Developing sustainable water governance systems: principles and practices

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Ref: WaterProtect D2.4
Version: v1
Date: 30/09/2020

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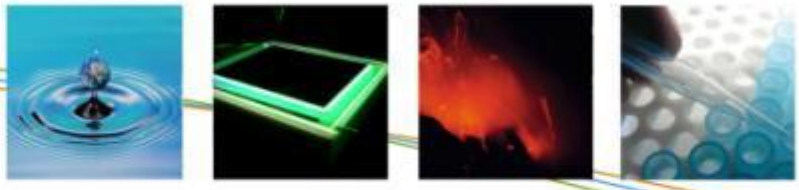

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Version	Date	Description
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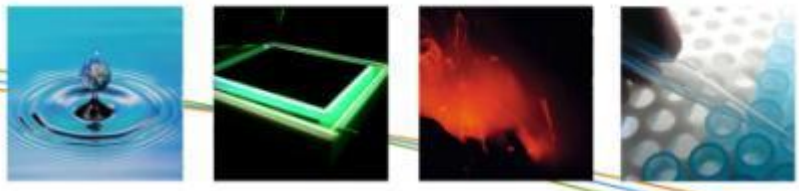

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List of abbreviations & acronyms

BMP	Best management practice
E	Education
E	Economics
MCPA	2-Methyl-4-ChloorPhenoxyAcetic acid
PPP	Plant protection product
RESET	Regulation, Education, Social pressure, Economics, Tools
R	Regulation
S	Social pressure
T	Tools
WFD	Water Framework Directive

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Management summary

This deliverable reports on the experiences of the different WaterProtect action labs with the implementation of multi-level and collaborative water governance, which is a central principle in the WaterProtect project. It does this by zooming in on the three different steps of the WaterProtect guide for good water governance, for which general results for all action labs as well as remarkable differences between action labs are reported.

In a first step, an overview is given of important context factors in the action labs that influence water governance. This reveals that the chosen action labs have some commonalities, but differ in many important context factors that determine their focus and approach. Second, the action labs were compared with respect to the implemented process. This disclosed that all action labs did great efforts to use a wide range of contact methods to involve different types of stakeholders. However, it also showed that few action labs had the time to go beyond communication and education, and work on the realisation of other incentives to change stakeholders' behaviour. Third, action labs were compared with respect to progress towards the formulated ambitions. Although limited improvement of the water quality can be measured, progress has certainly achieved towards the intermediary ambitions, which facilitate and reinforce the implementation of best management practices by farmers. Because of the limited time span of the WaterProtect project the implementation of BMP's however remains limited. Nevertheless, in many action labs, there are clear indications that farmers are more aware are change their behaviour if no large time or monetary investments are required.

Although important changes in governance processes can be recorded, the efforts need to be continued on a long-term basis in order to scale out the implementation of best management practices by farmers and in order to reach a better water quality. We therefore urge local water managers to take up a leading role and to keep working in the long term on a better multi-actor process. In this regard, a series of tips on the organization of the multi-actor process included in the discussion section, can already put local water managers on the right track.

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1. Introduction

This deliverable describes lessons, constraints and opportunities for effective, efficient and inclusive water governance, which are based on the experiences from seven action labs during the WaterProtect project. In this way, it contributes to the general objective of the WaterProtect project, which is the effective uptake and realisation of innovative farming systems delivering good water quality.

Work package 2 in WaterProtect had the aim to help the action lab leaders to analyse and improve their water governance. Water governance can be understood as the set of systems that direct the actors' decision-making regarding development and management of water resources. Both state and non-state actors can take a role in supporting the take up of good agricultural practices and so the improvement of the water quality in many different ways. Besides the governmental actors and the farmers, many other actors can influence the water quality or are affected by a bad water quality. For example, the drinking water companies are responsible for the provision of clean drinking water and want their cleaning costs to be as low as possible. Also chemical producers and distributers have an interest in a good water quality. The use of their products can be endangered if concentration in the water surpasses fixed levels. Moreover, consumers prefer a good water quality at a reasonable cost. Inhabitants living in the supply area prefer an attractive area without pollution, but can also have their own influence on the quality by their activities. It seems important to involve all actors when working towards a good water quality. In the processes in the action labs, inclusion of all actors is supported, as well as the implementation of strategies that provide incentives for farmers to take care of the water quality, such as 'education and information', 'social pressure', 'economics' and 'tools'.

The first step in our governance assessment was to set up a governance framework (D2.1 – Framework for analysing and improving water governance systems), serving as a tool to analyse and improve water governance systems. With the help of this framework, we gained insights in important context factors influencing governance in the seven action labs. Thereafter, action lab leaders initiated the formation of a network and set up of many different actions to improve governance. The starting governance situation in each of the action labs, the process conducted during the WaterProtect period and the results achieved are described in deliverable 2.2 (D2.2 – project briefs about governance system in each case-study – March 2020). The different steering structures used are described in deliverable 2.3 for each of the action labs (D2.3 – fact sheets about different incentive structures – March 2020). A general evaluation and cross comparison of the different governance processes in the action labs, including lessons learned for action lab leaders, work package leaders and policy makers can be found in this deliverable D2.4.

This document is comprised of 9 chapters. After this concise introduction of the project and its governance goals, more information on the case study design, the data collection and the cross-comparison approach are presented in the methodology section. The third section introduces and summarizes the seven action labs of the project, with a focus on the governance issues and results. In the following three sections the action labs are compared at three different levels: (1) at the level of the context factors, i.e. the initial situations in the action labs, (2) at the level of the multi-actor process, including the actors involved, the contact methods used and the different strategies applied in order to change stakeholders' behaviour, and (3) at the level of the achievements in comparison to the formulated ambitions at the beginning of the project. These governance insights are bundled with

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more practical experiences throughout the project and translated into lessons learned for both action lab leaders, work package leaders as policy makers in section 7. We finish the deliverable with a short conclusion and references in respectively section 8 and 9.

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2. Methods

2.1 Action lab research in seven regions

Action lab research was performed in seven catchments that are dealing with water pollution caused by agricultural activities affecting drinking water production (**Fout! Verwijzingsbron niet gevonden.**). The seven case studies were chosen because due to their differences in pedo-climatic conditions, in types of farming systems, legal frameworks and size of the water collection area. In each of the action labs, a process was initiated in order to get insight in the local context, and to stimulate actions to improve the water quality. The project assumes that therefore not only farmers with a direct influence on the water quality should be informed, but all stakeholders that are interested in the water quality or that can (in)directly influence the water quality should be involved and play a role. A multi-actor approach was therefore tested in each of the seven case studies. By doing so, the WaterProtect project aims to contribute to the development of participatory methods for local water governance and improve public policy instruments to protect drinking water resources.

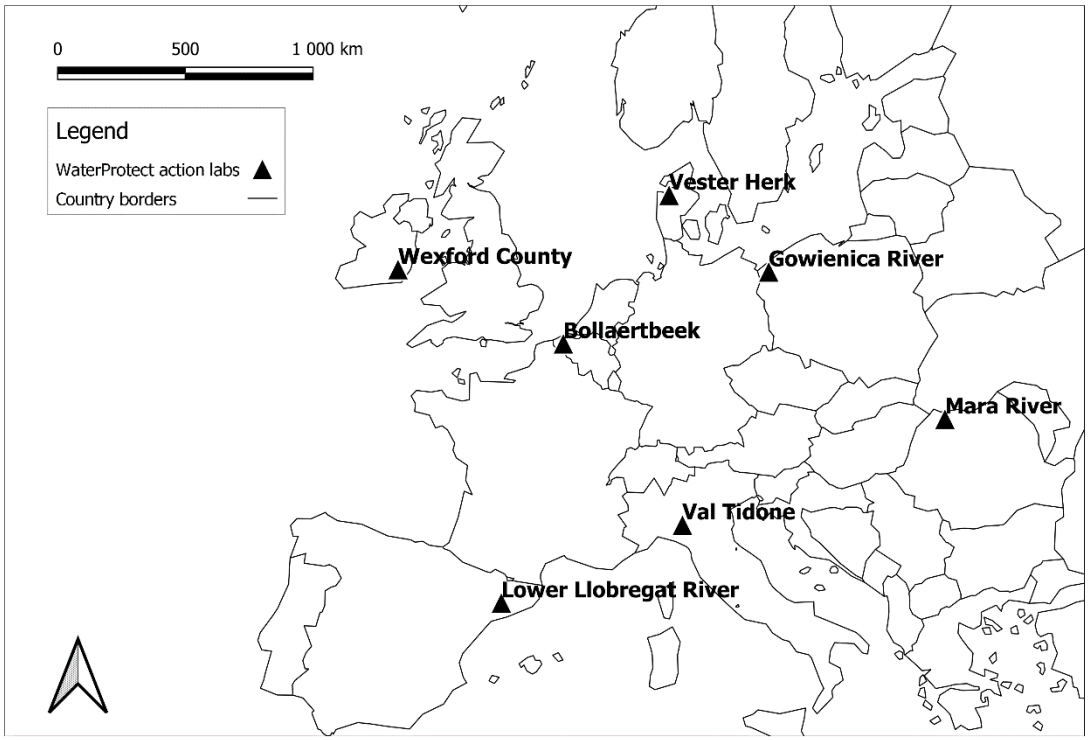

Figure 1: Location of the seven action labs in WaterProtect

2.2 Data collection

To help action lab leaders to keep track of stakeholder management and the governance progress in an organized way, work package two was developed. Action lab leaders were asked to collect information on topics concerning water governance and their process, and to report this to ILVO

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(governance work package leader) on a regular basis. More specifically, action lab leaders were asked on three occasions to provide one-off information by responding mainly to qualitative questions provided in a word document, i.e. (1) in march 2018 they had to report on the start situation, (2) in November 2019 they were asked to specify their ambitions and objectives, and (3) in December 2019 they completed an evaluation and reflection form. In addition, every two months the action lab leaders were asked to keep track of the multi-actor process by updating an excel file about the types of meetings organized and the number of stakeholders present. In the final year a similar excel sheet was made for action lab leaders to keep track of the achievements in their action lab, ranging from increased awareness up to the long long-term goal of a better water quality. In order to get a truthful representation of the process in the action labs, action lab leaders were encouraged to use different sources, including formal written and electronic communication as well as face-to-face contacts. All this information was used to make up deliverables D2.2, which bundles project briefs about the governance systems in each action lab, and deliverable D2.3, which pools fact sheets about the different actions organized to improve the water quality in the action labs. Differences in the degree of detail to which action lab leaders have been reporting is reflected in the difference in comprehensiveness of the final project briefs. Misinterpretation of results on the other hand was eliminated through researcher triangulation. Moreover, action lab leaders were invited to review this report, as well as D2.2 and D2.3 on which this report is based and were encouraged to point out and correct inaccuracies and misinterpretations. More information on how information was collected and pooled can be found in D2.2 and D2.3.

2.3 Cross comparison at three levels

This final report summarizes our governance findings throughout the WaterProtect project. The cross-comparison is carried out at three different levels, focusing on the context factors, the multi-actor process, and the achievements or results at the end of the project. These three levels are closely connected to the different steps in the WaterProtect governance framework (Figure 2), which is based on the initial framework described in deliverable D2.1, but further extended with the steps ‘process implementation’ and ‘assessment of the achievements’. The cross-comparison happened is based on the extensive information included in D2.2 and D2.3, which was further summarized in an excel table, with separate sheets for the initial governance situation, for the types of actors involved and contacts methods used in the process, and for the achievements.

In a first stage, the context factors between the action labs are compared by assessing on the one hand the resource system, made up of the water system and the agricultural system, and on the other hand of the governance system, existing of the different actors and their institutions. These systems are closely linked to each other and therefore the magnitude and extent of the links between these systems were thoroughly investigated. Finally, a comparison was made of action labs’ attention for six key characteristics of good governance, which are (1) transparency and trust, (2) coherence, (3) leadership, (4) scale, (5) inclusive participation and (6) roles and responsibilities. These are considered essential building blocks that create an enabling environment for good water governance. When looking at Figure 2, we see that this initial governance assessment corresponds with the first step in the WaterProtect water governance framework (Belmans et al., 2020c).

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In a second stage, the governance process in the different action labs was compared. Each action lab was asked to keep track of the type of meetings that were organized in the context of WaterProtect and to keep track of the stakeholders that were reached out to. Action lab leaders were not only asked to report quantitative data, but also to elaborate on their experiences with different approaches in a qualitative way (Belmans et al., 2020a). Furthermore, action labs had to list their efforts to influence stakeholders and categorize them according to the RESET framework (Lam et al., 2017). This framework distinguishes five types of strategies that govern actors' mindset and actions, i.e. (1) policy and legislation, (2) education and information, (3) social pressure, (4) economics and (5) tools (Belmans et al., 2020b). Moreover, the framework dictates that, to change the behaviour of different actors with different goals, a tipping point can be reached when different incentive strategies are implemented at the same time. This coincides with step 2 in the WaterProtect water governance framework.

In the final stage, the achievements of the different action labs were assessed. Although an improvement in the water quality is the ultimate goal of all action labs, this should be interpreted as a long-term goal, which was difficult to realise within the timeframe of the project. The focus was therefore on the progress with respect to the formulated ambitions. These were chosen based on the results of the initial governance assessment, and the action labs intended to make progress towards these goals by the end of the project. Many of these intermediary goals were the same over all seven action labs, which led us to define five common ambitions, i.e. (1) network formation, i.e. the creation of a network in which all relevant stakeholders are present, (2) exchange and continuation, i.e. the creation of a platform to discuss the progress towards goals and the continuation of the efforts at the end of the project (3) knowledge building, i.e. building up knowledge on both the water-agricultural system as well as the governance system, (4) actor awareness, i.e. make all relevant actors aware of the water quality problem and the role they play in this, and (5) implementation of best management practices, i.e. incentivizing farmers in different ways to implement best management practices.

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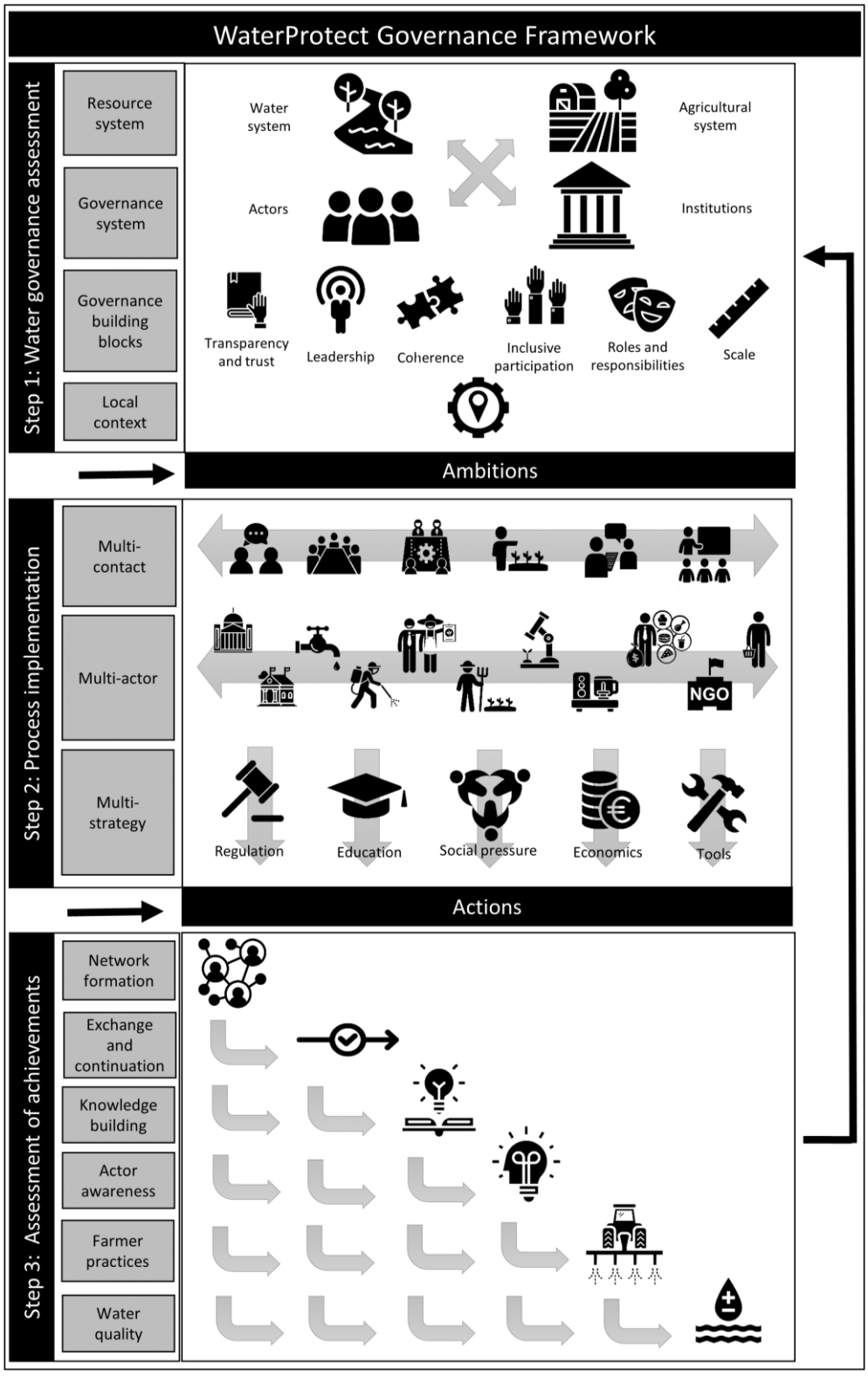

Figure 2: The WaterProtect governance framework, indicating three steps in the process (1) water governance assessment to formulate the ambitions (2) process implementation to stimulate actions and (3) assessment of the achievements to improve the water governance situation.

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3. Summaries

In this section, the seven action labs are presented in a concise way. In each action lab summary, attention is especially paid to important context factors, to the course of the multi-actor process and the achievements with respect to the formulated ambitions. The information included in these summaries is linked to the following three sections in which the different action labs will be cross-compared at these three levels.

3.1 Summary Belgian action lab

The action lab in Belgium is located in the western part of Flanders, the northern region of Belgium, has a surface area of 22.6 km^2 and is part of two adjacent municipalities, i.e. Ieper and Heuvelland. The region was chosen as action lab because it serves as a surface water capture area for drinking water production, however, drinking water production often is impeded in spring and summer because of pollution by plant protection products (PPP). Peaks of point source pollution were clearly identified as an important contribution to the water quality problem. Common farmer practices that were identified as contributing to this point source pollution are filling and cleaning of tanks with PPP on paved surface and loss of caps of PPP bottles into the environment. The first conversations with farmers made clear that farmers are generally not aware of the severity of the water quality problem in their area in comparison to Flanders in general. But not only the impact of agricultural activities need to be addressed in the action lab, also individuals that spray their garden and authorities that maintain war cemeteries and other public green areas such as train tracks, are thought to play a role in the bad water quality.

To tackle these problems, the Belgian action lab has set multiple ambitions. Besides the basis ambitions of network formation and exchange and continuation, action lab leaders focused on knowledge building, awareness raising, farmer practices such as safe filling and cleaning of spraying machinery and the implementation of grass buffer strips and mechanical weed control. In order to stimulate farmers to take action and make changes, financial resources were sought that could compensate farmers for their investments. In order to make progress towards these ambitions, 45 multi-actor meetings were organized, of which 17 bilateral meetings. This is the largest amount of multi-actor meetings among the action labs meaning that the Belgian action lab was very active in this regard. Besides bilateral meetings, also workshops were considered an important medium to convey information to stakeholders and at the same time receive input regarding the effectiveness of different measures. The action lab leaders had no experience with organizing workshops, and also farmers were not familiar with this type of meeting, however, experiences with workshops were positive and farmers who attended the meetings were discussing well and actively searching for solutions. Experiences with the multi-actor process were thus overall positive, however action lab leaders found it sometimes time consuming and difficult to balance efforts between raising awareness and supporting proactive farmers that want to take action.

Through the multi-actor process, progress has been achieved towards the different ambitions. The Belgian action lab successfully set up a network of stakeholders, among which also about ten interested farmers. With the help of this network, continuation of the efforts to improve water quality

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are assured through the approval and funding of a Leader project and by embedding the tasks in 'Water-Land-Schap', a land development program focused on regions with problems with water. Knowledge on the water quality problem has been improved through extra monitoring and reaches a larger public through better sharing and increased transparency through a newsletter and the WaterProtect webtool. A big leap forward is made in farmer awareness of the problem through workshops and multi-actor meetings, but especially the bilateral meetings have assured that all farmers are informed. The multi-actor approach has led to a change in behaviour of farmers, especially for those actions that require little time and investment, such as filing and cleaning spraying machinery on unpaved rather than on paved surfaces. A few farmers are considering to make investments in a professional cleaning and filling platform, and three of them signed up for the installation of buffer strips. The barrier for many farmers to not make investments, are the high costs involved. Therefore the project partners convinced the water production company 'De Watergroep' as the biggest beneficiary of a good water quality to (partially) compensate farmers making investments. The exact terms of this agreement will be decided upon in the follow-up project.

3.2 Summary Danish action lab

The Danish action lab, Vester Hjerk is situated in the north-western part of Denmark. It is a rural and flat area, close to the city of Skive. The land cover is mainly arable land with dairy farming, pig production, crops for fodder, potatoes and seeds as the main production. Groundwater resources in the area are used for drinking water production. These resources are protected in different ways as for example by approval measures for pesticides, regulation of the management of manure and fertilizer diffuse pollution and set-up of vulnerable zones. The groundwater pollution in Denmark is mainly related to pollution with pesticides and, many water drillings have been closed in recent years. However, where the groundwater aquifers are poorly protected due to layers of top soils with a course structure, nitrate is also a problem. The latter is the case in the Danish action lab, Vester Hjerk, where a small private waterworks is responsible for the drinking water supply. The objective of the action plan for the Vester Hjerk area is that water leaving the root-zone does not exceed a limit of 37.5 mg of nitrate/l.

To tackle this general objective, a multi-actor process was set up. At the end of the project 15 meetings were organized of which seven multi-actor meetings, with the presence of mainly farmers, water producers and representatives of the local government. The multi-actor process however did not always happen so smoothly. An initial problem was that the capture zone, i.e. the area from which the waterworks extracts groundwater, was delineated twice by the Environmental Protection Agency, based on different versions of a groundwater model, resulting in large differences in the location of the capture zone. This caused confusion among different stakeholders and especially among farmers, which organisations claimed that the planning process was based on a very unsecure data basis, which they could not accept. Given this, further investigations were done in WaterProtect on the geology and hydrology of the Vester Hjerk area and a third model work was initiated resulting in the delineation of a new capture zone. The WaterProtect model had the capacity to explain both of the capture zones suggested by the models used by the Environmental Protection Agency in addition to additional vulnerable areas. During the project, the stakeholders in the area were confronted with the alternative delineation of the capture zone. The new capture zone was generally accepted by the local stakeholders, which is important for the implementation of future measures for protection and

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improvement of the drinking water situation in the area. However the large size of the new suggested capture zone is also interpreted as a challenge by some stakeholders due to its high protection costs.

Progress has been made throughout the project towards the different ambitions. As such, the potential of collaboration among the waterworks in Skive Municipality with focus on the small waterworks has been debated, as they can help each other in situations of emergency. The set-up of a common 'water fund' that could finance future measures to protect groundwater sources was discussed. These meetings were very well attended and have clearly succeeded in creating interest in increasing the collaboration between the waterworks. The initiative has also created interests for collaboration on other issues than originally planned amongst Vester Hjerk and the closest neighbouring waterworks. At municipality level the situation is still unclear because the largest waterworks so far did not want to join the water fund. A last ambition of the action lab was to investigate potential alternative land use models in collaboration with farmers. The idea is to test if a more intelligent land use allocation and management can reduce the leaching of nitrate (to below 37.5 mg/l) and if farmers on a voluntary basis are willing to make adaptations to their land uses and farming practices. The potential of this type of measures as well as non-voluntary measures was evaluated on the basis of different workshops and farm visits. These workshops and farm visits also served another purpose, as also data was collected to model the nitrate leaching in the current situation. For the WaterProtect project to actually result in changes in the implementation of farming practices, the duration of the project was too short.

3.3 Summary Irish action lab

The action lab in Ireland is comprised of two catchments, i.e. the Ballycanew catchment and the Castledockerell catchment, located in County Wexford in the southeast of the island, with a surface area of 12 and 11 km^2, respectively. Both catchments count about 40 farms focusing on grass-based (beef and dairy) and cereal production. Many of these farms, as well as other rural houses have private wells, of which the water is used for drinking purposes, even though the water quality of these wells are not systematically monitored. In Ireland, research has shown that the main issues with drinking water are related to the use of MCPA (*2-**M**ethyl-4-**C**hloor**P**henoxy**A**cetic acid)*. Although stakeholders are aware of this problem, little is known about the transport processes and the persistence of MCPA.

Given this focus, the different ambitions for the WaterProtect project were set. In order to spur people to take action on a long-term basis, the process started with network formation and ensuring exchange and continuation. Furthermore, given the demand for more knowledge on the compound MCPA, a large part of the attention was given to knowledge building. Raising actor awareness and spurring farmers to take action was of course not forgotten. In this regard, the multi-actor process in the Irish action lab did not have to start from zero. Moreover, there were already many contacts between action lab leaders and the farmers through the Agricultural Catchments Programme (ACP). This program was designed to measure the effectiveness of the Good Agricultural Practice (GAP) measures implemented under the Nitrates Directive. The multi-actor process in the Irish action lab especially focused on multi-actor meetings, which make up about half of the meetings organized. Because of the focus on MCPA, Ireland also involved the phyto-industry, an actor that is only present in one other action lab (Belgian). The Irish action lab is also one of the few action labs in WaterProtect that managed to involve a food processor and distributer, more specifically Glanbia Ingredients Ireland Ltd., Ireland's leading dairy

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processor and retailer of sports nutrition, cheese, dairy ingredients, and vitamin and mineral mixes. Farmer unions on the other hand were not involved, as the ACP already have the trust of farmers, and this could have made the process too political. Overall, the main challenge was to raise the attention of the different stakeholders and keep them interested and involved throughout the project. Despite the progress made in this area, confusion still remains about the right governance structure and the inherent different roles, which sometimes inhibit further collaboration and progress.

The multi-actor process has led to progress towards different ambitions. Through the creation of a platform, cooperation with and between relevant actors has increased. This has opened up possibilities for further research collaboration, has assured funding for the continuation of activities and created a legacy of the WaterProtect project. With respect to MCPA (and other herbicides), knowledge has increased through a survey of 90 private drinking water wells and through continuous monitoring of herbicides in the two river outlets using passive samplers, and through two monitoring campaigns using passive samplers in 10 sub-catchments of each of the two catchments. Also, knowledge on governance and the role of different actors has improved, which was achieved by mapping stakeholders' perception on the water governance framework and the factors affecting drinking water quality. The action lab leaders invested in the creation of more transparency making use of the website, the WaterProtect tool, several interviews with stakeholders' representatives, regular emails with monitoring results, etc. This resulted in an increased actor awareness on the water quality, especially of farmers who are now more conscious of their impact on the environment through the application of plant protection products (PPPs). As the ACP already spent much efforts on reaching and involving farmers, results in this area cannot be solely linked to the WaterProtect project. With combined efforts it seems as a majority of farmers are now more willing to be mentored and to implement measures to prevent pollution such as avoiding the spreading of PPP at sensitive times, the sowing of winter cover crops and the implementation of specific measures to avoid the loss of MCPA into the environment.

3.4 Summary Italian action lab

The Italian action lab is situated in the north-west of Italy in the Emilia Romagna region. The region is hilly and characterised by a mix of urban, peri-urban and rural areas. One specific cultivation dominates the area: viniculture. Therefore two types of farm structures are present depending on whether grape transformation and wine retail is self-made or not. The majority of wine producers (75%) belong to the category without a cellar and deliver their grapes to a social cellar for further transformation and retail. Wine products are of high-quality and have been certified with DOC[1], DOP[2] and IGP[3] certificates. Both groundwater and surface water are used for drinking water production, but only groundwater was under study during the project. So far, the impact of grape cultivation on pesticides and nitrates groundwater contamination was never investigated. Therefore, the key concern of the Italian action lab was to investigate the role of agriculture, and more specifically grape production, in groundwater contamination.

[1] Denominazione di Origine Protetta – Protected designation of origin
[2] Denominazione di Origine Controllate – Controlled designation of origin
[3] Indicazione di Origine Protetta – Indication of protected origin

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Given this general goal, groundwater monitoring was an important task throughout the project. It revealed that agriculture does have an impact on water quality through both diffuse and point pollution. Diffuse pollution is mainly attributable to the fertilisation of agricultural lands. Point pollution is mostly accidental, but quite common, caused by mixture preparation and machine cleaning. Yet farmers were not aware of the problem and their role in it. For this reason, the priority of the action lab leaders was to involve all relevant actors by building a robust stakeholder network. Time was thus invested in setting up a multi-actor process, with a central role for the farmers. In total 48 meetings took place in the Italian lab, focusing on multi-actor and bilateral conversations and presentations, whereas also 8 surveys were completed throughout the project. Farmers and farmer associations were made aware of the water quality problem by letting them participate in groundwater monitoring. The development of the WaterProtect tool ensured that these monitoring results were also accessible to other actors involved. However, farmer participation in the project also influenced project partners awareness by informing them of local realities and by pointing out that farmers are not aware of the problem due to a lack of direct communication to the farmers. Finally, project partners succeeded in setting up a network with all actors involved in water governance in which there is increased trust between farmers and the other actors.

To reduce farmer's influence on water quality through point pollution, action lab leaders focused on the implementation and demonstration of an impermeable platform for washing machinery with the collection of wastewater. They succeeded in developing a demo-farm with an impermeable platform and hard containers. However, the development of a common impermeable platform for machinery washing was harder to achieve. One of the two important social cellars was not interested in getting involved and the other social cellar didn't have enough space to implement the platform. In addition, several farmers didn't want a common platform and preferred private platforms for singular use. Besides those social barriers, also legislation and economic factors hampered the implementation of a common washing platform. Finally, the Italian partners have also been very active in ensuring the continuity of the project. In their search for a leader for the water governance, they didn't succeed in transferring their facilitating role and letting local actors collaborate without their presence. However, they were able to make sure project results were included in official training courses for farmers and they submitted a regional project concerning the implementation of additional BMP's for water protection.

3.5 Summary Polish action lab

The action lab in Poland comprises a catchment of about 70 km^2 located in the northwest of Poland, of which over 90% is used for agriculture. Problems with pollution of groundwater and surface water in the catchment are centred on nitrates, which is mainly the result of intensive fertilisation on arable lands and to a limited extent – leaky septic tanks. The effects are reinforced by erosion under influence of climate change, resulting in more runoff and leaching of organic matter. The action lab also has to deal with infrastructural problems, as two villages in the catchment do not have a sewage system, whereas the existing treatment plants and networks are outdated and suffer from leaks. Furthermore during the course of the project the catchment struggled with some governance issues. As such a big change on the water law act caused changes in water management, resulting in uncertainties with respect to different roles and responsibilities. No efforts had been done yet to create one common

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platform to discuss and coordinate roles and responsibilities and to bundle all information and monitoring data.

To address these problems, the Polish action lab leaders set up a process which included 30 contact moments. The majority of these meetings were bilateral (12), whereas also a significant amount of workshops were organized (9) in the action lab. The main actors that were reached throughout this process are individual farmers, farmers advisors, agricultural companies, representatives of local and national governments and drinking water producers. This approach at the local level is rather unusual in the Polish action lab, and required large investments of time and efforts. The cooperation between representatives of the agricultural sector and environmental sector has not led so far to a good atmosphere of collaboration, where responsibility is shifted between the parties. This also explains the difficulties that were encountered by the partners in creating a network and to bring change. As such, there was initially little interest of stakeholders to participate, which often misunderstood the goals of the project. This was true for farmers, whose attention and cooperation requested a lot of efforts and the use of different means of communication, but also for some institutions who did not see advantages in participating in the project. Furthermore, well-intended actions did not always result in the desired result. For example, after the lack of control and enforcement mechanisms was mentioned to the relevant control institutions, the farmers in the action lab were subjected to a control, which goes radically against the multi-actor approach that was assumed and resulted in dissatisfaction among farmers.

Despite the encountered setbacks and difficulties to involve stakeholders, the Polish action lab made progress towards some of its ambitions. Although network formation was a long haul, trust between the institutional actors (slightly) rose throughout the WaterProtect project. Although no cooperation was established, positive examples of working together and solving problems were discussed. Nevertheless, many efforts are still needed to scale these discussions up to a real cooperation between stakeholders. To do so, the polish partners do not have a lot of time, as no leaders among farmers or institutions or no opportunities (e.g. funding) were identified to continue the multi-actor process that was set up. With respect to knowledge building, positive results were achieved, as there is now a sufficient understanding of the environmental, but also the social and organisational conditions in the catchment. The action lab leaders worked hard on distributing these results to stakeholders, resulting in a general awareness of the bad water quality and the roles of different actors to bring change and improve the water quality. The action lab especially excelled in involving broader actors with indirect influences on water governance, such as consumers by for example testing water quality from private wells during the AgroPomerania Fairs. Unfortunately this did not result in the implementation of extra best management practices by farmers, although farmers stated in a questionnaire that they are willing to do so. The big gap between the stated and actual willingness to implement practices and increase efforts to avoid pollution is probably due to a lack of environmental responsibility and awareness and a lack of funding for the costly measures.

3.6 Summary Romanian action lab

The action lab in Romania is situated next to the Mara River, in the northwest side of the country. The landscape in the action lab is shaped by traditional agricultural practices, which offer important tourism opportunities. These traditional practices however cause small point source pollutions of

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nitrate into the water system, which puts the water quality at risk. Furthermore there are problems with water quantity in the region. As such there is often a lack of water in dry periods, which is solved by shutting down at regular intervals the water supply. However, this could have a serious impact on tourism development in the region. A third problem in the region is related to the lack of good water infrastructure. The action lab for example does not have a functioning centralized sewage system or wastewater treatment facility. Also water use is not metered, which does not stimulate efficient use. Water management in the action lab could thus be improved in different ways.

The Romanian action lab has set multiple ambitions, among which the creation of actor awareness, implementation of best management practices and as specific ambition the creation of a proper water provision infrastructure. To assess how these ambitions should be approached, a governance assessment was done. This revealed that, in contrast with other action labs, a civil society organization, i.e. EcoLogic, which initiates environmental projects and awareness campaigns plays the leading role. Another remarkable stakeholder is the church, who plays an important role in disseminating information to farmers. Furthermore the governance assessment shows that there is a lot of cooperation between stakeholders, however that system functioning is partially obstructed by the strong bonds within the small community, which makes regulation less effective. To make progress towards the formulated ambitions, different types of contact moments and actions were organized. In total 27 contact moments took place, of which 9 bilateral meetings and 6 multi-actor meetings. These two types of contact moments were deemed most effective to reach and involve farmers and decision makers. The action lab leaders found it sometimes difficult to get different stakeholders together and involved throughout the whole project. To ensure this, they learned that constant communication, analysis and adaptation is necessary. They are however convinced that this is important to get a complete picture and to bring long-term integrated solutions.

At the end of the project, progress has been made towards different ambitions. First of all a real network has formed in which all actors are aware of each other and of the different challenges related to water management in the area. Continuation of the functioning of this network also already has been assured, which shall be led by EcoLogic within the context of the action lab as ecotourism destination. One of the main achievements of the action lab is the creation of awareness of the need for improved water management, especially for the development of a continuously flourishing tourism activity. The action lab also tried to make real progress towards a better water quality by focusing on the implementation of manure storage platforms by farmers. Although during the timeline of the project no storage platforms were built, four farmers are considering it and are only hold back by a lack of resources. The project partners continue to search for solutions to overcome this barrier and in the meanwhile work on an easy to use design model tool to make a price estimation of the manure storage platform. Last but not least efforts were spent on assessing what needs to be done to put the existing but dysfunctional sewage system back into operation. A lack of resources was identified as the most important barrier, and therefore a further search for funds is required in order to take action and make progress towards this important goal.

3.7 Summary Spanish action

The Spanish action lab is located in the metropolitan area of Barcelona. With a surface area of 468 km^2, it is the largest of all seven action labs. The area encloses the lower Llobregat river basin catchment,

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which extends from the Montserrat mountain range to the Llobregat river mouth, where a delta is formed. The catchment provides drinking water to approximately 2.8 million people in Barcelona and its metropolitan area. Different types of land use appear, ranging from industrial and urban activities, and large logistic facilities (Barcelona airport and harbour), to environmentally protected zones. Agriculture has long been an important activity in the area, but due to the increasing urban pressure, the surface devoted to it has been reduced. Farming land in the catchment is intensely dispersed leading to situations in which different units of the same farm owner are separated over long distances. Linked to the variety of land uses, many different actor types are present, each having specific roles and interests concerning water governance. They all rely on surface water collection from two rivers and groundwater abstraction from two aquifers. However, urban and industrial activities put great pressure on those available water resources. The Llobregat river, for instance, receives the effluent discharges of 63 wastewater treatment plants along its whole mainstream. The aquifers in turn are subject to overexploitation and consequential to seawater intrusion, which affects the groundwater quality. This fragile access to sufficient water resources of satisfactory quality is made even more difficult by the typical drought periods and river flow fluctuations of the Mediterranean climate. Therefore also desalinated seawater is currently used in drinking water production. Researchers expect the current situation will deteriorate because of the predicted impact of climate change. Furthermore, there is a water transfer from the Ter River supplying water to some parts of the Barcelona metropolitan area that could be restricted in the forthcoming future. This will cause an even more intensive use of the remaining water resources. All this together has led to ensuring water supply to all actors being the core priority of the Spanish action lab.

With the prospect of impending water scarcity, the Spanish action lab leaders mainly focused on raising awareness, stimulating collaboration between all stakeholders and building up knowledge about the reuse of water resources. They additionally formulated the specific ambition of setting up a sanitation safety plan for continuously ensuring the quality of reused water for irrigation, based on the WHO concept of Sanitation Safety Plans. By setting up a multi-actor approach consisting of 29 interactive meetings, the different ambitions could be further discussed and pursued. Moreover, special attention was paid in the Spanish action lab to workshops, multi-actor conversations and conferences, bringing together a lot of different actor types. It is important to note that in every step undertaken during the process, farmers, farmer advisory and farmer unions were involved. Farmers have to rely on reclaimed water to irrigate their fields due to the water scarcity. In this way, farmers could positively influence the general water supply through their role as (1) filter or decontaminant factor of surface water, (2) catchment for later uses, (3) resource that helps to recharge natural groundwater.

Even though work still needs to be done in the future, the Spanish action lab accomplished several things among which increased actor awareness and problem knowledge. At the end of the project, all actors agreed on the need of optimizing the use of water in agriculture, increasing water reuse in the Baix Llobregat and improving the quality of regenerated water. Concerning the water reuse, the Spanish action lab has succeeded in determining what the quality of reclaimed water for agricultural use should be and in determining the specific treatment characteristics of the waste water treatment plants producing it. Furthermore, all data about the quality and quantity of water from different sources are publicly available in the newly created GISEL tool. Additional achievements include new knowledge on PPPs occurrence and origin of nitrogen species, and implementation of multiple BMPs.

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These include mechanical systems against herbs, marigold plants in field margins/greenhouses, management of remnants of prohibited phytosanitary products, biological control, cleaning places for the spraying equipment, calibrated sprayers for appropriate and optimized application of PPPs, and clean water loading points for application machines. Finally, continuation of the work would be ensured in the event that a proposal presented in the EU PRIMA call received funding.

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4. Context factors

In this section, the different action labs are cross compared at the level of the context factors, which determine the initial governance situation in the action labs. To be able to make this comparison, the different action labs leaders analysed the initial water governance situation in their action labs making use of the developed WaterProtect Water Governance framework, explained in D2.1 and schematically represented in Figure 3. This resulted in knowledge of the water system and the agricultural system, and led to the identification of stakeholders, i.e. people that have a certain interest in or influence on the water quality, and different types of barriers that make water governance in the action lab susceptible for improvement. In this comparison, we follow the order of the WaterProtect Water Governance framework and discuss the following components (Figure 3):

(1) Resource system consisting of agricultural system and water system
(2) Governance system as a result of interactions between actors and their institutions
(3) Building blocks that contribute to a well-functioning system
(4) Local context factors

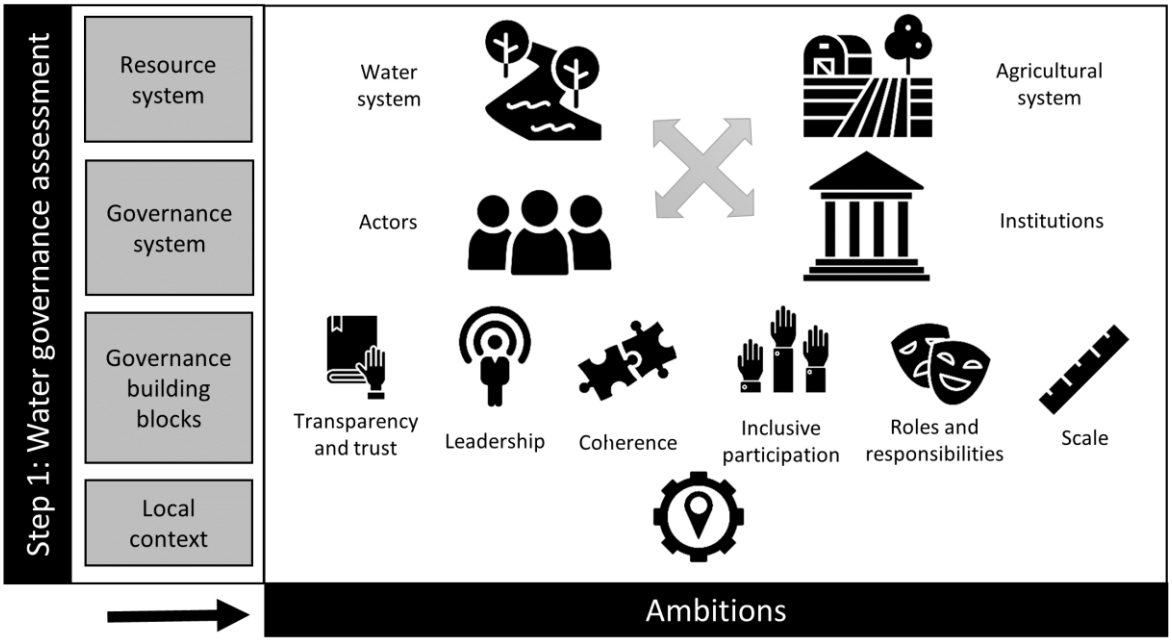

Figure 3: WaterProtect governance framework: step 1 – water governance assessment.

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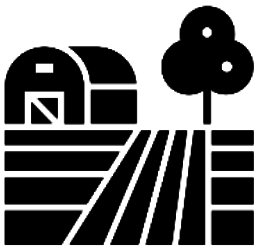
4.1 Resource system



The **agricultural system** differs largely among the seven action labs. First, there is a large variance in agricultural intensity. Agriculture in the Polish action lab, for example, is practiced generally on farms of about 100 ha, although also on large-scale agricultural company cultivating about 1000 ha is present in the action lab. In the Romanian action lab, on the other hand, farmers are engaged in small-scale, subsistence farming. Another difference is the way how the agricultural systems are organised. In most action labs one type of farm system organization dominates, often being family farms. In Spain, however, besides family farms, also part-time farmers, large agricultural companies, retired farmers and recreational farmers are active, all taking place in an overarching agricultural park. In the Belgian action lab, beside the farmers that have their seat or agricultural land in the area, also seasonal farmers are described. These are farmers that produce food on seasonally rented parcels. Also the agricultural output differs between the action labs. In most action labs, agricultural production is a combination of livestock farming, arable farming and vegetable production, with some crops more dominant than others. However, in the Italian action lab, the focus is completely on grape cultivation and wine production.

The **water system** is an extensive and complex system. We describe some characteristics of it, important for the focus of WaterProtect. First of all, the main objective of WaterProtect is to protect the water quality. However, besides the importance of good water quality in the project, we also had to take into account that the inhabitants of the Romanian and Spanish action labs were more concerned about quantity issues. In the Romanian action lab, water supply is cut off in dry periods as a preventive measure. In the Spanish action lab, located in the delta area of Barcelona, water availability fluctuates due to the Mediterranean climate. In combination with the high population density in the area, the available water sources are overexploited, which leads to seawater intrusion. This fragile access to sufficient water resources can only be exacerbated by the predicted impact of climate change, i.e. more severe drought periods.

Each of the seven action labs is located in an area where provision of good drinking water is of great importance. However, they differ in the source used for drinking water: surface water, groundwater or a combination of both. Except for the Belgian and Danish action lab, which are supplied for 100 % from respectively surface -and groundwater, both water sources are used for drinking water in the action labs. However, this does not imply that both sources are studied. The Romanian action lab for example the focus is only on surface water. The treatment rate to produce drinking water also varies. In the Belgian action lab drinking water is extensively purified, while in the Danish action lab, drinking water is only allowed to be oxygenated and filtered, resulting in a faster closure of wells in case of a bad water quality

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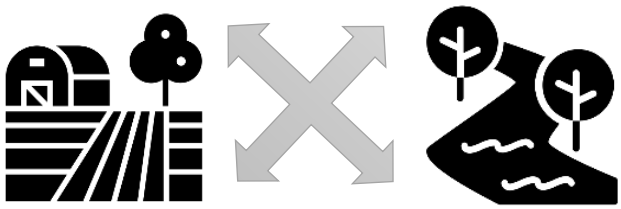

WaterProtect investigates the **interaction between the agricultural system and the water system**, and the effect of agricultural activities on the water quality. Two types of pollution were in focus, i.e. plant protection products (PPPs) and/or nitrates. In the Danish, Polish and Romanian action labs water quality is mainly influenced by nitrates. In the Romanian action lab for example, this is mainly caused by leaky tanks for manure or manure plates. In Belgium, the water quality partly reflects the spraying season, making clear the impact of the agricultural sector in the action lab. The focus of the Irish action lab is on plant protection products, with special attention for the impact of MCPA (2-Methyl-4-ChloorPhenoxyAcetic acid). In this action lab, a lot of previous work has been done on nutrients, but not yet on plant protection products and their impact on water quality. Last, the Spanish and Italian action labs studied both types of pollution. For the specific case of Italy, this can be linked to the fact that the impact of grape cultivation on PPP and nutrient groundwater contamination was never investigated before. Since the main pollution in the Spanish action lab originates from households and industry, they also study chloride, and waste-water and industry-derived pollutants.

Natural and human factors may also reinforce the levels of agricultural pollution that occur. Examples of natural factors that influence the water quality are the weather conditions, climate change, soil and landscape conditions. For example, heavy rainfall can cause more erosion, surface outflow and influence the amount of leaching from the soil surface to groundwater, which can all lead to increased levels of contamination. Dry periods and the accompanying evaporation of surface water can cause higher pollutant concentrations in the surface water due to a lack of dilution of persistent point sources. Dry periods may also build up a pool of nutrients in the soil due to a lack of growth and enhanced mineralisation. This pool of nutrients may later be flushed out to water. Due to climate change, events like heavy rainfall, drought, etc. will become more frequent, more sudden and more extreme in the future. Soil conditions are also frequently indicated in the action labs as a reinforcing factor. In action labs focusing on pollution caused by nitrates, a natural factor originating from soil conditions can occur. This is for example the case in the Danish lab, where the spatial differences in soils and the vulnerability to N-leaching is used to optimise the farming practices spatially. As PPPs do not have a natural origin, natural appearance of the pollutants is absent or rather limited. The Belgian action lab also defines some reinforcing human factors. Private individuals, and contractors treating gardens, train tracks, and war cemeteries also have a reinforcing influence on the PPP concentrations measured. Other sources of pollution (from outside the agricultural and environmental sectors) were also identified. One issue frequently mentioned is the problem or inefficient or incomplete sewage systems. In the Irish action lab for example, there exist only one sewage treatment plant for 75 people. The vast majority of the population has to rely on septic tanks. In the Romanian action lab, there is not any functional treatment facility. Examples of case specific pollution are acidification of the river caused by a nearby quarry in the Irish action lab or historical pollution of the groundwater originating from a former Soviet Union army base in the Polish action lab.

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4.2 Governance system

Many different **actors** are identified in the action labs, having an important stake in the water quality. They differ in knowledge about the water quality, interest or motivation to improve the water quality and the capacities or power to influence the water quality. Knowledge about the water quality is collected by monitoring campaigns. In function of the Water Framework Directive, as well as the Groundwater and Nitrate directive, monitoring of the water quality is carried out in a systematic way, which is further expanded in the context of the WaterProtect project. In most action labs, monitoring is done by one of the following three actor types: the regional/national government, the producers and suppliers of drinking water and research institutions. In the Irish action lab on the other hand, all relevant knowledge concerning water quality is centralised at the farmer advisory, Teagasc, which is the sole organisation responsible for monitoring. Although the data obtained by monitoring campaigns are supposed to be accessible, local actors such as farmers and inhabitants are often not aware of the existence of these data. This makes the pollution problem in a specific region less known. The interpretation of data gives an additional difficulty. For example, farmers are used to work with trade product names, while the monitored data gives the presence or exceedance of the active substances of plant protection products, which are often unknown for them. If the problem is not locally experienced, there can be little belief in the need to implement extra measures.

Many actors have a certain **interest** in or **motivation** to improve the water quality. A first major motivation to strive towards a good water quality is the use of the water for different purposes. Good water quality is important for drinking water production companies, as it can reduce the cost of treatment while increasing the time span of the year in which drinking water can be produced, resulting in important financial benefits. Farmers benefit from a good water quality, since they can use it as drinking water for their livestock or for irrigation. However, farmers are also the first that are confronted with the costs of a good water quality in the form of extra labour and investments that are necessary to avoid pollution. For society in general, the provision of clean drinking water and the safe disposal of wastewater at a reasonable price is vital. Another important motivation to strive towards a good water quality is the preservation of PPP and the current way of farming. Deterioration in water quality may result in future restrictions on farming activities. This is an important motivation and concern for actors like such as farmers, farmer representatives and companies selling farm inputs. Also trading, processing companies and retailers would be hampered by an increase in regulations and restrictions, taking into account that it would limit the maximization of agricultural production and in this way affect their economic viability. Other motivations that are mentioned are the image of agriculture, the image of governmental instances towards their voting audience and towards higher level governmental instances, the value of the water ecosystem and the recreational value (bathing, canoeing, fishing, etc.).

Interactions between the actors can on the one hand stimulate cooperation and partnerships, and on the other hand, can lead to conflicts. Examples of strong links between actors can be found in the Danish action lab where a trustful relationship between the drinking water producers and suppliers and the municipalities can be found. In the Belgian, Irish and Italian action labs, the good connection

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between farmers and farmer advisory organizations are highlighted. On the other hand, most of the action labs indicated that the cooperation between the agricultural sector and the water sector is rather limited. The Polish, Italian, Belgian and Romanian action labs also indicated the low level of trust between the farmers and the governmental organizations. For example, the farmers in the Polish action lab pointed out that it is difficult to cooperate with institutions responsible for environmental protection and water governance because of unclear competences.

Every actor has valuable **capacities and power** to contribute to solutions. The best-known example in the case of water pollution through agricultural activities is the capacity and willingness to implement best management practices. In almost every action lab, farmers are pointed out as the main responsible actor for the effective implementation of BMPs. Other actors can influence this willingness through personal contacts. For example, actors like farmer advisories and farmer unions can play an important role through their influence on farmers. However, some actors have more power on farmers' behaviour, for example the retailers and processors which are as suppliers both in direct contact with the farmer. Retailers and processors could influence the farmers' behaviour by imposing some specifications regarding the sustainability of production. Their influencing capacity therefore does not stem from a trustful personal relation, but rather from their relationship to farmers in the supply chain. The ability to provide financial resources is also seen as an important capacity, both on an overarching level, as specific for measure implementation. For example, in the Belgian action lab water quality issues are tackled on a project basis. More structural financial resources are missing. In the Irish, Romanian and Spanish action lab, the limited financial resources of the farmers and the impact this may have on the implementation of measures are highlighted.

The water governance situation in the action labs is determined by the interactions between the actors and the deployment of their capacities and power. In this way, **institutions** like policy and legislation, norms and values and markets and finances are being formed. In all action labs, **policies and regulations** to enforce or prohibit a specific behaviour are set up by governmental organisations. Policies are mainly stipulated on European and national/regional level and further translated at local level. For more information on the content and impact of policies, we refer to the deliverables of work package 7. This top-down organisation structure of policies and legislation implies decision-making at a higher level, whereas issues at local level are only known to a limited extent. Luckily, the detailed organisational structure is often still open for interpretation and can be decided upon by the local managers. For example, in the Danish action lab, every resident with a stake of interest has the right to be heard and to give input in the local water management plans. Besides participation in planning, it is also important that legislation is applied and enforced. In every action lab, actors are appointed to control the proper implementation of the policies and regulation, and as such to ensure the well-functioning of the legislation. In this regard the control of the cross-compliance with agro-environmental standards and rules is often complained about. For instance, in the Belgian action lab, the 1-meter rule (buffer strip of one meter wide that cannot be cultivated next to rivers and borders) is almost not controlled resulting in a rather limited application.

Social norms and values regarding the water-agriculture system are formed by the many interactions between the various actors. Different initiatives and collaborations between actors exist that strive

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towards an improvement of the water quality. An example of such an initiative is the creation of the Tidy Town Community groups in the Irish action lab. Those groups, consisting of local inhabitants, aim to keep their town or village clean and pollution-free through the removal of litter from nearby streams and rivers. But more important in the context of WaterProtect, are the many information and education programs that exist in the different action labs to share knowledge and raise awareness about the water quality problem. They are mainly organized by governmental organisations, civil society organisations, farmer organisations and, to a lesser extent, research institutions. In the Italian action lab, the possibility to have a sustainability certification after following a voluntary sustainability program, induced farmers to have a more environmental-friendly behaviour. In the Romanian action lab, the local priest plays an important role in shaping norms and values (also around environmental themes). Furthermore, the inhabitants in the Romanian action lab have very strong bonds, which restrain them from reporting violations against the water laws and regulations.

Last but not least, influence can be exerted and people can be steered through **financial stimuli**. Governmental organisations as well as private market actors can have an influence on various actors by means of financial stimuli. Seven different types of stimuli were differentiated in the action labs: funds, management agreements, taxes, benchmarks, price ceilings, subsidies and licenses. These financial stimuli are based on the principles of 'Payment of Ecosystem Services', i.e. instead of holding farmers responsible for the pollution caused, they are rewarded for the ecosystem services delivered, and in the case of WaterProtect especially for the pollution of PPP and/or nutrients they avoided by changing their behaviour or by doing investments. In all seven action labs, it is the government who takes the lead, however the target group of the financial stimuli differs. The Belgian financial stimuli, for example, are mainly directed towards farmers (funding of investments on farms, environmental friendly vegetable production, erosion measures, etc.) whereas the Danish financial stimuli are mainly focused on drinking water producers, i.e. benchmarks and price ceilings ensuring working efficiency of water supply services. Besides the government, the Danish action lab also describes the drinking water producer and supplier as having financial influence. Moreover, the local waterworks are required to add a tax to cubic meter prices on water in order to cover expenses for mapping, planning and quality control. Finally, in the Irish action lab both consumers and retailers and processors have an economical influence. The global nutrition group Glanbia, for example, is committed to protect the environment and in order to do so, they can refuse to accept milk from suppliers or offer them a lower price if they fail to reach certain sustainability criteria. At the end of the food chain, consumers can have some influence on retailers by refusing to buy food which is not produced in a sustainable way.

4.3 Building blocks for well-functioning

Transparency and trust in processes and decisions is important to create support for certain ideas and solutions. High involvement in the decision-making process and a clear communication are essential. A lack of (clear) communication between actors concerning water quality is seen as an important barrier for change. In the Belgian action lab, for example, no direct communication to the farmers about the problem and about possible solutions was available. Moreover, it was unclear who should communicate the monitoring results to the farmers. Although the monitoring data of the environmental authority are publicly accessible, they are not actively communicated to farmers in a clear way. Furthermore,

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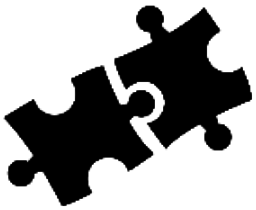
knowledge transfer concerning water quality issues among sectorial instances is also lacking. A common, publicly accessible platform where stakeholders can share data and experiences can be a possible example to communicate collected data. Only the Danish action lab disposes of such platform, i.e. the database Jupiter.

A **leader or pioneer** can actively work on problems and solutions and can motivate and activate other actors. Many action labs indicated the absence of a clear local leader or pioneering farmer in their area. As a result, all actors adopt a 'wait and see' approach, and little progress is made towards the formulated ambitions. The absence of a leader often also restrains the continuation of activities at the end of the project. This is the case in Poland where the lack of a clear leader who takes up responsibility makes it very difficult to continue the efforts to improve water governance at the end of the project. Some action labs did manage to find a leader. In the Italian action lab the Emilia Romagna region' was identified as the most appropriate stakeholder to take up the leading role, whereas also one pioneering farm agreed to demonstrate the use of platforms. Also in Romania, the environmental organisation EcoLogic was identified as the leader steering the water governance processes in the area, particularly within the context of ecotourism development.



Ensuring **coherence in governance strategies** avoids overlap and conflicts. Complementarity of policies and legislations from different domains is considered a prerequisite for efficient collaboration and governance. In the Italian, Belgian, Danish and Romanian action lab, policies are not integrated in a satisfactory way. For example, in Denmark the protection of groundwater and surface waters is not integrated. In both Belgium and Denmark, the stakeholders indicate that the agricultural sector is over-regulated. It is difficult for farmers to keep an overview of all regulations (not only on water issues, but also on animal welfare, food safety, environmental quality, etc.). Many action labs had some first contacts with policy makers in order to eliminate bottlenecks and simplify regulation, however, this is a long-term process of which the results are not immediately visible.

Inclusive participation aims to involve all relevant actors in the decision-making process. Moreover, different stakeholders (multi-stakeholder) coming from different sectors (multi-sector) and different levels (multi-level) should be heard throughout the process. Not in all action labs, participation in decision making processes is usual. In the Romanian action lab decisional power is centralized, which means that only some authorities rule the community. The voice of the farmers is low. This power imbalance is also observed in the Polish action lab where public authorities are overrepresented and citizens are underrepresented. The Italian action lab is an example of a fractioned decisional power, i.e. the decisional power is fractioned between governmental institutions, responsible for water availability, and several associations, protecting private interests. Due to this fractioned decisional power and the absence of a decisional final leader, decisions can be conflicting. In the Irish action lab, power imbalances are tackled and to some degree mitigated through the engagement and community work of the local authority waters and communities office (LAWCO).

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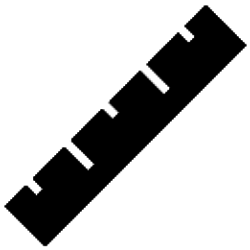
An important part of water governance is to deal with conflicts in order to ensure a continued participation of all actors. Conflicts can have many different causes. For example, a conflict can arise when different definitions exist of a good water quality among different stakeholders. Drinking water producers will focus on water quality parameters or compounds that have an impact on drinking water production, whereas farmers or environmental organisations will focus on parameters related to agricultural production and ecosystem quality, respectively. However, conflicts of interest can also be linked to water use. In the Italian action lab, the different users of water were assigned priorities by law in case of water scarcity. As such, drinking water and water contributing to environmental safety were considered most important, whereas economical uses of water, i.e. for agriculture, industry and territory conservation, only were assigned as a third priority. Especially in the case of water scarcity, these priority rules can create conflict. Conflicts may also arise when actors are more concerned about other issues. For instance, In the Polish action lab, action lab leaders find it very difficult to convince farmers and inhabitants of the importance of water protection. Polish farmers in the action lab are primarily profit-oriented and as such much more worried about the impact of a limited use of fertilizers on their competitiveness and yields rather than on its positive consequences for nature.

The degree to which **roles and responsibilities** related to the water-agriculture link are defined, is another important factor for the well-functioning of the system. For instance, in the Belgian action lab, responsibilities for water issues are divided among many actors. For people or organisations which are less familiar with water quality issues, it is unclear who has which responsibilities. Also the Polish, Danish and Irish partners mentioned this issue of unclear roles and responsibilities of the different stakeholders.



The action labs have different **scales**. The area of the action labs are determined by the natural borders of the catchment. The areas vary between 11 km^2 in the Irish action lab to 468 km^2 in the Spanish action lab. This scale also determines how many farmers are involved in each catchment. Although the areas of the Romanian and Belgian action labs are smaller, there is a relatively large density of farmers living in those areas. The smallest number of farmers is in the Danish action lab with only 21 farmers in an area of 70 km^2.

4.4 Local system context

Other local factors can also play a role, and in their own ways impact the water quality in the action labs. In the Polish action lab for example, a restructuring of public institutions at regional and national level took place. This reorganisation of water governance was due to the adjustment of the Polish Water Law Act to the EU requirements set in the Water Framework Directive (WFD) or the Nitrates directive. In brief, the whole reorganization of administrations related to water governance was introduced too quickly, causing chaos, which made it difficult for the Polish WaterProtect action lab leaders to get an overview of the roles and responsibilities of different institutions with respect to water management.

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The Spanish action lab is located in the metropolitan area of Barcelona and therefore is highly liable to urban pressure. As a result farming land is intensely subdivided with some farmers having different farm units separated over long distances. In addition, part of the area is also environmentally protected. These settings force the Spanish action lab, more than in other action labs, to very well think through their stakeholder management throughout the WaterProtect action lab.

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5. Multi-actor process

Taking into account the results of the initial governance assessment, explained in section 4, the different action labs set up a multi-actor process to work on an improved governance structure and towards a better water quality. They were encouraged to include all relevant stakeholders in this process, to use different methods to reach out to these stakeholders, and to apply different strategies to convince stakeholders to take action. Hence, throughout the project, action labs were working towards a multi-actor, multi-method and multi-strategy process, which is schematically represented in Figure 4. The first row shows the different contact methods that project partners used to reach out to stakeholders, many of which are interactive. As such, bilateral meetings, multi-actor meetings and workshops seem important methods to reach out to the different stakeholders, but to a lesser extent also field visits, surveys and presentations or conferences have been used as interactive methods to involve stakeholders. The variety of stakeholders that have been included in the process is shown on the second row in Figure 4. In all action labs farmers were the centre of attention, as they have the largest and most direct influence on the water quality through their agricultural practices. But besides farmers, many stakeholders have an indirect influence on the water quality, through motivating (or discouraging) farmers to take action. This includes from left to right in Figure 4 national governments, local governments, water producers, the phyto-industry, farmer organizations, researchers, food processors and distributers, businesses, NGO's and consumers. Once the contacts are established with the different stakeholders, action lab leaders were encouraged to apply different strategies to convince stakeholders to take action. The RESET-model defines five different types of strategies that can be used to change people's behaviour. These are shown in the third row in Figure 4, i.e. Regulation, Education, Social pressure, Economics and Tools.

In this section an overview will be given of how different action labs implemented the process in their action labs, by zooming in on contact methods, stakeholders involved and strategies applied. Before doing so, a general quantitative overview will be given.

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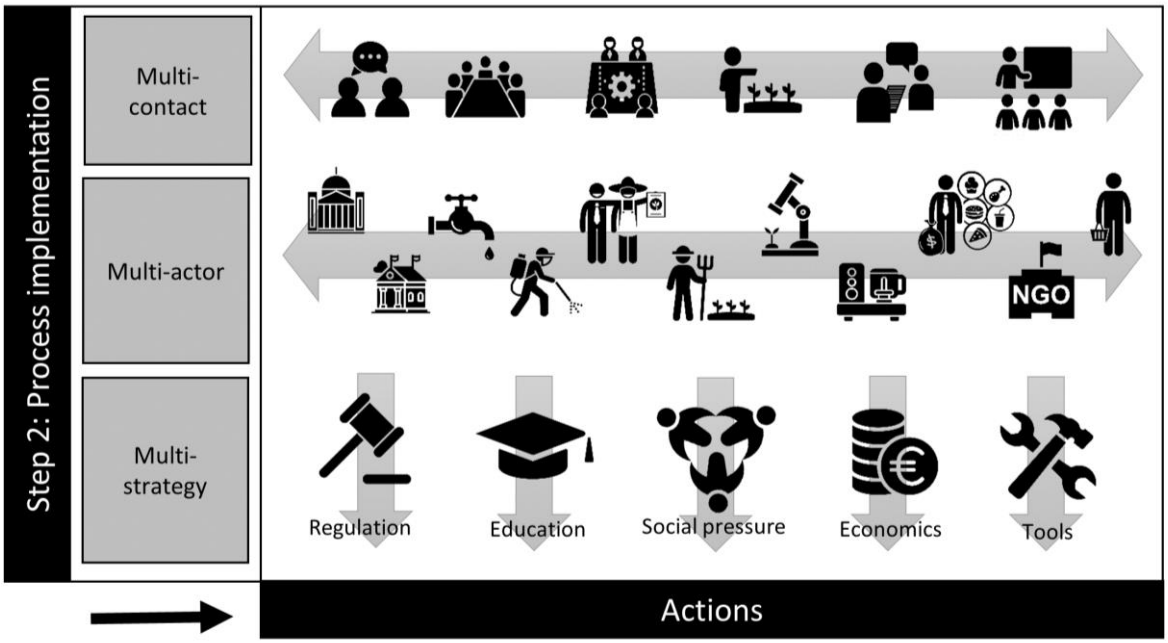

Figure 4: WaterProtect governance framework: step 2 – process implementation

5.1 Quantitative overview

Table 1 shows that there are important differences between the action labs with respect to the types of contact methods used, the types of stakeholders reached out to, and the types of strategies applied. When we look at the different types of meetings used in the action labs to reach out to the stakeholders, it can be concluded that bilateral meetings were especially important in Poland, Belgium and Romania, where they formed at least one third of the contacts organized. Multi-actor meetings on the other hand were assigned the most important role in Denmark and Ireland, where they account for more than half of the meetings. Presentations and conferences were considered the least important and were only used by Belgium and Spain as a medium to convey information to stakeholders.

Concerning the different stakeholders involved, all action labs gave a considerate amount of attention to farmers and their representatives, which were present in respectively 53% and 41% of the meetings between action lab leaders and stakeholders. Also national and local governments were stakeholders that all the action labs included. Moreover, in one out of three contacts in the action labs a national and local governmental actor was involved. The next most important stakeholder that was involved in the process were water producers, which in Romania is a governmental organization and therefore is not included in Table 1. However, many actors were only reached out to in some action labs, often relating to the focus of the action lab. The phyto-industry for example was only involved in Belgium and Ireland, the two action labs that mainly focused on agricultural pollution by plant protection products. The tourism sector was only reached out by the Romanian action lab, where tourism is an important economic sector that may be influenced by consequences of poor water quality. Figure 5 shows that not all stakeholders groups were approached in the same way by the action lab leaders. National and regional governmental actors for example were targeted mainly through bilateral and

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multi-actor meetings. These were also important contact methods to exchange with farmer unions, which were also happy to participate in field visits. To reach out to farmers, surveys and field visits were mainly used, although farmers were also contacted individually and invited to participate in workshops and bilateral meetings. The rest of the stakeholders were often approached individually through bilateral meetings, and afterwards participated in many of the events on which they were invited to, no matter the format of the meeting.

Table 1: Differences in the types of meetings used, the type of stakeholders reached out to, and the relative importance of strategies between the different action labs. Whereas 'multi-contact' represent the amount of meetings that took place, 'multi-actor' does not represent the amount of stakeholders that were involved, but rather the amount of meetings in which that type of stakeholder was involved. Strategy numbers on the other hand only give an indication of the relative importance of a strategy in an action lab. As the efforts that have been done to set up or organize a strategy might differ greatly between ambitions and between countries, a comparison between countries in this regard is not possible.

	Belgium	Denmark	Ireland	Italy	Poland	Romania	Spain	Total
Multi-contact								
Bilateral	17	3	1	9	12	9	3	54
Presentation/conference	4			9			9	22
Workshop	9	2	4	5	9	3	7	39
Survey	4	1	1	8	1	5	2	22
Newsletter	7	2		1	2			12
Multi-actor	7	7	10	11	3	6	8	52
Field visit/demonstrations	4	1	3	4	1	4	2	19
Leaflets				1	2			3
TOTAL	52	16	19	48	30	27	31	**223**
Multi-actor								
Phyto industry	19		11					30
Farmers	17	6	5	23	12	13	19	95
Contract sprayers	8							8
farmer unions	13	4	11	20	9	3	19	79
Researchers			12	4		6	19	41
Water producers	8	6	7	7	4		7	39
Local government	11	7	10	3	11	11	8	61
National government	19	2	8	7	9	9	10	64
Food processer and distributer			4	11	1		2	18
Consumers		3	1	4	3	5		16
NGO's		1						1
tourism						5		5
TOTAL	95	29	69	79	49	52	84	**457**
Multi-strategy								
Regulation	3			2				5
Education	7	3	2	4	2	3	3	24
Social pressure	7	2	1	3	2	2	1	18
Economics	5	1		1	2	1		10
Tools	5	2	1	2	1	1	1	13
TOTAL	27	8	4	12	7	7	5	**70**

Table 1 gives an indication of the relative importance of the different types of strategies used by the action labs. Comparisons between action labs in this regard are not possible, given that the efforts undertaken to set up or organize a strategy differ greatly between countries, ranging from one

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discussion with a stakeholder to putting a concrete idea into practice. Nevertheless, the table still gives us a good idea of which strategies were most popular among action labs. As such the table tells us that the strategies 'education and information' and 'social pressure' were the first and most important strategies in order to change stakeholders' behaviour. This is particularly confirmed by action lab leaders who experienced that many actors were not aware of the water quality problem, and that actor awareness is vital in changing stakeholders' behaviour and getting them enthusiastic about the implementing or taken advantage of other strategies.

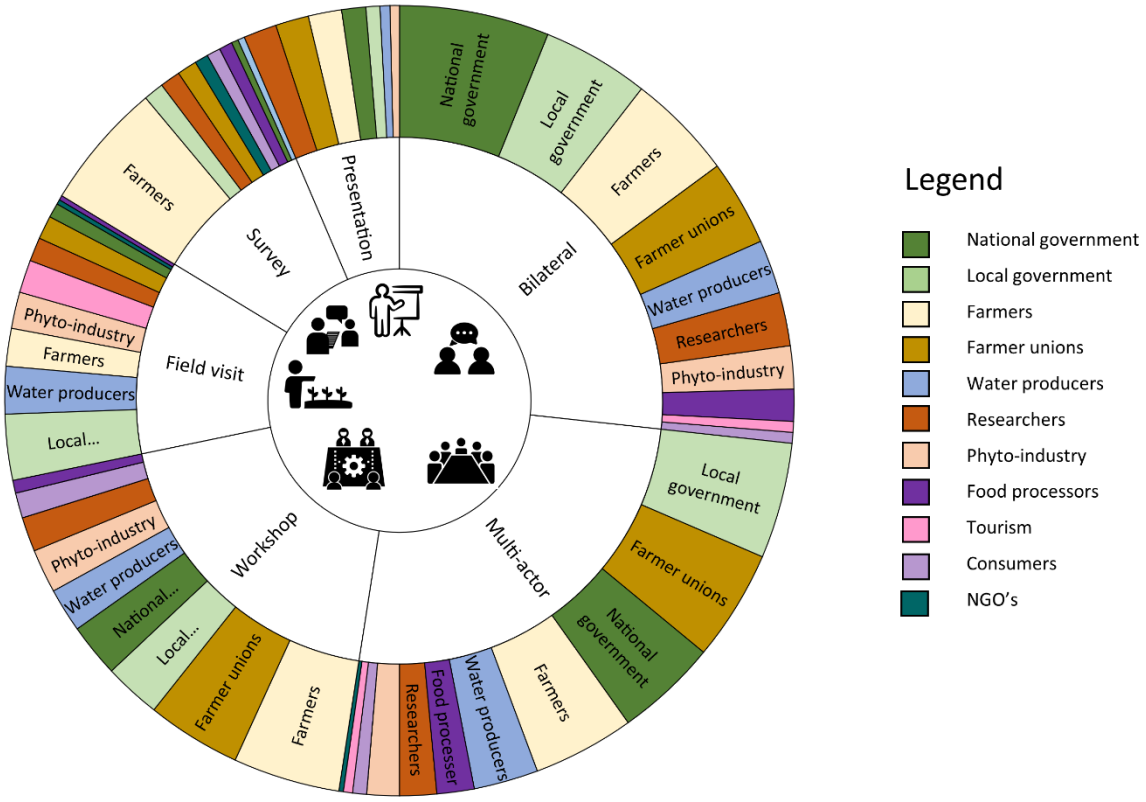

Figure 5: Overview of the relative importance of the interactive contact methods in the action labs, and the main stakeholder groups targeted by the respective contact methods.

Although Table 1 gives a good overview of which contact methods were used by the different action labs to reach out to the different stakeholders, some remarks should be made. As such we would like you to keep in mind that the numbers reflect the main method used to contact stakeholders, whereas they are often composed of different types of contact methods, for example, workshops and multi-actor meetings were often alternated with presentations to introduce the stakeholders to the topic of the meeting. Furthermore, we also would like to mention that no clear guidelines or definitions were given to the action labs about the process reporting, more specifically about the classification of contact methods. This led to different interpretations. Hence, similar contact formats in which a group of stakeholders was brought together to discuss and brainstorm, was in some action labs classified as a multi-actor meeting, and in other action labs as a workshop. Another example are the one-by-one

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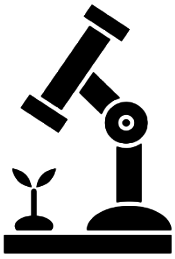
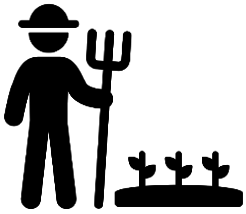
visits to farmers, which in some action lab were classified as bilateral meetings and in other action labs as surveys. Despite these shortcomings, we are convinced that Table 1 gives a truthful representation of how the processes were conducted and which stakeholders were involved in the different action labs.

5.2 Multi-actor experiences



RESEARCH

In all countries, research organizations were involved in the action lab. Overall, research organizations took up the important role of action lab leader, sometimes collaborating on this with other important organizations in the action lab, such as water producers in Spain, farmer organizations in Italy and an NGO in Romania. In the majority of the action labs, the researchers involved had a technical agricultural or ecological background, are very familiar with the agricultural crops that are grown and the potential water quality problem in the region. However, many researchers had less experience with social research, which is in this project was equally important to the technical and agronomic research. ILVO as leader of the governance work package therefore took a step-by-step approach to guide action lab leaders through the process of assessing and improving water governance.



FARMERS

In all action labs specific attention was paid to involve farmers as key actors, since they are responsible for the implementation of BMP's. This happened in different ways in the different action labs, as also the farmer profile is very different among action labs. In Italy for example, all farmers in the region focus on the production of grapes for wine, whereas in other action labs, the focus is on the production of a variety of agricultural products, including cereals, vegetables, and meat. In the Romanian action lab, subsistence farming is still common, whereas in other action labs, agriculture is completely mechanized. Also the size of farms differs among action labs, with very small farms in Romania, to very large agricultural companies in Spain that employ a lot of agricultural workers. There are also agricultural workers which were more difficult to reach out to. An example are seasonal farmers in Belgium, who are only present temporarily and do not live in the action lab. Also contract sprayers are common in the Belgium action lab and can be considered as key actors as they spray very large surfaces and have larger capacities to invest in new machinery. Overall, the action labs report that it was not too difficult to reach interested farmers, however it was not possible to involve all farmers at the same level. Nevertheless, all action labs agreed that the format of the meeting was of paramount importance for a fruitful discussion. Therefore, the experiences of the action labs with involving farmers are highlighted in a series of tips in the section 'learned lessons'.

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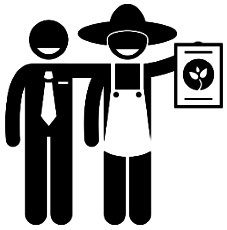
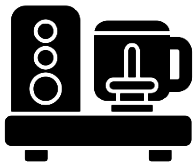


FARMER UNIONS AND ADVISORY

Farmer unions and farmer consultants are involved in most of the action labs. They are considered important because they work together with farmers at many levels, which results in mutual understanding and trust. The presence of farmer unions or farmer consultants can therefore increase farmers' participation rate in meetings. Only in Ireland, farmer unions are not involved, as there are many different farmer unions and it may become too political to involve only a few of them. Nevertheless, the Agricultural Catchment Program in Ireland has already worked a long time together with farmers, which has resulted in a good level of trust with farmers. In the case of Ireland, the Agricultural Catchment Program thus takes up this role.

THE PPP SECTOR

The PPP sector that produces and distributes plant protection products was only involved in the Belgian and Irish action labs. This is quite logical as their main focus is on reducing the impact of PPP on the water quality. In Belgium, distributers of PPP were considered very important as their consultants also are in contact with farmers and thus influence their behaviour. In Belgium, representatives of chemical producers attended some workshops in which some difficulties with respect to the implementation of BMP's were discussed. It is in their own interest to get farmers to better handle PPP's and implement these BMP's, otherwise the use of PPP's could be further restricted by the government.



FOOD PROCESSORS AND RETAILERS

Food processors played an important role in the Italian, Irish and Polish action labs. In Italy the Cantina Sociale is an association of wine processors that uses groundwater for their activity, and also influences farmers by advising them about the sustainable use of groundwater. The association pushes itself to produce sustainable wine (trough V.I.V.A. program of Certification), which is translated in stimuli for farmers to implement BMP's. This is also the case for Ireland, where Glanbia, the largest dairy processor in the country, helps farmers to work towards sustainability. More specifically, Glanbia organizes information and education campaigns to promote good practices and it pays higher prices for milk if farmers reach certain sustainability criteria. In Poland, a local sugar company established a cooperation with farmers producing sugar beetroot with the aim to educate farmers on how to achieve best produce.

DRINKING WATER PRODUCTION COMPANIES

As the focus of the project is on agricultural areas that are used for drinking water production, water production companies are important stakeholders to take into account. That is something that all action labs understood and acted upon. In Denmark, efforts were spent on initiating a network of waterworks, partially through large meetings in which all waterworks representatives of the municipality of Skive were present, and in smaller meetings in which groups of neighbouring waterworks representatives were represented. It was challenging to keep the attention of these waterworks, as many of the people involved work on a voluntary basis and have thus important time constraints. In contrast to Denmark, where most of the waterworks companies

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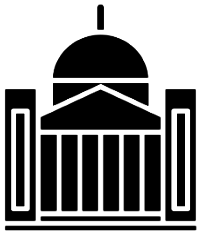
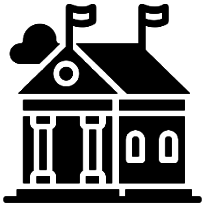
are privately owned, production of drinking water in Romania is done under the supervision of the local government. That is the reason why in Table 1 there is no presentation of drinking water companies in the actor process, although local representatives participated in the process. Due to the importance of drinking water production for the community, also in many other action labs, drinking water production companies have a special status with many governmental links. In Belgium these links were useful in the discussions of the drinking water company with the action lab leader and governmental actors. The goals of these discussions were to set up an arrangement in which the drinking water company compensates farmers to implement BMP's, as their purification costs will be lowered by a better water quality.



EUROPEAN AND NATIONAL GOVERNMENTS

European governments were not involved in the action labs. However, this does not imply that European governments and their decisions are not important for the action labs. The Water Framework Directive for example has shaped important requirements for the organization of water governance in Europe and all EU member states must comply these requirements. National governmental actors were to some extent involved in the action labs. In most of the action labs the national and regional authorities for agriculture and environment were present in part of the organized meetings. In some action labs also other authorities were involved, such as the authorities for energy, utilities and climate (Denmark and Italy), industry, businesses and financial affairs (Denmark), water management and inland navigation (Poland), housing, planning and local government (Ireland), etc. However, some action labs experienced difficulties to get these stakeholders actively involved. The Danish action lab mentions for example that it was difficult to involve national authorities to the annual stakeholder advisory group. In Ireland on the other hand, action lab leaders experienced difficulties to involve higher level actors because they are not very approachable and often busy with other duties.



REGIONAL AND LOCAL GOVERNMENTS

In all action labs, efforts were undertaken to get regional and local governments involved. In some of the action labs this was very successful. In Denmark for example, the municipality of Skive (also a partner in WaterProtect) invited citizens and waterworks to discuss a common water fund, which had a lot of response, in contrast to previous efforts of the action lab leaders. In the Italian action lab, the municipality of Ziano Piacentino collaborated for the organisation of stakeholder meetings, and allowed the use of municipality's rooms for the meetings, whereas the region Emilia Romagna is so important in water governance that it is considered as the leader of the action lab. Moreover, when confronted with the critical monitoring results in the region, the Emilia Romagna region took the lead in searching for solutions together with farmers. In Belgium however, some difficulties were experienced with involving local governments. A bilateral meeting with the two municipalities of which the Belgian action lab is part of, revealed that also at the local level there are tensions between environmental and agricultural views priorities, often competing for the same limited funds.

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LOCAL BUSINESSES

In some action labs also local businesses were identified as stakeholders. Especially the tourism and catering industry is considered to experience influence, as an improvement in the water quality may boost local and international tourism opportunities. The action lab where most attention was paid to this type of stakeholders is the catchment in Romania, which is already known as an important ecotourism destination due to its traditional agricultural landscapes. Moreover, many farmers and inhabitants in that action lab have invested in the construction and decoration of guest rooms, and can see their incomes rise or fall with the preservation of a good ecological status of the environment. These farmers were thus happy to attend or be involved in meetings organized by the action lab leader.

NON-GOVERNMENTAL ORGANIZATIONS

Non-governmental environmental organizations were in general very pleased with the arrival of the project. However, the action labs did not manage to get the NGO's actively involved in the process. An exception is Romania, where the environmental organization EcoLogic is considered as a very important actor and even takes up a leading role in the action lab. More specifically EcoLogic initiates environmental projects and awareness campaigns, in order to empower citizens and farmers to take action. Furthermore, EcoLogic is seen as an important middleman and broker in the action lab by working together with the different institutions in the region and by bringing together and integrating the interests of the agricultural, the environmental and the ecotourism sector.

CONSUMERS

Except for Belgian action lab, all action labs mention consumers as having an important stake in a good environmental status and quality. Despite this, not all action labs did efforts to involve them, as they are convinced that consumers have little time to take part in the process and already trust governmental institutions to take care of a good water quality. In Poland, representatives of the city council even pointed out that involving consumers could result in unnecessary conflict as they could misunderstand the role of agriculture in the water quality problem. In the Danish action lab however, consumers were reached through a face-to-face survey in their homes, which informed the consumers, but also tested their knowledge and investigated their preferences about the future supply of drinking water. In Romania, the general public was not reached out to in a systematic way. However, the priest of the local community was identified as an important contact that helped to spread information, not only about social issues, but also about environmental issues such as the water quality.

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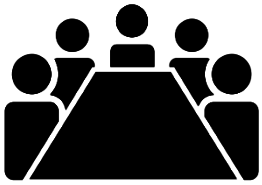
5.3 Multi-method experiences

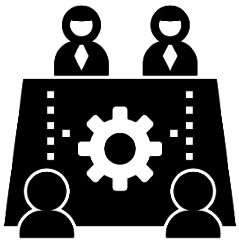
BILATERAL MEETINGS

Of all different types of contact methods, bilateral meetings were organized most frequently among the different action labs. They were implemented in the majority of the action labs to reach out for the first time to potential stakeholders that could play a role in the project, before inviting them to group meetings with different stakeholders. Throughout the project, bilateral meetings were also considered most effective to discuss freely with a specific actor about a specific problem. In many action labs also private conversations with farmers took place. In the Belgian and Danish action labs for example, most of the farmers in the action lab were visited in person, as they feel much more confident in a trusted private interview, rather than in a group with other farmers. This helped to get a better insight into farmers' views on the water quality and farmers' motivations to (not) take action. However, the drawback is that bilateral meetings are time-consuming and therefore an expensive way of approaching farmers.



MULTI-ACTOR MEETINGS

The second most implemented contact method used by the action labs were multi-actor meetings. Multi-actor meetings allowed to efficiently sharing the expertise present among the different stakeholders, and as such contributing to the creation of a network. It is more effective than bilateral meetings in creating discussion and looking for innovative solutions for the water quality problem, as people from different sectors and with different opinions participate in the meeting. To be sufficiently interactive, not too many people should participate in a meeting. Ireland for example reports good experiences with multi-actor meeting of groups of three up to five people. If the number of participants was higher, as for example in the Spanish action lab, sessions needed more preparation, and required more effort to gather the people around the same table and keep them sufficiently attentive throughout the discussions. In the Danish action lab, the plan was to use a multi-actor meeting to present the project at the beginning of WaterProtect to all stakeholders, however very few people responded to the invitation, and the multi-actor meeting was cancelled. A personal conversation thus seems to be a better way to rouse stakeholders' personal interests and to get them involved. Furthermore it seems more difficult to get farmers present on these multi-actor meetings. Thus, if farmers are the main target audience, more interactive meeting formats such as workshops or fields visits should be preferred.



WORKSHOPS

Workshops have in common with multi-actor meetings that they consist for a large part of discussion. However, in contrast with multi-actor meetings they need more preparation and organization. These often consist of different steps in which different tools and/or methods are used to stimulate participants and guide them towards discussion. For many participants, especially farmers, participating in this type of meeting was new, as well as project partners who should get used to the organization of this type of meetings. Nevertheless, experiences with workshops among the different action labs were overall positive. In

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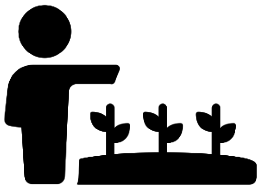
Poland, the biggest challenge was to motivate farmers to participate in workshops. Once farmers were on board, workshops were an effective way to stimulate peer-to-peer learning on the condition that enough moderators and facilitators were present. This is confirmed by the Spanish action lab, which recommends keeping track of time throughout the workshops. Moreover, time should allow in-depth discussions, but not take hours as this would put off farmers to participate. The need for good moderators was also experienced by the Irish action lab, which noted that it was difficult to give the word to every single person present in these meetings, and that people sometimes feel constrained to say what they think. However, a workshop with delegates of all stakeholder types, as experienced by the Italian action lab, showed to be very useful to have rapid feedback and overview for specific queries/conditions.

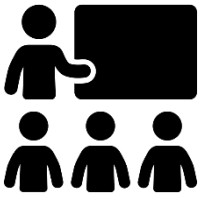


FIELD VISITS

Whereas it often took a lot of effort to convince farmers to participate in meetings and workshops, this was not the case for field visits, which were most attended by farmers. If the goal of a meeting is not to brainstorm and find ideas for problems, but to convince farmers to change their behaviour or to give stakeholders a better understanding of the territorial reality, field visits are experienced by the action labs as most effective and inspiring. Furthermore, the Italian action lab leaders experienced that fields visits with international partners also increased farmers' trust and made them feel part of the project, as such contribute to a better functioning of water governance in the area. Drawbacks of this contact method is that it, similar to a workshop, requires preparation time and that, in contrast to other meeting formats, the logistical efforts to transport participants between sites should be considered.

SURVEYS

Most of the action labs performed one or more surveys, mainly with farmers as the main target actor. As such in Italy, Spain and Romania surveys were used to involve farmers in the project. In Denmark, on the other hand, surveys were used to connect with consumers about the water quality problem. The surveys served mainly to gather knowledge on the problem and learn about the awareness of farmers and consumers, but served as well to inform and incentivize them to take action at different levels. In Belgium, similar meetings with farmers took place, however they were categorized as bilateral meetings. There is thus some overlap between the use of bilateral conversations and surveys, depending on the focus of the visit (on information gathering, or informing and advising), and the interpretation of the action lab leaders.



PRESENTATIONS

Presentations were used in the Belgian, Italian and the Spanish action lab to transfer information about the project to stakeholders. As the least interactive type of contact method, it focused especially on informing and raising awareness, and is thus less effective in getting people actively involved in the project. In Belgium and Italy, presentations were used to inform farmers about the bad water quality. In this context, it was really important to keep presentations short and simple, allow time for questions, and to provide refreshments in order to keep farmers attentive and happy. In Spain and Italy, presentations were also used during conferences to enable project actions and

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results to be visualized and discussed. Taking into account the audience, action lab leaders required less need to be inventive, and used the traditional PowerPoint to convey their message. However, also in this context, saving up some time for questions is worthwhile and helps to keep the audience attentive.

5.4 Multi-strategy experiences

REGULATION

Regulation is a common strategy to enforce positive behaviour or prohibit unwanted behaviour. However, it must be interpreted much broader than just the creation of new legislation, and may also include actions that strengthen the enforcement mechanisms of existing regulations, the increase of participation in consultation processes of legislative proposals, etc. Despite the broad interpretation of the strategy 'regulation', only the Belgian and Italian action labs reported to apply it. In Belgium, discussions were held with authorities of the national land development program Water-Land-Schap to test the potential of new measures that can be included in the regular management agreements. In Italy on the other hand, a regulatory workshop was organized in order to discuss the possibility of making policy more flexible and stimulating farmers to implement best management practices. Although other action labs did not report to have implemented regulation strategies, most of them had at least informal contacts with local policy makers in order to discuss local barriers. This can be recognized as the first step towards the implementation of a regulation strategy.

EDUCATION

Communication and education are in all of the action labs the first and most used strategies to stimulate farmers to take action and to improve the water quality. This is also logical as all other actions that are set up to change stakeholders' behaviour, will not be effective if actors are not aware of their existence. Moreover, every action that is set up in the action lab, should include an 'education and communication component', which could be a sensitizing campaign or a training or demonstration. For example, in Belgium, progress was sought towards the ambition 'safe cleaning and filling of spraying machinery', by, amongst others, providing the farmers collection boxes for remnant water. However, without an intensive information and communication campaigns, farmers would not be aware of the availability of this boxes, and the action would thus not have been effective. Overall, education and communication were most important in the action labs of Ireland and Poland, two action labs with a strong focus on ambitions such as knowledge production and awareness raising.

SOCIAL PRESSURE

Social pressure influences people's norms and values, and can have a long-term effect on internal motivation. Overall, social pressure is the second most applied strategy, which is often applied together with the education strategy. The multi-actor process has stimulated action lab leaders to bring different stakeholders together in different settings, in order to discuss their differences in opinions. This approach has helped to shift people's norms and

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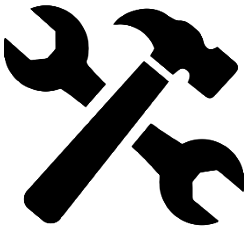
values into the right direction. In Poland for example, the impact of water pollution on human health was discussed in meetings with farmers, as such creating pressure on farmers to reduce their impact. Further, in some action labs, discussions about social pressure as a strategy were taken to a higher level. In Belgium for example, there were discussions on the provision of higher financial support for pioneers that are willing to host demonstrations, for neighbouring farmers that are willing to implement buffer strips together, as well as for all farmers if they could manage to improve the water quality of the water together.

ECONOMICS

External motivation can be evoked by financial stimuli such as bonuses and penalties, which can be granted or imposed both by governmental instances as well as by private market actors. In WaterProtect this strategy was especially used to convince farmers to implement best management practices (BMPs) which often require large investments of time and money. In most of the action labs, the economic strategy remained limited to a search for existing European, regional or local funds for sustainability investments in agriculture, and the provision of help to farmers who are willing to apply for these funds. However, in some other action labs, there was an active search for parties who could finance farmers to take care of the water quality. In Belgium for example, the action lab leaders worked on the set-up of an economic system that can compensate farmers for their investments, which is largely paid by the local drinking water company. The rationale behind this economic system is that, in case of a water quality improvement, the water company can scale down the intensity of the costly water treatments, resulting in a win-win situation for both farmers and water companies.



TOOLS

Innovation can result in tools and arrangements which make the desired behaviour much easier and self-evident to perform. Tools refer especially to technical provisions, means and methods, which can stimulate actors to perform in a certain way. In WaterProtect especially online tools were very important. As such, all action labs made use of an on-line tool, which maps all measurement results of the catchment in an accessible way (see deliverables of WP5). Furthermore, many of the action labs also developed their own apps to bundle and exchange data and knowledge and to help themselves to reach their ambitions. In Denmark for instance, a tool was developed that shows the effects on leaching of nitrate when land use is adapted and/or farming practices are changed, whereas in the Romanian action lab, a tool was developed that guides the farmer in the design and price estimation of a manure storage platform. Besides designing applications, some action labs also invested time and money in physical tools meant for common use. For example, in the Italian action lab, the construction of a common platform allowed farmers to familiarize with the concept and its functioning, as such facilitating the implementation of the good practice.

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6. Achievements

Based on the initial governance analysis (see section 4), the different action labs chose different ambitions to work towards throughout the WaterProtect project. Based on these ambitions, they organized different types of meetings with different types of stakeholders in order to set up incentives for farmers to implement BMP's (described in section 5). In this section we report to what extent these ambitions were achieved at the end of the project. Although no (or limited) improvement of the water quality could be measured, progress has certainly achieved towards the intermediary ambitions, which all facilitate the implementation of best management practices. Taking into account that there is a lot of similarity between the different action labs' ambitions, we define five broad types of ambitions (Figure 6), i.e.

(1) network formation
(2) exchange and continuation
(3) knowledge building,
(4) actor awareness
(5) implementation of farmer practices

The order in which these different ambitions are mentioned is not accidental, as each progress towards an ambition reinforces and stimulates progress towards the next ambition. Moreover, if we want a better water quality, we need farmers to implement best management practices, which is only possible if they are aware of the problem. Awareness raising on the other hand is only effective, if we fully understand the problem, which is only possible if there is exchange within the network among all stakeholders with expertise, interest and influence. The implementation of best management practices by farmers is thus not only stimulated by BMP specific measures, but also implies putting effort in networking, knowledge building and awareness raising. Moreover, the more of the former ambitions are fulfilled, the easier it will be to get farmers to implement best management practices and to achieve a water quality improvement.

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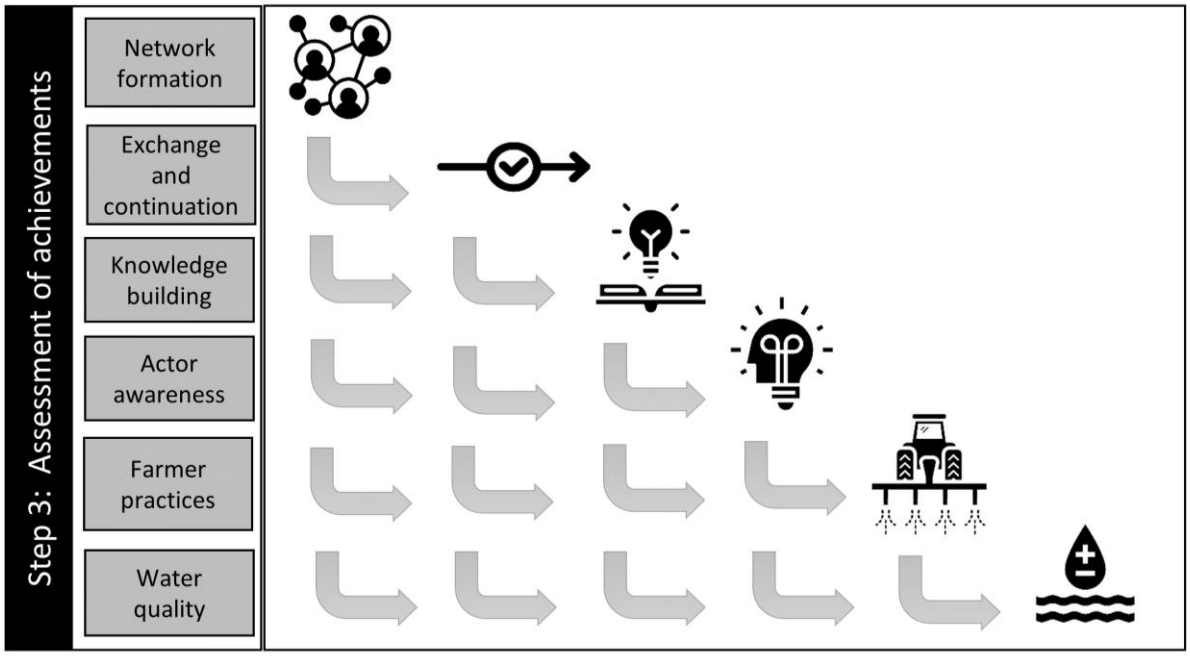

Figure 6: WaterProtect governance framework: step 3 – assessment of achievements

6.1 Network formation

The involvement of a wide range of actors was a main principle of the WaterProtect project. The importance of this task was emphasised several times by project coordinators, as well as by ILVO as leader of the governance work package. Guidelines and tips about how to set up a multi-actor approach were provided at the beginning of the project. Every action lab had the ambition to involve various actors and to stimulate network formation between actors who influence the water quality and actors that are influenced by the water quality. In the formulation of their ambitions, the Spanish and Polish action labs emphasised the importance of water producers. The Danish action lab highlighted the aim to create a network between the waterworks.

Every action lab did efforts to reach out to various actors and tried to involve them in the process. In doing so, ensuring trust was an important requirement, which was not always easy to achieve. In Poland for example, it was rather uncommon for institutions to work together with problems at the local scale, and not every institution desired to cooperate with the project. Also, the presentation of the local water quality results to the institutions responsible for control can lead to an immediate control of the farmers, which is against the cooperation approach principle within WaterProtect. Despite this, action lab leaders found the participatory multi-actor process an effective tool to build relationships and bring change in the action lab. Looking at the range of actors reached out to among the action labs, the actor types ‘farmer’, ‘farmer advisory and union’, ‘water producers and suppliers of drinking water’ and (national, regional and local) governments are most involved and represented in all action labs. Nevertheless, differences existed between the action labs. For example, the Belgian and Italian action labs are characterised by the involvement of many different types of actors, while

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the Danish action lab has focused on a strong involvement of mainly farmers, consumers, the waterworks and the municipality. For further details about and experiences with the involvement of the different types of actors, we refer to section 5.

6.2 Exchange and continuation

Continuation of the local operation in the action labs after the project timespan was not an explicit ambition of the project. Nevertheless, in every action lab, opportunities were looked out to continue the multi-actor process and to continue working in action labs in the same manner on an improvement of the water quality. This is possible through funding by new projects, by structural embedding in the tasks of local institutions or by finding local leader willing to steer the local operation.

In the Belgian, Irish, Italian, Danish and Romanian action labs, new (research and development) projects were found. Although it is certainly positive that local operation can be continued, it should be mentioned that these projects are often (again) temporary in nature, and have limited funds. Some countries succeeded to anchor the multi-actor process into the local operation in the action lab. In the Italian action lab, the multi-actor process in the territory of Val Tidone can be further valorised through the foundation of the local 'Observatory of Val Tidone Landscape'. In the Romanian action lab, the region is part of the ecotourism destination Mara-Cosău-Creasta-Cocoşului. The local action plans now include the suggested actions obtained by the WaterProtect project. They also had the idea to create a special department that can deal with water management systems, which includes important resources. In the Spanish action lab, all actors agreed on the need to optimize the reuse of water in agriculture and presented a proposal in the EU PRIMA call with this purpose. This is an important step in the process to effectively increase water reuse in the Baix Llobregat region and to increase the will to improve the quality of the regenerated water.

The Italian and Polish action labs explicitly indicated their efforts to find a (local) leader(s) who can continue the local operation for each action lab. In the Italian action lab, the leader is the regional government body 'Regione Emilia Romagna'. In the second part of the project, they took up their leading role and were directly involved in finding solutions. In the Polish action lab, they looked for local farmers that could take up a leading role. Unfortunately, no pioneering farm could be identified. They also thought of the farmers' advisory boards in the role of leader, but were not yet able to effectively identify people that can continue the efforts made during the project and take up the lead. Also in the Spanish, Belgian and Romanian action labs, local leadership with respect to water governance was stimulated. In the Spanish action lab, stakeholders identified the regional government body 'Área Metropolitana de Barcelona' as a potential leader. They have been more actively involved in the project since March 2020, so more time is needed to see if they are open and suitable to effectively take up this role. In the Belgian and Romanian action labs, the action leaders (respectively Inagro and EcoLogic) further take up the role as a local leader in the follow-up project, but they still depend on financial resources in order to take up this task.

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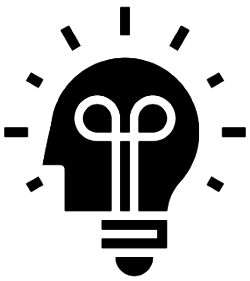
6.3 Knowledge building

Knowledge building, on the one hand regarding the water quality and on the other hand regarding the water governance system, was another important ambition in WaterProtect.

In many of the action labs, water quality data already existed. Additional measuring points carried out in the project gave more detailed information about the problem. In the Italian action lab, the monitoring results provided information to investigate the impact of the grape cultivation (with the use of pesticides and nutrients) on the quality of the groundwater, which was never done before. This allowed further investigation of the contamination sources and implementing the most suitable BMPs in a demo-farm (see achievement 'farmer practices'). Also in the Irish action lab, the knowledge building regarding the pesticide MCPA was new. The monitoring campaign enabled to improve the knowledge about the underlying processes of loss of MCPA to water. Furthermore, the Polish action lab managed to involve stakeholders in the monitoring tasks, as such showcasing a good example of participatory monitoring, which was actively encouraged throughout the WaterProtect project. Moreover, the Polish action lab used water quality tests using photometers, where the amount of nitrate is directly visible (change of colour). This directly gave the farmers and inhabitants an idea about the quality of their water in use. In the Spanish action lab, specific monitoring surveys using advanced analytical methods and isotopic analysis provided new knowledge on the sources of nutrients and PPPs. The valuable results obtained were interpreted using ground-water hydrological tools that were developed as part of the project. For the details on the monitoring results, we refer to the deliverables of work package 3.

In addition to the water quality monitoring, the knowledge in the action lab can also be extended through governance monitoring. In the Danish action lab, for example, information was collected about the actor preferences. A survey was carried out among the consumers to get more insights into the actor preferences for different potential set-ups and the relation between price and quality. The Polish action lab emphasized their additional knowledge collection about the environmental and economic conditions of the agricultural system. In the Romanian action lab, more information has been obtained about the impact of the water quality on the economic activities, especially on the tourism sector.



6.4 Actor awareness

At the start of the project, it became clear that local actors are not (fully) aware of the water quality problem and the most appropriate solutions to improve the water quality. With this in mind, raising actor awareness became an important ambition in the project. Actor awareness need to be understood as an important requirement for people to change their behaviour and to implement best management practices. All action labs spent a great deal of effort on raising awareness among farmers as well as other actors. Although an increase in awareness has not been verified scientifically, different outcomes suggest that this is the case, e.g. information being read by

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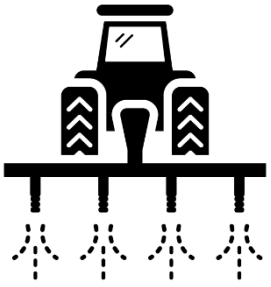
the targeted actors, actors that change their behaviour (either by starting to speak about the problem or solutions and/or perform real actions), etc.

A proof that information reaches the farmers effectively can be found in different action labs. In the Belgian case, Inagro as action lab leader could monitor the clicking behaviour of the local online newsletter, as such they could verify if farmers open and read the different news items. In the Polish action lab, farmers were involved in the monitoring campaign. Farmers could bring water samples from their own wells and find out the result of their sample immediately. In all action labs, it is assumed that the information during the bilateral conversations, workshops and demonstrations is transferred to the farmers. However, the question remains on how effectively this information is recorded and how effectively it results in behavioural changes. An example showcasing the effective recording of information can be found in the Belgian action lab. The farmers started to call the farmer contact person of the Belgian action lab to point out whenever other farmers were causing (point source) pollution. This central contact person became a trusted and well-known person among the farmers in the region. Another example that clearly indicates an awareness raise in the Belgian action lab, was observed during a local meeting organized with farmers of the Bollaertbeek catchment and farmers of a nearby catchment (which are not involved in the project) to discuss solutions. The farmers of the Bollaertbeek were actively thinking about possibilities for improvement of the water quality, whereas some farmers of the other catchment didn't know of the water quality problem. The action lab leaders had to explain the problem as they did at the beginning of WaterProtect to the farmers of the Bollaertbeek. Also, in the Romanian action lab, farmers started to actively approach the project members to ask them how they could improve their management. On the other hand, the farmers also started to speak to each other about inappropriate actions affecting the water quality. An important remark for each action lab is that, even if there is an increased awareness of farmers, this is not always the case for all farmers. The ones who frequently followed the project activities and participated in the communication events can be assumed to be more aware than others. It remains a challenge to reach every farmer, and the past efforts to spread the word about the water quality problem and the need for behavioural change needs to be continued.

Regarding the awareness among other actors, we would like to highlight the approach of some of the action labs. The Polish action lab for example focused (next to the farmers) on the education of school youth and inhabitants and learned them more about the threats and the need to protect the waters. Also the Romanian action lab focused on school children from the local village as good promoters of environmentally friendly behaviour, making use of specific kits for the analysis of the groundwater quality. In this action lab, the role the local priest is also emphasized, as he can take up an important role in spreading information about environmentally related aspects.



6.5 Farmer practices – BMP's

The implementation of best management practices was certainly an important goal of the WaterProtect project. Based on the local conditions and needs, the most suitable best management practices were selected for each action lab. An overview of the BMPs and a decision tree to select the appropriate ones can be found in the deliverables of work package 4.

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After three years of the WaterProject project, the effective implementation of best management practices in the action labs is rather limited. This can be explained by the multi-actor approach, which is systemic and participatory, but also has to be understood as a long term process with little short-term results. Nevertheless, an increased interest in some BMPs can certainly be recorded. This is the outcome of all the preparatory steps for implementation, such as the active involvement of actors, knowledge building about the local situation, awareness creation about the problem and possible solutions and the set-up of supporting mechanisms.

The interest and implementation results for the chosen best management practices are shown in Table 2. These BMP's differ largely among the different action labs, only the Belgian and Italian action labs had a common BMP they focused on: to ensure a safe cleaning and filling place for spraying machinery. As seen in the table, most of the results are more related to 'interest in the solution' rather than the real implementation of the BMP. If effective implementation of a best management practice could be achieved (as is the case in the Belgian, Italian, Romanian and Spanish action labs), this is often on a small scale. Most of the action labs also indicated that more time is needed to scale up the results, which will be done (if possible) in follow-up projects, by structural embedding in the tasks of local institutions, or with the help of local leaders (see ambition 'exchange and continuation').

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Table 2: Interest in and implementation of best management practices in the action labs

BMP	Country	Interest at the end of the project	Implementation at the end of the project
Safe cleaning and filling places	Belgium	• Most of the farmers are not willing to install a concrete filling and cleaning place on their farm as it requires permits and is very expensive.	• Some farmers changed their cleaning and filling place from paved to unpaved surfaces. • Collection of remnant water by 9 farmers. • Organisation of a temporary place with removable mats.
	Italy	• A (mobile) impermeable platform for washing machinery with collection of waste water: Collaboration with Emilia-Romagna region to overcome the legislative gap for the use of systems to treat the wastewater in field.	• A (mobile) impermeable platform for washing machinery with collection of waste water: A demo-farm (where an impermeable platform and hard containers were installed and used for machinery washing and collection of wastewater).
Grass buffer strips	Belgium	• Open discussion with VLM about management agreements.	• 3 extra grass buffer strips. • Extra funding found for implementation of grass buffer strips (post-project)
Avoid spreading at sensitive times	Ireland		• Farmers indicate to be more observant.
Sowing winter cover crops	Ireland	• Farmers are interested.	
Manure depositing platforms	Romania	• Farmer acknowledge the need to implement them. • Four farmers are willing to build manure platforms, but discussions are still ongoing.	• Easy to use design for manure storage platforms (local materials) will be available for all farmers.
Biological control of pests in the crops	Spain	• Farmers are motivated to start implementing these techniques.	• Effective implementation by many farmers
Use of mycorrhizas	Spain	• Farmers are interested.	• Used/implemented by some farmers
Mechanical systems against herbs	Spain	• Farmers are interested.	• Used/implemented by some farmers
Management of remnants of prohibited phytosanitary products	Spain	• Farmers are interested.	• Used/implemented by some farmers
Calibrated sprayers for optimized application	Spain	• Farmers are interested.	• Used/implemented by some farmers
Clean water loading points for application machines	Spain	• Farmers are interested.	• Used/implemented by some farmers
BMP's (not specified)	Poland	• Farmers are willing to implement additional BMP's (results from the questionnaire).	

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6.6 Other ambitions

In addition to the general types of ambitions explained in the previous section, there are some action labs who specified some other, often very context-specific ambitions. These context-specific ambitions often can be inserted in the list of standard ambitions, as such creating extra stimuli for the other ambitions to be implemented. An example is the Romanian action lab, which sets the ambition to work on the set-up of an efficient centralized sewage system, which is at the moment not in function. Taking this into account, the water quality problem also had to be attributed to households in general. Meanwhile discussions with the local municipality about the issue have taken place, which revealed that all parties consider it a priority, however the finances to cover the high costs were currently still lacking.

Another example comes from the action labs in Denmark and Spain, which both had the ambition to stimulate alternative land use models. The idea in the Danish action lab is to combine smart farming practices with a more optimal spatial allocation of the current crops and farming practices. This concept was discussed several times during the project, but more time is needed for the farmers to implement the ideas in their management. The developed spatial tool to display the effects of the adapted land use and farming practices could serve as an aid in the decision making process. In the Spanish action lab, the idea is to adapt the crop schemes depending on the water quality the regeneration process could ensure. During the WaterProtect timespan, the 'Sanitation Safety Plan for continuously ensuring the quality of reused water for irrigation' has been set up. However, as it requires changes in the work process of treatment plants, more time is needed to complete this and put it into practice.

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7. Learned lessons

During the WaterProtect project, ILVO has guided action lab leaders throughout the process of analysing and improving water governance. By going through this process not only the action lab leaders learned important lessons, but also ILVO as governance work package leader gained important insights, e.g. in how to steer action lab leaders towards changes and actions in their action lab. In this section we will therefore evaluate our approach at different levels, i.e. elaborate on the different strengths and weaknesses that we have encountered and summarize our recommendations for future action lab leaders, work package leaders and policy makers dealing with water governance in Europe.

7.1 For action lab leaders

APPROACH THE PROBLEM HOLISTICALLY

Given the complexity of the problem, a holistic systems approach is recommended. The problem needs to be addressed at catchment scale and with all actors involved, as it is very difficult and expensive to trace individual polluters. In this context, often difficulties arise since in many countries agriculture and water issues are approached in a very sectorial way. Only parts of the problem are solved or it is unclear who should tackle the problem. We encourage to clearly define the system of interest, in our case, the pollution (nutrients or plant protection products) of the water body (groundwater or surface water) caused by agricultural sources (all types of agricultural systems and polluting ways). In addition to this specific focus, we encourage to visualize the broader context and influencing factors on this system under focus. Following questions could be asked:

- What information is available regarding the impact of agriculture on the water quality?
- What other factors can affect water pollution? (e.g. weather conditions, soil conditions, climate change, etc.)
- Which other actors may have an influence on the pollution level? (e.g. private individuals, garden contractors, treatment of train tracks, etc.)
- Besides the type of pollution in focus, what other pollutants exist in the water body?

INVOLVE ALL KEY STAKEHOLDERS, ESPECIALLY FARMERS

All relevant actors should take up a role in the process to improve water governance. Even though the focus of the project was on reducing farmers' impact on water quality, the water quality problem cannot be solved by farmers alone. It needs to be tackled at system level. Many actors across sectorial boundaries can work together towards solutions by sharing their experiences and bundling their capacities. They all have different opinions about the factors which affect water quality, different knowledge about the water quality topic, different resources available to improve the water quality, different levels of power, etc.

However, in practice it was not that easy to involve all relevant actors in the project. First, an overview of the water governance system and their actors needs to be drawn up: which actor types are present in your region and how do they interact to each other? Each actor is characterized by a different motivation to improve water quality and a different capacity to influence water quality. In WaterProtect, the following types of actors were present: farmers, farmers unions and advisory, the PPP sector, food processors and retailers, research, drinking water companies, European and national governments, regional and local governments, local businesses, non-governmental organizations and

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consumers. More information about the different types of actors can be found in section 5.2. All these different types of actors should be consulted, and all of them should contribute to the design of strategies to incentivize farmers to take action.

As it is of great importance to involve farmers in such processes, we give some general recommendations to increase farmers' interest and famers' participation rate. These tips should be interpreted as a guide based on our experiences during the project. Even if farmers are willing to participate, they are still subjected to the socio-economic system in which they find themselves. For instance, one tip is to look for a 'leading' farmer in your area. In the Italian case, a leading farmer was present, but the other farmers did not recognize him as a local leader because of several interpersonal frictions.

- **Involve farmers from the start of the project:** As farmers are the key actors in the project, they certainly need to be informed about the project and the action lab ambitions. Their awareness and, as a consequence, participation will be higher when they have been involved from the start of the project. Involvement of farmers in project activities is possible at different stages. In WaterProtect, special attention was given to involvement of farmers in monitoring activities, which can increase farmers' awareness, but also their trust and confidence in government and control instances. More information about the role of participatory monitoring in the project can be found in deliverable 3.3 (Guidelines for future, more efficient and sustainable participatory monitoring practices).
- **Involve key persons to increase farmers' trust**: Actors in close contact with farmers, such as farmer advisors, already have a trustful relationship with farmers. The presence of these actors in the project and on events can trigger farmers to participate.
- **Look for 'leading' farmers:** The presence of a 'leading' farmer can be an important incentive for farmers to participate. This can be a farmer who already implemented some best management practices or a farmer who is interested in the project and has a good reputation among the other farmers. He or she can trigger other farmers' curiosity and motivate them to find out more about the project.
- **Visit farmers personally:** It has proved useful to visit farmers personally on their farm. Through bilateral conversations, project partners can inform farmers of the project and of the upcoming workshops. Also, personal farm visits help to build up trust. Although the majority of the farmers are not interested in participating in a group meeting, they are often ready to receive consultants on their farm for personal recommendations.
- **Take time constraints of farmers into account:** Farmers will participate only in the activities when their work in the fields is finished. It is therefore of high importance to organise meetings at times when farmers are less busy with agricultural activities. For instance, meetings organised on farmer markets or after harvesting.
- **Ensure an attractive and friendly meeting location:** Farmers are more likely to participate in workshops organised at a demo-farm or a local farmer market.
- **Use different means of communication to involve farmers:** Farmers can be invited to project meetings in different ways, i.e. e-mail, telephone, direct invitations, etc. However, every communication channel has its advantages and disadvantages and not every farmer is approachable through the same channel. Therefore different communication channels could

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be used in order to make sure every farmer is aware of the planned meeting. For instance, project partners could follow up e-mail invitations by giving farmers a call or visiting them personally.

- **Link the meeting to another activity:** Farmers can be encouraged to participate in project meetings by coupling the meeting to other activities such as an information session in order to obtain or maintain a spraying license. However, this linked activity could also be an aperitif afterwards.
- **Use accessible language:** The language of meetings should be adapted to the target audience. For example, farmers are used to work with product names instead of active substances, so ensure the translation of the laboratory results into practical information.
- **Involve the international project partners in the local activities:** It is important for farmers to get the opportunity to see the bigger picture of the project. Therefore it can be interesting to organise some meetings with both local actors and international partners in order to make local actors, in particular farmers, feel part of the project and increase their trust.

COMBINE DIFFERENT CONTACT METHODS

Self-mobilisation whereby actors independently take care of the problem has not occurred within WaterProtect. The use of different contact methods in the process is thus recommended. Since our aim is to trigger as many relevant actors as possible, and as people are affected in different ways, the use of a range of methods is encouraged. Participation is recommended in all stages of the process to maximize the involvement of the actors in the decision-making. Each method certainly has its own value. Yet, methods that present learning opportunities and stimulate exchange between actors, are encouraged. An overview of the used contact methods is given in section 5.3. In the following recommendations, some important characteristics of each of the methods are emphasized.

- **Newsletter, leaflets, brochures, on-line tools, etc**.: these are examples of more passive contact methods to inform the actors about the project, the problem and solutions. Many actors can be reached in this way and they can consult the information source whenever they want. As there is no contact, these methods do not allow listening to the people's responses.
- **Presentation**: this contact method has a focus on informing the actors by exchanging relevant information related to the problem, solutions or findings. Although there is sometimes direct contact between the actors, discussion and exchange is not always encouraged.
- **Surveys**: surveys contain a list of questions that is posed by the researchers to a group of stakeholders. In this way, a lot of information was collected about possible solutions and the barriers to implement them. It contributed to get a good overview of the existing situation. The exchange of information is rather limited, but it can be combined with a more open conversation and discussion.
- **Bilateral conversations**: this method is a contact method where the actors are consulted personally. The conversations are more open, and the researchers can listen to the views of the actors. In the project, it seemed important that the conversations were held at the actors' workplace and to emphasize the anonymity of the conversations.
- **Multi-actor meetings**: this method seemed in the project as a good method to share in an effective and fast way the expertise present among the different stakeholders. As people from

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different sectors with different views are around the table, discussions and exchange are stimulated.

- **Demonstrations – field visits**: It is a good method to effectively show best management practices in real-life settings and inspire farmers. How the demonstrations are organized will determine additional benefits such as for example (peer)-learning effects or practical skills. For the organization of demonstrations, we would like to refer to the projects of FarmDemo. These projects focus on on-farm demonstrations as a way to enhance networking, knowledge exchange and learning and give some practical tips for organisation. Three basis rules for demo-events are highlighted: (1) relate learning content to farming practice, (2) engage participants in active knowledge exchange and (3) use of variety of learning activities to anticipate on the different learning styles of actors.
- **Workshops – interactive sessions**: these are contact methods in which special attention is paid to the format and design of the meeting in order to maximally stimulate interaction and discussion. They often include a reflexion exercise, which is discussed in small groups and of which the outcomes later on are shared with all attendees. In this way, expertise and experiences are shared, learning from each other is stimulated, social cohesion is strengthened and (new) relationships can be formed.

FACILITATE THE PROCESS

The role of the action lab leader in facilitating the process and keeping track of the findings is important. This means that the communication about ambitions and objectives should be clear in order to retain the interest of the various actors and to avoid mistrust. During the process, the action lab leader (or process responsible) should classify all information collected during the contacts with the stakeholders in a structured way. This information should be used to make well-founded decisions with respect to the process. More ideally, the decisions are made together with all the actors (for example, during interactive sessions). It is encouraged to continuously re-analyse the input and to adapt the process to the acquired input.

REMAIN FLEXIBLE IN THE PROCESS

Openness and flexibility are required in terms of solution directions. As we work with different actors, we have to take into account different ideas about what the problem exactly is and the different options about the most efficient ways to solve them. Pay sufficient attention to align these positions as closely as possible to come to a common understanding of the problem and solutions. Also be aware of your own view on the problem and solutions. Action lab leaders and experts often have an idea about the solution directions from their background knowledge. Sufficient openness is required to address the concerns of other actors and if necessary, change or adapt solutions. For example, some BMPs seem easy to implement in theory, but are not easy to implement in practice for various reasons. It is important to be open to find out and recognize the barriers.

AWARENESS RAISING IS A PRIORITY STEP

Pay sufficient attention to raise awareness about the problem and possible solutions. A balance has to be sought between the continuous work to raise overall awareness and the setup of further actions. Actors that are not aware of the problem and the project should not be deterred to take subsequent steps (towards implementation) in the process. Actors that are well aware of the problem should not be demotivated and should be sufficiently stimulated to take effective implementation steps.

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COMBINE REGULATIVE AND STIMULATING SUPPORTING MECHANISMS

The research in WaterProtect has shown that farmers are certainly willing to implement solutions. We recommend to carefully pay attention to the bottlenecks for real implementation and look for solutions at different levels. Moreover, the combination of regulative and stimulating mechanisms to support implementation of BMPs is recommended. In WaterProtect, the RESET model is used, which categorizes strategies into five different types: 'regulation', 'education', 'social pressure', 'economic incentives' and 'tools'. A creative combination of the different types of incentives to address as many potential implementers as possible is encouraged. Examples of how this is implemented in WaterProtect can be found in deliverable D2.3. Further inspiration can also be found in the described case studies in deliverable 6.1 (D.6.1 Complete comparative case study assessment).

An example of a multi-strategy approach can be found in the Belgian action lab, where a lack of economic resources was identified as an important barrier preventing the implementation of BMPs. To tackle this barrier, the Belgian action lab wanted to investigate the willingness of the drinking water company to financially support the farmers to implement certain BMPs. In the discussions about the design of this financial support system also different social pressure incentives for farmers were thought out and discussed, i.e. providing a leader bonus when organizing on-farm demonstrations or a neighbour bonus, when convincing neighbouring farmers to participate.

FORESEE SUFFICIENT TIME AS PROCESSES ARE TIME CONSUMING

Processes are time-consuming. Overcoming barriers and organizing a system that is coherent and well-coordinated requires time investment. A period of three years (the WaterProject timespan) was too short for the real implementation of BMPs in the field in many action labs, and was certainly too short to show the effects of the implemented BMPs on the water quality.

7.2 For work package leaders

Throughout the WaterProtect project, ILVO gained as work package leader more experience about how to guide action lab leaders towards change and action. An evaluation resulted in important lessons for future work package leaders focusing on governance processes.

COLLECT INFORMATION IN AN ORGANIZED AND STANDARDIZED WAY

In WaterProtect, progress with respect to governance in the action labs was tracked through several excel sheets and word documents which action lab leaders needed to fill-in at regular time intervals. This made a cross-comparison of cases possible; however some improvements in the approach are certainly possible. The fact that several documents and excel sheets were used next to each other, caused confusion in some action labs. It also resulted in an overload of information, that required a lot of processing time and often resulted in internal contradictions that needed to be investigated. In these documents and excel sheets often open questions are used, with no indications about the required depth of the answer. This resulted in large differences in the extent in which answers were provided, which can result in a wrong picture of the efforts of the different action labs. Also, action lab leaders were asked to keep track of the amount and type of contacts that took place during the project. Although different types of contacts were provided by the action lab leader, no definitions of these contact methods were included, which led to different interpretations. As such contact meetings in which action lab leaders visited farmers to ask questions and give recommendations, were sometimes

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interpreted as bilateral meetings and sometimes as a questionnaire. Similarly, meetings in which a group of different actors were discussing and brainstorming actively were sometimes categorized as a multi-actor meeting and sometimes as a workshop. In order to avoid these confusions and make more truthful comparisons of the processes in the different action labs, clear definitions of types of meetings should be communicated. In summary, future action lab leaders should better plan and design the data collection process, in order to avoid confusion and an overload of data, and to assure a certain depth in the answer in case of qualitative questions.

STIMULATE ACTION LAB LEADERS TO NETWORK AND EXCHANGE EXPERIENCES

During the project there was regular communication between the action labs about their ambitions, methods and achievements. This communication happened during the 2-monthly (skype) meetings in which general project management issues were discussed. The attention that has been paid to the sharing of experiences and results in these core group meetings is certainly important and made action lab leaders aware of the focus in the other action labs. However, this time frame did not suffice for action lab leaders to get a real grip on the situation in the other action labs and to use these insights to reflect on the progress in their own action lab. Also, we did not see action lab leaders dealing with the same problems to connect, discuss and compare their plans of action and results outside of these core group meetings. These kind of bonds could have a lot of value and result in important learning opportunities, but they require more time investments, which is a scarce resource among researchers. Therefore we recommend future governance work package leaders to facilitate to a larger extent interaction time between action lab leaders and take initiative to bring action lab leaders dealing with similar issues together to learn from each other.

REMIND ACTION LAB LEADERS TO STAY FOCUSED ON GOVERNANCE FAILURES

Many action lab leaders were already working on water quality issues, more specifically on monitoring or the implementation of farmer practices. The WaterProtect project and associated funds can be used to continue this operation and ways of working at the local scale. However, it is important that action lab leaders do not lose track of the governance focus and try to integrate this in the functioning of their action labs. When evaluating the actions and achievements in the action labs, we noticed that they do not always correspond with the identified barriers in the governance analysis at the start of the project. Especially identified failures with respect to the enabling environment were often not actively managed throughout the WaterProtect project. Therefore we propose to future work package leaders to present the creation of an enabling environment as an important ambition, and to oblige action lab leaders to regularly report on progresses in this regard. This will ensure that the action lab leaders do not lose track of the important governance goals.

7.3 For policy makers

One of the main objectives of the project was to improve water governance in order to get farmers implementing the most suited best management practices to reduce surface and groundwater pollution. These efforts can be categorized according to the efficiency-substitution-redesign (ESR) framework, which describes and assesses progressive strategies to support the transition from conventional to sustainable agriculture (Hill and MacRae, 1996). Moreover, it features (1) efficiency, which focuses on making best use of resources within existing system configurations; (2) substitution, focusing on the use of new technologies and practices to replace existing ones that may be less

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effective on both productivity and sustainability grounds; and (3) redesign, which centres on the (re)design of agro-ecosystems to deliver the optimum amount of ecosystem services to produce food and improve natural capital. Although redesign of agro-ecosystems requires more time to implement and demands greater changes, it is acknowledged as a game changer which is proactive and can generate permanent solutions to problems (Hill and MacRae, 1996). Gliessman (1998) added a fourth level to the progression to address the need for associated social transformation, however from the viewpoint of Hill (2014), institutional and sociocultural transformations must be considered at every stage in the ESR progression, as changes at these levels also happen progressively.

When categorizing the efforts of the action labs in WaterProtect, we noticed that the focus was mainly on efficiency and substitution measures. In the Belgian and Italian action labs for example, there was attention for spraying behaviour of farmers (the use of modern machinery with drift-reducing nozzles and timing of spraying) and the installation of cleaning and filling platforms with collection of remnant water, which can be seen as 'efficiency measures' according to the ESR framework. Furthermore, in the Belgian and Danish action lab, efforts were done to convince farmers to adapt their behaviour close to rivers. More specifically, in Belgium, farmers were incentivized to implement buffer strips next to rivers, whereas in Denmark the potential of alternative land use allocations that would impact the water quality to a lesser extent, was investigated. These are good examples of substitution measures, which reduce the level of runoff and the overall need for spraying next to rivers.

However, the potential of 'redesign' measures, which would eliminate the use of plant protection products and chemical fertilizer applications on farms completely, has not really been given attention in the action labs. Despite this, we are convinced that, in order to reach a good water quality in the long term, incremental changes might not be sufficient and more radical measures are needed. Policy makers should therefore try to work on policies and subsidize research projects that encourage holistic thinking and trigger a redesign of farming systems. However, holistic thinking is only gradually being recognized, and instruments supporting this development direction are still met with resistance. In the short term, we should therefore not reject development directions that imply an efficiency or a substitution approach rather than a redesign approach. First, due to the fact that efficiency and input substitution and practices would still have a general positive impact on the environment when compared to conventional practices. In this respect, each pollution that is avoided to reach the water bodies has value and should be interpreted as a step into the right direction. Second, because of the fact that a stakeholder's position in a paradigm has to interpreted as a stage in a longer trajectory, which is subject to change and overlapping. The last step from input substitution towards redesign might be more difficult for farmers to implement in practice due to the presence of a series in lock-ins. Nevertheless, it is only in this step of the trajectory that farmers will get conscious of the presence of these lock-ins. The more farmers and stakeholders reach this stage, the more support can be generated for systemic change in order to eliminate barriers and lock-ins.

Essential in this regard are networks of farmers and stakeholders at the local level, where difficulties, solutions and doubts can be shared, and this is where WaterProtect certainly has excelled in. In many action labs the largest efforts have been spent on reaching out to stakeholders and bringing them together to design an action plan that is supported by all. These efforts have led in most of action labs to strong networks, where relevant organizations and farmers rely on each other and actively work together towards common goals. Although the overall objective of an increase in the water quality still

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seems to be far away, the group of people that can bring change to the water quality are activated, and are searching together for opportunities to continue their operation. The real innovation of the project thus lies in the governance approach, which is certainly of a redesign nature, and will certainly contribute to a reorientation of the focus to more holistic measures.

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8. Conclusion

This deliverable describes the experiences of the seven action labs across Europe with the organisation of a multi-actor process to improve water governance in regions producing drinking water but suffering from agricultural water pollution. In this way, the action labs aimed to contribute to the effective uptake and realisation of innovative farming systems delivering good quality, which is the overarching aim of the WaterProtect Project.

The experiences in the action labs were compared at three different levels. First, the different action lab leaders evaluated the initial governance situation and important context factors, making use of the developed WaterProtect water governance framework described in D2.1. This cross-comparison revealed that the chosen action labs have some commonalities, but differ in many important context factors that determine the focus of each action lab. Second, the action labs were compared with respect to the implemented process. This disclosed that all action labs did great efforts to use a wide range of contact methods to involve different types of stakeholders. However, it also showed that few action labs had the time to go beyond communication and education as base strategy for change. And if they were able to, the efforts within the WaterProtect project were limited to exploratory discussions. Third, action labs were compared with respect to progress towards the formulated ambitions. Although no (or limited) improvement of the water quality can be measured, progress has certainly achieved towards the intermediary ambitions 'network formation', 'exchange and continuation', 'knowledge building' and 'awareness raising', which all facilitate and reinforce the 'implementation of best management practices'. Because of the limited time span of the WaterProtect project the implementation of BMP's however remains limited. Nevertheless, in many action labs, there are clear indications that farmers are changing their behaviour, especially if no large time or monetary investments are required.

We conclude that the governance process that is set up in the context of the WaterProtect project has taken a good start, however, that it needs to be continued on a long-term basis in order to scale out the implementation of best management practices by farmers. We therefore urge local action lab leaders and local water managers to take up a leading role and to keep looking for opportunities to continue the initiated multi-actor process. In doing so, the experiences of the action labs, bundled in a series of tips in section 7, will come in handy.

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