond the lifetime of the FAIRWAY project. However, the EIP-Water Action groups stopped their activity in 2020. Consequently, the focus of MS22 was redirected to EIP AGRI and the establishment of Focus Group (FS) within.

The CHALLENGE: It was recognized during the FAIRWAY project that the multi-actor networks established under different research projects stopped functioning after the end of the project. Considering the fact that success of multi-actor networks to continue connecting people for achieving environmental improvement in relation to agricultural practice require stable investments in terms of time, money and facilitation, the challenge is to search for options how multi-actor networks could continue their collaboration and continue to co-innovate and knowledge exchange after the research projects end.

THE AIM: of the M22 is to provide for project FAIRWAY sustainability by establishing a baseline framework for continued integrated scientific support after the FAIRWAY project ends. For M22 the term “integrated support” is defined as continued scientific support in project afterlife to **multi-actor networks (including and decision-makers)** via EIP platform.

THE GOAL: of MS 22 is to try to establish an EIP AGRI FG to continue to link with the existing 13 case studies using to monitor the case study development and provide scientific support to the EU via the EIP instrument.

THE TASKS of the MS22 were

- Analyse current EIP AGRI activities in relation to reducing agricultural diffused nitrates and pesticide pollution.
- Identify options for continued networking between and within the already established multi-actor networks after the projects end.

- Prepare and submit a proposal for a new EIP AGRI FG dedicated to finding solutions for continued networking between and within the already established multi-actor networks after the projects end.
- Consider applying for and possibly apply to open calls for EIP AGRI FGs as a partial solution to the challenge identified.

5.3.2 METHODS

This methods chapter describes the approach to M22. Over the course of the FAIRWAY project several actions have been undertaken to ensure future baseline framework for continued integrated scientific support after the FAIRWAY project ends is established via EIP platform.

The most important part of the approach was a thorough analysis of both EIP WATER and EIP AGRI instruments. This involved content analysis of 29 EIP WATER action groups and 43 EIP AGRI focus groups (Figure 4). We looked at the activities and final reports to distil information on what has been done so far and what relevance (high, some, low) does the work of action groups and FG has in relation to ADP. Analysis of EIP Water to acknowledge any of the current work that might support the formation of a network for ADP involved consulting EIP Water secretariat via email on several occasions in period from the 20th August 2019 on to enquire about new EIP Water action group calls and the follow-up platform. EIPs finalised their activities end 2020, and no calls for new action groups were announced in 2021. On contrary EIP AGRI mechanism is still running, and seems to be more developed than EIP WATER with respect to ADP. Analysis of EIP AGRI FGs (currently 43 groups) took into account all final reports of EIP AGRI FG and how they address ADP.

Next, based on the identification of issues, barriers, and solutions to CPSS from D7.1 we developed a possible list of actions for new EIP AGRI FG.

Further, in defining the possibility of using the EIP AGRI as a tool for providing integrated support in project afterlife to **multi-actor networks and decision-makers** via EIP platform the idea of a new EIP AGRI FGF was discussed with the FAIRWAY partners between 9th and 13th September 2019 a third plenary meeting of FAIRWAY project held in Ljubljana. Several actions were taken to discuss the possibilities. The approach to establishing a new EIP AGRI FG was presented to the participants of the 3rd plenary meeting of FAIRWAY during the **"results achieved" introductory meeting**. During the presentation the aim was explained, and an update on discussion with the EIP Water secretariat was presented to the participants. No feedback from the participants was gained at this stage.

The discussion regarding the new EIP AGRI FG continued as a **facilitated discussion** by the WP7 leader during the carousel meetings of WPs with the case study leaders. The following set of questions to support a facilitated discussion regarding establishing a new EIP FG was formed:

- How do the case-study leaders imagine future communication between the field examples?
- What is required to successfully exchange knowledge between stakeholders?
- What are appropriate tools to foster knowledge exchange between stakeholders?
- Is the proposed use of FAIRWAY outputs something the stakeholders would benefit from occasionally?
- Is facilitated distance communication the right tool to promote knowledge exchange?
- Are there any other issues and barriers that could be addressed by ADP?

Finally, the intention of establishing a new EIP AGRI FG that would focus on using the agri-environmental indicator to monitor the case study development and provide scientific support to the EU via the EIP instrument was discussed with an EIP AGRI representative in a bilateral online meeting on November, 23rd, 2021.

Table 3 summarises activities and stakeholder consultation on the importance of establishing a new EIP AGRI FG to continue to link with the existing 13 case studies using to monitor the case study development and provide scientific support to the EU via the EIP instrument.

Table 3: Milestone 22 integrates views of several stakeholder(s) and stakeholder groups at different decision making levels.

Stakeholder or stakeholder group	**Way of communicating**	**Date or period of implementation**
EIP water secretariat	email	20th Aug. 2019 on
FAIRWAY project coordinator	emails; face-to-face discussion at the project plenary meeting	20th Aug. 2019 on; 9th and 13th Sept. 2019
FAIRWAY project case study leaders	facilitated discussion at the project plenary meeting	9th and 13th Sep. 2019
FAIRWAY project case study leaders bilaterally	emails, video-conference	9th and 13th Sep. 2019
FAIRWAY WP leaders bilaterally (email, video conference)	emails, video-conference	
Others involved in the FAIRWAY project at the project Plenary Meeting	bilaterally, face-to-face at the project plenary meeting	9th and 13th Sept. 2019
Coordinator of the sister EU research project WaterProtect	email	3rd Sep. 2019
Joint submission for a new EIP AGRI FG with WaterProtect via an on-line form	Email, on-line form	May 2021
National contact point EIP AGRI from Slovenia (Subgroup on Innovation for agricultural productivity and sustainability)	email, phone	23rd Sept. 2021 – 26th Oct. 2021
Draft proposal for a new EIP Agri was again discussed by WP leaders	(email, video conference)	8th Oct. 2021

5.3.3 RESULTS

5.3.3.1 The role of EIP instrument

5.3.3.1.1 EIP Water action groups

EIP Water website (https://ec.europa.eu/environment/water/innovationpartnership/index_en.htm) summarises European Innovation Partnerships (EIP) aim to accelerate innovations that help solve societal challenges, strengthen Europe's competitiveness and contribute to job creation and economic growth. EIPs help pool expertise and resources by bringing together public and private actors at EU, national and regional levels and combining supply and demand-side measures.

We analysed EIP Water to acknowledge any of the current work that might support the formation of our initiative. The European Innovation Partnership on Water (EIP Water) was active between 2012 and 2020 as an initiative within the EU 2020 Innovation Union. It ran activities in 29 Action Groups (AGs). AGs address different priority areas (water reuse and recycling; water and wastewater treatment, including recovery of resources; water-energy nexus; flood and drought risk management; ecosystem services) and crosscutting priorities (water governance; decision support systems and monitoring; financing for innovation). Desktop review of existing AGs shows that the AGs targets drinking water quality from several different ends:

- Decision support systems and monitoring: Testing online water quality assessment technologies and affordable water quality monitoring strategies for a denser water quality monitoring network (AG AugMent, AG RTWQM), and water quality monitoring via innovative sensors to utilise data models for a reliable early warning system for a more efficient water distribution network management (AG126); assessing benchmarking as a *management tool to improve water services (AG125).*
- Ecosystem services: Building on methodologies to assess benefits from natural and constructed ecosystems in environment and monetary terms (AG052); identifying bottlenecks and barriers in fragmentation of knowledge, lack of demonstration sites, funding, and address current policy challenges for nature-based solutions in water management and ecosystem restoration (AG 228, AG225).
- Financing for innovation: identification, development and implementation of approaches to increase financial flows in the water (and water-related) sector (AG013).
- Flood and drought risk management: artificial aquifer recharge (AG128), design and implementation of economic instruments (e.g. insurance) for inducing individual water use decisions for increasing droughts risk resilience (AG014), water reuse in irrigation, energy saving in irrigation, integrated agricultural water management under drought (AG112), improvement in water governance with a focus on multilevel governance (AG042).
- Water and wastewater treatment, including recovery of resources: developing market plans for resources from the water cycle (AG108), focusing barriers to scaling-up specific innovative wastewater treatment technologies (AG110, AG118).
- Water governance: utilisation of new aquifers for water supply (AG111), international platform to support SMEs in releasing innovative water technologies to the (international) market (AG131), assessment of water cycle and its water governance options (AG041), participative governance (AG224), water justice (AG117), water services regulation and governance (AG102).
- Water reuse and recycling: development of new technologies for water reuse and treatment (WATER CIRCLE, AG045, AG201) and resources redistribution (AG132).
- Water-energy nexus: Knowledge sharing and events contribution at the crossover of energy and water (AG115), application and market placement of a zero energy consumption pumping systems for productive irrigation (AG115), promote the use of desalination for sustainable water supply powered by renewable energy (AG025), terminology and a coherent framework for the energy sector to assess its interactions with water (AG029).

5.3.3.1.2 EIP AGRI Focus groups

The agricultural EIP-AGRI works to foster competitive and sustainable farming and forestry that 'achieves more and better from less'. It contributes to ensuring a steady supply of food, feed and biomaterials, developing its work in harmony with the essential natural resources on which farming depends. Of 43 analysed EIP AGRI FG, 47% are highly important to the topic of reducing nitrates pollution from agriculture,

while 40% is highly relevant for the topic of pesticides pollution reduction. Table 4 provides a summary of a detailed content analysis of relevance of EIP AGRI FGs in promoting approaches and tools for reducing ADP of drinking water supplies with nitrates and pesticides (high, some, low).

Table 4: Detailed relevance of EIP AGRI Focus Group in relation to agricultural diffuse pollution of drinking water with nitrates and pesticides (high, some, low).

No.	EIP AGRI Focus Group	Relevance	
		NITRATES	PESTICIDES
1	Agroforestry: introducing woody vegetation into specialised crop and livestock systems	high	low
2	Animal husbandry - Reduction of antibiotic use in the pig sector	low	low
3	Bee health and sustainable beekeeping	high	high
4	Benchmarking of Farm Productivity and Sustainability Performance	some	some
5	Group Moving from source to sink in arable farming	high	some
6	Circular Horticulture	high	high
7	Robust and resilient dairy production systems	low	low
8	Diseases and pests in viticulture	high	high
9	Ecological Focus Areas	high	high
10	Fertiliser efficiency focus on horticulture in open field	high	high
11	Sustainable mobilisation of forest biomass	low	low
12	New forest practices and tools for adaptation and mitigation of climate change	some	some
13	Protecting fruit production from frost damage	high	low
14	Genetic Resources - Cooperation models	high	high
15	Grazing for Carbon	low	low
16	High Nature Value (HNV) - Farming profitability	some	some
17	Integrated Pest Management (IPM) - Focus on Brassica species	low	high
18	Sustainable industrial crops	high	high
19	Reducing emissions from cattle farming	high	low
20	Mixed farming systems: livestock/cash crops	high	low
21	New entrants into farming: lessons to foster innovation and entrepreneurship	some	some
22	New feed for pigs and poultry	low	low
23	Non-chemical weed management in arable cropping systems	some	high
24	Nutrient recycling	high	low
25	Organic farming	some	low
26	Permanent grassland	high	some
27	Pests and diseases of the olive tree	low	high
28	Plant-based medicinal and cosmetic products	low	low
29	Plastic footprint	high	high
30	Precision farming	high	high
31	Protein crops	high	high
32	Reducing antimicrobial use in poultry farming	low	low
33	Reducing food loss on the farm	low	low
34	Renewable energy on the farm	low	low
35	Short food supply chains	low	low
36	Soil contamination	high	high
37	Soil organic matter	high	high
38	Soil salinisation	low	low
39	Soil-borne diseases	low	high
40	Sustainable beef production systems	low	low
41	Tropical crops	high	high

No.	EIP AGRI Focus Group	Relevance	
		NITRATES	PESTICIDES
42	Water & agriculture	some	some
43	Wildlife and agricultural production	low	low

5.3.3.2 Drafting the EIP AGRI Focus Group actions

5.3.3.2.1 Issues, barriers, and solutions to provision of scientific support to the EU

Deliverable 7.1 identified issues, barriers and solutions related to provision of scientific support to the EU (Glavan et al., 2019). To sufficiently evaluate barriers and issues we completed (i) a desktop study, (ii) a workshop and (iii) individual interviews (all presented in detail in D7.1)

The key message was that perceived barriers are mostly observed on the national or regional level and are connected with

- a lack of political will,
- scarce instruction on the legislation implementation process, and
- a lack of funding opportunities for science to be included in policy making and further EU policy implementation.

In response to that D7.1 suggested using dissemination techniques for specific audiences and in local languages. It further proposed to enhance connectivity between data, information and decision making by implementing monitoring in real-time, to allow for faster adaptation of strategies.

In addition, project clustering (science, policy, stakeholders, and citizens) was suggested to make science and research more connected to current policy challenges and stakeholder needs along with citizen involvement. Based on the overview of the key issues, barriers, and solutions a set of actions for FG was developed to provide integrated support to multi-actor networks (including and decision-makers) via EIP platform.

5.3.3.2.2 Actions for new EIP AGRI Focus Group

Based on the identified issues, barriers and solutions related to ADP reduction (Glavan et al., 2019) we developed a set of five actions that should be integrated within the FG to provide an integrated scientific support for relevant EU-policies (Table 5):

Acton 1: Establish an EU pool of field examples: The initiative proposes to pool the FEs addressing ADP from different EU projects. In the first phase FG could include 13 FEs from FAIRWAY project. In the next phase the FG could be open to accept new examples of existing FEs from other EU projects (such as for example WATERPROTECT project). New EFs could be included in the FG using the “issues-barriers-solutions” framework (Table 5). Each FE should be catalogued in using the predefined framework from **Error! Reference source not found.** for easier comparison between the FEs.

Action 2: Facilitate distance knowledge exchange: The important part of the FG is stakeholder network. These are to some extent similar but also vary greatly from country to country. Open information flow accessible to all interested stakeholders regardless of the duration of the projects means that the FEs are able to gain from each other’s know how and have access to better practices across the EU. Distance knowledge exchange between the mapped stakeholders will be enabled through contacts list. Online discussion events on selected topics will be facilitated by the FG leader to promote distance knowledge exchange through targeted communication.

Action 3: Indicators of catchment restoration: Often stakeholders have a low understanding of how much time is still needed to meet the targets on a field scale. This action aims at bridging the problem by establishing clear-cut catchment restoration indicators with a timeline. FG user will be informed on how much time is still needed to meet the targets on a field scale and which indicators are used to measure the catchment restoration goals.

Action 4: Institutional framework for policy implementation: Often stakeholders are unsure why some measures are needed or how their implementation relates to policy goals. Institutional framework for policy

implementation differs between countries. FG will provide institutional framework of policy implementation with a clear-cut links between policies, actions needed, and measures required to meet the policy goals.

Action 5: Financial instruments and implementation mechanisms: Different financial mechanism are in place to meet the catchment restoration goals. This actions aims at providing a map of existing financial instrument for policy implementation linked to FEs. Additionally assessment will be available explain whether the financial means meet the financial inputs required for policy implementation and under which circumstances.

Table 5: Overview of the key issues, barriers, and solutions and actions concerning integrated scientific support.

ISSUES	BARRIERS	SOLUTIONS	ACTIONS
• **Fragmented and not easily available data.**	• Lack of easily accessible site specific field examples (best practice examples often too general).	• Provide publicly accessible and comparable data across field examples using agri-environmental indicators to monitor the progress of field examples.	• Establish an international pool of field examples where stakeholders can learn from, exchange experience views, ideas.
• **Lack of knowledge about agricultural impacts on water quality.**	• Low level of shared understanding between science, policy and practice. • Inefficient involvement of stakeholders. • Non-targeted communication strategies.	• Promote development of shared understanding and thus how provide scientific support to regulators and practitioners).	• Facilitate distance knowledge exchange of actors from science, policy and practice to strengthen stakeholder networks and empower stakeholders.
• **A time lag between taking measures and changes in water quality.**	• Low understanding of how much time is still needed to meet the targets on a field scale.	• Defined time placement within the process of catchment restoration.	• Provide catchment restoration time scale linked to field examples (where we are and where we are going).
• **Lack of coherency between policies implementation and transition to local level.**	• Low awareness of links between policies, objectives and required actions (why are the actions needed).	• Provide clear-cut links between policies, actions needed, and measures required to meet the policy goals.	• Provide institutional framework of policy implementation.

• **Financial questions about available budget and allocation of the costs.**	• Lack of appropriate financial means for applying certain measures.	• Map existing financial instruments and implementation mechanisms.	• Provide financial instruments and explain implementation mechanisms linked to field examples.

5.3.3.3 FAIRWAY participants' opinion

Table 6: Open question raised and opinions expressed by the FAIRWAY case study leaders during a carousel meeting at a third plenary meeting of FAIRWAY project held in Ljubljana between 9th and 13th September 2019.

Questions	**Open question raised and opinions expressed by the FAIRWAY case study leaders**
Future communication between the field examples How do the case-study leaders imagine future communication between the field examples?	*Why did we intend to establish EIP Water focus group: The call was saying there is no link between EU level and field level* *My first impression is that it sounds as a good idea.* *It's a way how transfer of knowledge to the commission.* *It's a loss if we don't continue our network. For example we had a discussion of decision support tool and it would be a pity not to continue with that.* *Network of case studies – to cooperate further on regarding similar problems – transfer of knowledge should continue after this project ends.*
Knowledge exchange prerequisites What is required to successfully exchange knowledge between stakeholders?	*It's important to define 'What's in it for me'.* *We would need to find a way to communicate without going anywhere.* *Maybe traveling is not such a huge burden.* *Who will be in the group? This needs to be defined – if it is farmers, researcher, for whom is intended.*
What are appropriate tools to foster knowledge exchange between stakeholders?	
Is the proposed use of FAIRWAY outputs something the stakeholders would benefit from occasionally?	*What about engaging water companies, it's an important topic.* *River basin management plans have a mechanism of water partnerships, which we could include to a new network.*
Tools to promote knowledge exchange Is facilitated distance communication the right tool to promote knowledge exchange?	*COST actions are another way to bring stakeholders together.* *Land and water use congress(es) is/are a potential meeting place for case studies.* *Alternatively we could showcase our case-study examples at the EIP AGRI in the form of practice abstracts. The same was done by project WaterProtect.*
Other issues and barriers Are there any other issues and barriers that could be addressed by ADP?	*At the moment EIPs don't have funding which is a problem for future.* *The costs to join meeting related to EIP are not payed.* *Economic incentives need to be defined.*

Questions	Open question raised and opinions expressed by the FAIRWAY case study leaders
	First define for whom this platform would be and then define economic resources for seeking out such a network.

Taking into account the analysis of the EIP instrument with respect to ADP and the opinion of the stakeholders listed in Table 6, a proposal for a new EIP AGRI FG was drafted to link with the existing 13 case studies to monitor the case study development and provide scientific support to the EU via the EIP instrument.

5.3.4 PROPOSAL FOR EIP AGRI FOCUS GROUP

Following the link at EIP AGRI (https://ec.europa.eu/eip/agriculture/en/content/idea-eip-agri-focus-group-0) an idea for an EIP-AGRI FG was developed.

5.3.4.1 Suggestion for Focus Group topic

Agricultural diffuse pollution with nitrogen and pesticides is one of the main obstacles in achieving drinking water quality targets. State-of-the-art approaches and tools for knowledge exchange among different level stakeholders (science-policy-practice) supported by agri-environmental indicators are crucial for progressing towards more effective and timely implementation of measures, supported by advanced policy mechanism, for reducing ADP on farms (Figure 5).

5.3.4.2 Key question(s) to be addressed

- Advancing the use of agri-environmental indicators in relation to ADP to provide scientific support to policy programming, policy implementation, and evaluate policy success.
- How to promote the development of shared understanding and thus how provide scientific support to regulators and practitioners in relation to ADP?
- How to ensure clear-cut links between policies, actions needed, and measures required to meet the policy goals in relation to ADP?
- What financial instruments, implementation mechanisms, and government approaches are in place and functional in relation to ADP and how to apply them in catchments?
- How to ensure that the field examples of stakeholder networks are supported beyond the end of research projects to continue to network and exchange knowledge related to practices for reducing ADP?
- How to enable publicly accessible and comparable data across field examples using agri-environmental indicators to monitor the progress of field examples ADP.
- How to capture and evaluate the time placement within the process of catchment restoration together with catchment restoration indicators in relation to ADP (taking into account climate change)?

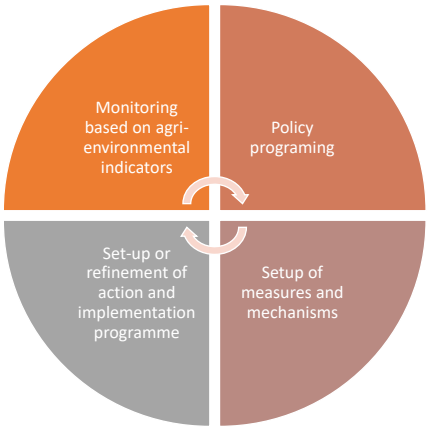

Figure 5: The proposal for a new EIP AGRI FG will address advancing the use of agri-environmental indicators in relation to ADP to provide scientific support to policy programing, policy implementation, and evaluate policy success.

5.3.4.3 Argumentation why this topic should be taken up by an EIP-AGRI Focus Group

Reducing ADP for protecting drinking water quality is an important theme running with high relevance through half of 43 EIP AGRI FGs. While FGs do deep in individual strategies for reducing ADP and the related enabling factors and limitations, the focus on expected measure efficiency and the possible combinations of measures is still lacking. A more systematic and uniform approach needs to be undertaken with a clear indication which measures can be applied by whom and to what extent (stakeholder responsibility). EIP AGRI FGs have not yet addressed diffuse agricultural pollution with nitrogen and pesticides from the viewpoint of strengthening science-policy-practice interface by using agri-environmental indicators. Collaboration between stakeholders of various catchments is firmly established during the lifetime of projects. Still, it usually ceases after the end of research projects limiting the exchange of knowledge related to practices for reducing diffuse agricultural pollution with nitrogen and pesticides. The state-of-the-art approaches reached their maximum efficiency in some catchments or failed to meet the water quality standards in others. Effective knowledge exchange among different level stakeholders (science-policy-practice) on the pan-catchment scale is required to support policy development that will further reduce diffuse agricultural pollution with nitrogen and pesticides.

The FAIRWAY initiative of scientists, experts, and farmers aims to establish a permanent EU-wide platform for hosting examples addressing diffuse agricultural pollution with nitrogen and pesticides. The proposed EIP-Agri Focus Group will provide scientific support to regulators and practitioners to ensure clear-cut links between policies, actions needed, and measures required to meet the policy goals in relation to diffuse agricultural pollution with nitrogen and pesticides. In addition, the platform will provide information on financial instruments, implementation mechanisms, and government approaches that are in place and functional in relation to diffuse agricultural pollution with nitrogen and pesticides.

5.3.4.4 Geographical scope

The topic of diffuse agricultural pollution primarily refers to continuing work with MAPs from 13 catchments around Europe: namely Tunø and Aalborg in Denmark, Anglian Region in England, La Voulzie in France, Lower Saxony in Germany, North Greece in Greece, Derg Catchment in N. Ireland, Overijssel and Noord-Brabant in the Netherlands, Vansjø in Norway, Baixo Mondego in Portugal, Arges-Vedea in Romania, and Dravsko Polje in Slovenia. The proposed EIP-AGRI Focus Group will be open to new and innovative field examples of reducing diffuse agricultural pollution with nitrogen and pesticides from the whole European area.

5.3.4.5 Links to existing projects or networks

WATERPROTECT: https://water-protect.eu/en

OPTAIN: https://cordis.europa.eu/project/id/862756

SPRINT: https://sprint-h2020.eu/

5.4 SUPLEMENTARY FILES

Proposal 1: EIP-AGRI Focus Group proposal with project WATER PROTECT.

Title: Water governance & agriculture – models, best practices and solutions

Key question(s) to be addressed
Please indicate which key questions should be discussed and answered by the Focus Group, in your view (1000 characters maximum).

1. What are the key characteristics of successful water governance models involving agriculture sector?
2. What are the key incentives for the participation of farmers in water governance?
3. What are the advantages of participatory water governance and what are the costs associated for farmers?
4. How does EU policy implementation benefit from bottom-up water and agriculture governance?
5. How can local stakeholder be incentivised to engage in a dialog with the farming community for the sustainable long-term management of water resources?
6. What are the solutions and best practices for participatory governance of water resources involving farmers?

7. What are the research and innovation needs to boost implementation of participatory governance in water?

Please indicate why this topic should be taken up by an EIP-AGRI Focus Group in your opinion?
(1500 characters maximum)

European dialogue around sustainability of the farming is now marked by the EU cycle of policy reforms and implicitly by the discussions of the role, scope and synergies between agriculture and water policies. The implementation of these policies and the effectiveness in producing real results is very much influenced by the initiatives and implementation mechanisms at local level. EU policies are evolving to address the interactions between water and agriculture. The one-size-fits-all approach of the CAP is being replaced by a more flexible system, with greater freedom for Member States to decide how best to meet common objectives. Therefore, stakeholders are all keen and ready to engage in learning from across Europe about innovative and successful measures for water management. Best management practices exist, but more training to farmers is needed and progress made needs to be communicated to incentivize farmers to continue.

In this context, very relevant are the examples of local policies, initiatives and partnerships making a positive contribution to the protection of drinking water production locations (surface and ground water) which are located in or close to intensive farming areas. The focus group should analyse this context and set EU and national policy recommendations for innovative approaches to drinking water management involving farming systems and land management, with the aim to:

- Scale-out examples of local policies, initiatives and partnerships making a positive contribution to the protection of drinking water production locations which are located in or close to intensive farming areas. .
- Encourage dialog and networking between local authorities and stakeholders to discuss the factors that contribute to the success of these initiatives, platforms or policies
- Identify the long term objectives and effective instruments that constitute building blocks for long-term drinking water management and synergy with land-use management and farming.

Geographical scope
Please indicate if this topic covers the whole European Area or a specific area in Europe

the whole European Area

Organisations supporting this proposal
Fill in the names of the organisations that support this proposal. (max. 1500 characters)

University of Ljubljana, Biotechnical Faculty

Links to existing projects or networks
Add links to existing projects or networks related to this topic. (max. 1500 characters)

FAIRWAY: https://www.fairway-project.eu/
OPTAIN: https://cordis.europa.eu/project/id/862756
SPRINT: https://sprint-h2020.eu/

6. REFERENCES

- Carvalho L., Mackay E.B., Cardoso A. C., Baattrup-Pedersend A., Birke S., Blackstock K. L., Borics G., Borjah A., Felde C. K., Ferreira M. T., Globevnik L., Grizzetti B., Hendry S., Hering D., Kelly M., Langaas S., Meissner K., Panagopoulos Y., Solheimm A. L. 2019. Protecting and restoring Europe's waters: An analysis of the future development needs of the Water Framework Directive. Science of The Total Environment, 658, pp 1228-1238. Open Access https://www.sciencedirect.com/science/article/pii/S004896971835126X
- Deliverable_2.1_Engagement_plans_for_MAPs.pdf
- Deliverable_2.3_Workshop_on_how_to_establish_and_nuture_MAPs.pdf
- Deliverable_3.1_Agri-drinking_water_quality_indicators.pdf
- Deliverable_3.2_Link_between_agricultural_pressure_and_drinking_water_quality.pdf
- Deliverable_4.1_Nitrate_measures.pdf
- Deliverable_4.2_Pesticide_measures.pdf

- Deliverable_5.1_Survey_and_review_of_decision_support_tools.pdf
- Deliverable_5.2_Evaluation_of_decision_support_tools.pdf
- Deliverable_5.3_Assessment_of_costs_and_benefits_using_DSTs.pdf
- Deliverable_6.1_Coherence_in_EU_law.pdf
- Deliverable_6.2_Governance_arrangements_in_the_case_studies.pdf
- Deliverable_7.1_Barriers_and_issues.pdf
- Graversgaard, M., Hedelin, B., Smith, L., Gertz, F., Højberg, A.L., Langford, J., Martinez, G., Mostert, E., Ptak, E., Peterson, H., Stelljes, N., van den Brink, C., Refsgaard, J.C. 2018. Opportunities and Barriers for Water Co-Governance—A Critical Analysis of Seven Cases of Diffuse Water Pollution from Agriculture in Europe, Australia and North America Sustainability. 10(5), 1634; Open Access https://doi.org/10.3390/su10051634
- Kim, H.; Surdyk, N.; Moller, I. ; Graversgaard, M., Blicher-Mathiesen, G. ; Henriot, A. ; Dalgaard, T. ; Hansen B. Lag time as an Indicator of the link between Agricultural Pressure and Drinking Water Quality State. Water 2020, 12, 2385 https://doi.org/10.3390/w12092385
- Klages, S.; Heidecke, C.; Osterburg, B. The Impact of Agricultural Production and Policy on Water Quality during the Dry Year 2018, a Case Study from Germany. *Water* **2020**, *12*, 1519. https://www.mdpi.com/2073-4441/12/6/1519
- Klages, S.; Heidecke, C.; Osterburg, B.; Bailey, J.; Calciu, I.; Casey, C.; Dalgaard, T.; Frick, H.; Glavan, M.; D'Haene, K.; Hofman, G.; Leitão, I.A.; Surdyk, N.; Verloop, K.; Velthof, G. Nitrogen Surplus—A Unified Indicator for Water Pollution in Europe? *Water* **2020**, *12*, 1197. https://www.mdpi.com/2073-4441/12/4/1197
- Matjaž Glavan, Špela Železnikar, Gerard Velthof, Sandra Boekhold, Sindre Langaas and Marina Pintar. 2019. How to Enhance the Role of Science in European Union Policy Making and Implementation: The Case of Agricultural Impacts on Drinking Water Quality. Water 2019, 11(3), 492; https://doi.org/10.3390/w11030492
- Milestone 3.1 Inventory of agri-drinking water quality indicators on website
- Milestone 7.2 Workshop with actors at EU level
- Milestone_4.2_Framework_for_promising_measures.docx
- Milestone_6.2_Protocol_for_collection_of_data_v2018_01_26.xlsx
- Milestone_7.2_Joint_Policy_Conference_minutes.pdf
- Moore M.L., Ridell D., Vocisano D., 2015. Scaling Out, Scaling Deep, Scaling Up, Scaling Deep. Strategies of Non-profits in Advancing Systemic Innovation. The Joiurnal of Corporate Citizenship, 58
- Nicholson, F.; Krogshave Laursen, R.; Cassidy, R.; Farrow, L.; Tendler, L.; Williams, J.; Surdyk, N.; Velthof, G. How Can Decision Support Tools Help Reduce Nitrate and Pesticide Pollution from Agriculture? A Literature Review and Practical Insights from the EU FAIRWAY Project. *Water* **2020**, *12*, 768. https://www.mdpi.com/2073-4441/12/3/768/htm
- Wuijts S., Claessens J., Farrow L., Doody D.G., Klages S., Christophoridis C., Cvejić R., Glavan M., Nesheim I., Platjouw F., Wright I., Rowbottom J., Graversgaard M., van den Brink C., Leitão I., Ferreira A., Boekhold S., 2021. Protection of drinking water resources from agricultural pressures: Effectiveness of EU regulations in the context of local realities, Journal of Environmental Management, 287:112270 https://www.sciencedirect.com/science/article/pii/S0301479721003327