

Advancing MAPs as vehicles for resolving issues on drinking water pollution from agriculture

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1. SUMMARY

This report presents and analyses experiences from ten multi-actor platforms of the FAIRWAY project. FAIRWAY's overarching objective is to review approaches for drinking water protection against pollution from agriculture. With the aim of doing a critical assessment of the engagement processes in a multi-actor context, we harvest lessons from the participants in FAIRWAYs *multi-actor platforms* (MAPs). Further, we map opportunities and bottlenecks for meaningful engagement, shed light on challenges and how they have been addressed, and explore the future sustainability of the engagement platforms beyond the lifetime of the project.

Issues of trust between participants and actors is flagged as a crosscutting issue, relating to all other dimensions of engagement, requiring facilitation and long-term commitment. Across the project, the MAPs seem successful in creating arenas for dialogue and exchange of information and viewpoints. However, three years into the project many of the MAPs are still short of seeing real impact of the processes in terms of reaching established goals. There is evidence from some MAPs that the lack of impact might jeopardise the engagement processes, creating disappointment or fatigue on the part of the participating actors. It is reported that building relationships and fostering good relations and common understanding requires long-term commitment and takes time. When coupled with awareness-raising amongst key actors, it also takes time for change to take place, for instance the changing of farming practices. Voluntariness in terms of implementation of measures is considered something that can help in the trust-building process, but that also constitutes a barrier for effective implementation. There are also apparent differences in perspectives within the MAPs, on whether the facilitation of dialogues is to be considered a success-factor in itself, or whether success only can be determined when there are real impacts with reference to set goals.

2. INTRODUCTION

2.1 AIM AND OBJECTIVE

The overall objective of the FAIRWAY project is to review current approaches and measures for protection of drinking water resources against pollution caused by pesticides and nitrate from agriculture. Further, the project goes on to identify and further develop innovative measures and governance approaches for more effective drinking water protection. With 13 case studies in 11 countries the project uses a multi-actor approach to facilitate effective cooperation between actors of different sectors and levels, including farmers, advisors, drinking water companies, scientists and policy makers.

The objective of this report is to present and analyse experiences at case-level relevant for developing well-functioning engagement processes. This work is part of the FAIRWAY project's aim to advance the *multi-actor approach* through critical assessment of the engagement processes (Task 2.3). By harvesting lessons from the participants in *multi-actor platforms* of the FAIRWAY project we will map opportunities and bottlenecks for meaningful engagement, shed light on challenges and how they have been addressed, and explore challenges and opportunities for the sustainability of MAPs beyond the FAIRWAY project.

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3. MULTI-ACTOR ENGAGEMENT

Public participation and stakeholder involvement have long been considered central in policy and planning processes (Reed 2008, Lamers et al. 2010, Akhmouch and Clavreul 2016). Simpson and Løe (2020) argue that for complex environmental problems, such as groundwater protection, involvement of expert scientist are not enough, but that affected communities are essential for enabling lasting solution that also pay respect to local knowledge, beliefs and values. Ideally, by involving a broad set of stakeholders one enlarges the knowledge base of the processes, increasing the ownership to and legitimacy of the outcomes (Lang et al. 2012).

Participation has for these reasons increasingly also become a prerequisite for decision-making processes, and a requirement of integrated and adaptive governance arrangements (Reed 2008, Lamers et al. 2010, Akhmouch and Clavreul 2016). The European Water Framework Directive is a case in point, where the inclusion of interested parties in decision-making processes is a central tenet of river basin planning (WFD 2006), although the exact form of participation required is not given (Newig et al. 2018). The promotion of stakeholder engagement is also at the core of the OECD water governance principles (OECD 2015). Despite the general agreement on the importance of participation, it is still disputed to what extent participation is a necessary requirement to solve environmental problems (Newig et al. 2018). Hence, the exact ways in which engagement processes can contribute to sound environmental outputs and water governance

processes, begs further attention (Koontz and Thomas 2006, Young et al. 2013, Drazkiewicz et al. 2015, Scott 2015, Akhmouch and Clavreul 2016).

In our attempt to address the agriculture-drinking water nexus within a multi-actor context, a useful point of departure is the existing and vast literature on multi-stakeholder approaches and platforms (Steins and Edwards 1996, Warner 2006, Reed 2008, Fish et al. 2010, Heinelt 2012, Lang et al. 2012, Graversgaard et al. 2018, Kochskämper et al. 2018). This literature points out the promises of participatory approaches, but also some of the pitfalls and limitations.

While optimal representation would require every affected party to be included, this is most often not the case; either because it is practically impossible or financially not viable. There might also be other reasons for why some parties are not invited to participate, or are not able or willing to take part (Lamers et al. 2010, Warner and Verhallen 2012). Also, once an arena for engagement is formed, although the participants might take part on an equal footing, power dynamics are at play that might work to the detriment of the quality of the process (Reed et al. 2018). Varady et al. (2016) highlight *stakeholder endurance* as a critical factor, that it might be difficult to sustain interest and participation over time; either because it is difficult to commit timewise or financially to enduring processes, or that *stakeholder fatigue* might be the outcome when goals are unclear or immediate benefits hard to reach.

Building on this literature on stakeholder engagement, we also suggest a shift in perspective, conceiving of participants in engagement processes as being actors, rather than stakeholders. To look at participants as more than just “having a stake” or representing an interest, holds a potential to move beyond agency as motivated by economic interest only, and opens up to enable more complex understandings of interests and standpoints, that might also include values and perceptions (cf. Braun 2009). Such a shift also entails a move away from focusing on finding the appropriate tool to facilitate engagement processes, but instead emphasise participation as a process (Reed 2008), and acknowledging that the process can be as important as the outcome (Young et al. 2013, Graversgaard 2018).

Involvement of multiple actors in participatory processes can be justified with reference to two different categories of benefits (Reed 2008, Graversgaard 2018). Firstly, there are functional or pragmatic reasons for participation, where the aim is to improve decisions and environmental performance, in which participation is a means to an end. Secondly, there are normative reasons, focussing on participation as a democratic right and that broad involvement ensures representation, transparency, and legitimacy of processes.

While engagement processes often concern obtaining social licence for particular interventions, there are also important social learning-aspects of engagement processes. Social learning can here be understood as the ways stakeholders “*acquire (rather than just convey) knowledge and collective skills through better understanding of their situation as well as the perceptions, concerns and interests of [others]*” (Wehn et al. 2018:37). Lacroix and Megdal argue that “*while engagement as a learning process may not solve [conflicts] per se, it is considered very important to overcome persistent norms and ‘difficult-to-change socio-technical systems’*” (2016:2). This also further emphasizes the process-dimension of engagement. Hence, actors have an interest, but also a potential and an ability to take part in the co-production of knowledge and co-creation of solutions to complex dilemmas of governance and management in these sectors (Graversgaard et al. 2017).

In a project setting, a multi-actor approach is devised to ensure meaningful involvement, with real impacts on the research process and outcomes through co-creation of knowledge and solutions (cf. Ostrom 2010). Such engagement should take place as early as possible in the project cycle; from the planning of work and experiments, their execution and implementation up until the dissemination of results, and evaluation (Reed 2008). This will facilitate joint knowledge production and interactions between a range of actors, including end-users, in ways that will lead to shared

ownership to both process and results (Levidow and Neubauer 2014, Belmans et al. 2018, Graversgaard et al. 2018).

Steins and Edwards consider an engagement platform to be “a negotiating and/or decision-making body (voluntary or statutory), comprising different stakeholders who perceive the same resource management problem, realize their interdependence in solving it, and come together to agree on action strategies for solving the problem” (1996:244). In line with the discussion of multi-actor approaches, we find that a more non-linear understanding of these platforms is necessary, to acknowledge the dynamic character of engagement processes. Hence, we will in our analyses of multi-actor platforms relate to Acquaye-Baddoo et al. (2010:4) as they define such platforms as “a more-or-less ongoing mechanism in which actors meet regularly to foster exchange and promote joint decision making and collaboration in a continuously evolving way”. We will however also engage with other frameworks and dimensions for multi-actor engagement.

3.1 FAIRWAY’S MULTI-ACTORS PLATFORMS

The FAIRWAY project works through 13 cases in 11 EU member States. These cases are included in the project as multi-actor platforms (MAPs). These MAPs are either engagement platforms that have a longer history and have then been brought in under the project to contribute to FAIRWAY’s aims, or they have been set up within the project start. See table below for an overview of the cases and their history.

Table 1. Overview of Multi-Actor Platform in the FAIRWAY project, indicating history of engagement

Case study	Existing platform prior to FAIRWAY	New platform set up under FAIRWAY
1: Tunø Island, Denmark	X	
2: Aalborg, Denmark	X	
3: Anglian Region, England		X
4: France	X	
5: Lower Saxony, Germany	X	
6: Greece		X
7: Derg, Northern Ireland	X	
8: Overijssel, the Netherlands	X	
9: Brabant, the Netherlands	X	
10: Vansjø, Norway	X	
11: Baixo Mondego, Portugal		X
12: Arges-Vedea, Romania		X
13: Dravsko Polje, Slovenia		X

Whether the MAPs of the FAIRWAY project are new or have a longer history is only one feature of difference between the cases of the project. While some address quality of drinking water as surface water, others concern groundwater. While some MAPs address issues pertaining to nitrates and/or phosphorus, others deal with pesticides; while yet others engage with all these issues. In some cases, there is a high level of conflicts, in others the tensions are less visible, or absent. In some cases, the platform functions with an official and formal mandate; in other cases, it is more of a loose association around more or less common challenges or problems. The platforms

also vary according to the kind of actors they involve; for instance, on whether and how farmers are involved.

Warner and Verhallen (2012) argue that because of the complexity and the variety of social, cultural and political contexts, there are no normative definitions of multi-stakeholder or multi-actor platforms in terms of structure or methodology used. According to Reed, “*different levels of engagement are likely to be appropriate in different contexts, depending on the objectives of the work and the capacity for stakeholders to influence outcomes*” (Reed 2008:2419). Hence, defining a standard or ideal engagement platform is not desirable, and it has been difficult to devise one common strategy for setting up engagement platforms within the FAIRWAY project. It also means that there are challenges in comparing across the cases; as anything from the respective MAPs’ objectives, their structure, history and context varies a lot. In the following we will present a framework for analysing engagement process that we believe is helpful, regardless of the mentioned challenges and differences among them.

3.2 DIMENSIONS FOR MULTI-ACTOR ENGAGEMENT

The vast literature on stakeholder participation, from the seminal work of Arnstein (1969) and her “ladder of participation”, to recent work by Reed et al. (2018), indicates an array of typologies relevant for multi-actor engagement. Warner and Verhallen (2012) sketch a typology of multi-stakeholder platforms with regards to dimensions that are considered relevant for assessing strengths, weaknesses and opportunities for change with regards to engagement platforms. These dimensions relate in different ways to *the process*, *the content* and *the context* of engagement processes (Figure 1).

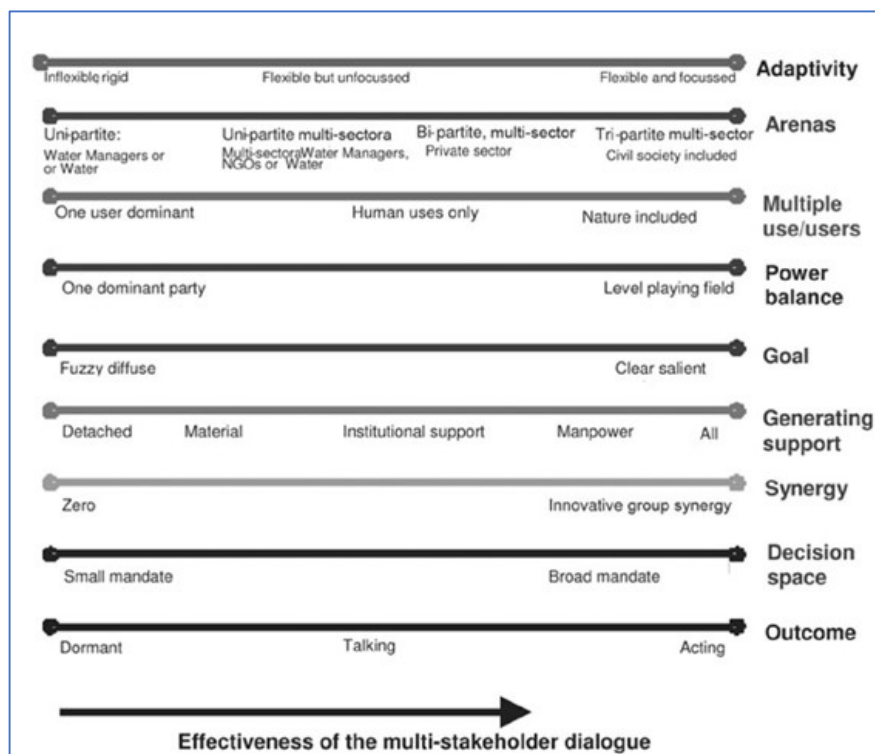


Figure 1: Warner and Verhallen's (2012) Assessment Dimensions for Multi-Stakeholder Dialogues

Inspired by Warner and Verhallen (Warner and Verhallen 2012), we have developed a typology fit for the multi-actor platforms of the FAIRWAY project. Some adjustments have been made from this initial typology in labelling and descriptions. Moreover, Warner and Verhallen suggest that a movement of any given engagement platform from the left to the right in their typology implies a move towards a more effective multi-stakeholder dialogue. Given the dynamic character of multi-

actor process, and the differences between the MAPs of the FAIRWAY project we found that this is an assumption that is difficult to set up-front. Our suggested framework is therefore more open-ended in terms of the ideal conditions for engagement. The issue will be returned to in the analyses in chapter 5.

Our framework of dimensions relevant for meaningful engagement processes (Figure 2) is presented in the following:

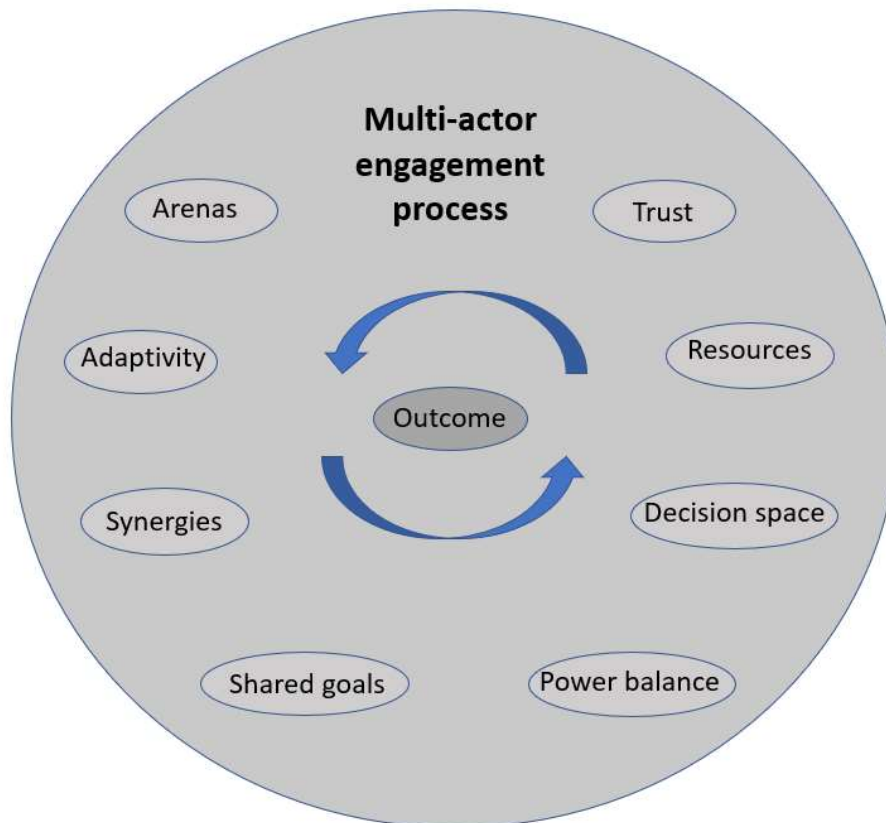


Figure 2: Key dimensions of multi-actor engagement processes

Arenas involve what kind of actors are involved from which sectors and at which levels.

Adaptivity refers to the capacity of the platform to adapting to changing external circumstance, as well as adapting to the dynamics of the organization, and being flexible to change direction and goals depending on identified needs with the platform.

The **synergies** of a platform ranges from a focus on each stakeholder's own interests (with no synergies), to a more joint effort to find solutions and innovations that bridges these different interests, as well as bringing in additional social learning outcomes.

Shared goals refer to whether there is a shared understanding of the urgency and the nature of the problem, and consequently whether there is a goal that is shared by all parties and that everyone can rally behind and work towards.

Power balance is here understood as whether within the engagement platform there are one or more actors that dominate discussions, decision-making and agenda-setting, or whether there is a more level playing field.

Decision space refers to the kinds of mandate and legitimacy a platform has, ranging from a small/narrow mandate, e.g. as a consultative body, or a broader mandate when influencing decision-making processes. This could refer to both internal mandate (constituency to representatives) and external mandate (enabling environment) (Warner and Verhallen 2012).

Available resources refer to the extent to which the platform is seen as having resources with regards to institutional support, funding and manpower, whether the structure set up with the voluntary contribution from all actor groups, or the platforms take the form of a network with a staffed secretariat or the like. Available internal resources may refer to different kinds of public, legal or financial support, while external resources on the other hand may be outside legitimacy of the platform with regards to the problem at hand.

Trust refers in this context to a broad understanding of trust between actors, both encompassing relational trust (between oneself and the other) and calculative trust (relating to perceptions of past behaviour of the other and/or on constraints on future behaviour) (cf. Earle 2010).

Outcomes can be understood as both tangible outcomes as achievements in terms of environmental improvements and reaching set targets, but can also be seen as process outcomes, such as the building of legitimacy through improved relationships and increased understanding of other actors' positions and perspectives.

4. CASE-WISE METHODS FOR ANALYSES OF MULTI-ACTOR PLATFORMS

In order to harvest lessons from the FAIRWAY MAPs on successes and challenges for meaningful engagement processes, a series of methodological data-collection exercises have been carried out. The results of these exercises comprise the data for the subsequent analyses.

A. Quick scans (2017)

At the start of the project, the respective MAP coordinators filled in a “Quick scan” for basic information on case studies, governance structures & multi-actor platforms. This gave a general overview of the context of each MAP, but also a snapshot of respective engagement processes at the outset of the project.

B. Mapping of dimensions (2017)

A year into the FAIRWAY project each case study was asked to rank their MAP according to the key dimensions in the framework for multi-actor engagement processes. This will be revisited before the project ends to enable a tracking of changes through the duration of the project.

C. Engagement plans (2018)

As part of the project’s support for developing and nurturing multi-actor processes, each case submitted an engagement plan with details on plans for engagement in term of actors included and the process of engagement throughout the project. These are submitted separately as project deliverable D2.1.

D. Activity logs (2018, 2019)

All cases have reported on meetings held in their respective MAPs, including the purpose, participants and outcomes of activities.

E. MAP analyses (2019)

All MAPs were in 2019 asked to carry out either a survey or a set of interviews as input to the overarching MAP analyses. The aim of this exercise was to get feedback from MAP participants on the performance and functioning of the respective MAPs, and to enable the harvesting of lessons and best practice. A set of questions relating to the chosen framework for dimensions of engagement was developed and shared with all MAPs to form the basis for this exercise (Annex I.). Each case has been free to tailor these questions to their respective context for either surveys or interviews.

In the following section, we will go through the collected data for ten of the FAIRWAY cases that managed to carry out an analyses of their multi-actor platforms (E.) Three of the FAIRWAY cases - Romania, Greece and France - are not included in these preliminary analyses of engagement processes of the FAIRWAY MAPs. For Romania and Greece, there was no engagement platform prior to the project. Hence, their respective multi-actor platforms were at such an early stage that it would impair the engagement efforts if the participants were to evaluate their emerging platforms. For the French case, there were unforeseen staff changes that made it impossible to participate when the data collection for this work was carried out.

The following presentation of the FAIRWAY MAPs is organised according to a set of headlines corresponding to key issues relevant for the engagement processes as shown in our typology (in ch. 3.2): i) Description of the MAP as an engagement platform, ii) Problem identification and shared understanding, iii) Achievements, iv) Engagement process and participation, v) Trust, vi) Conflicts, vii) Future sustainability of the MAP, and lastly viii) Lessons learned.

4.1 MAP: ISLAND TUNØ, DENMARK

4.1.1 Description of MAP

Groundwater protection on Tunø was the first of its kind in Danish drinking water protection history. High level of nitrate in the wells from horticulture production, initiated a governance response. The drinking water protection project started in 1986: The main instrument used was the implementation of protection zones (no agricultural production) across the drinking water capture zone of each abstraction well. The protection involved comprehensive and systematic monitoring to determine the effects on groundwater quality.

Background

During the 1980s, the nitrate content of the drinking water increased to very high levels (up to 150 mg/l in single wells). This meant that action was needed to ensure compliance with the drinking water standard of 50 mg NO₃/l.

A working group was established in 1986 to draw up a strategy for safeguarding the drinking water supply and the resultant sustainable water supply project established protection zones surrounding Tunø Waterworks. In 1989, the initial protection zones were established (1989-1992) with 3 ha inner protection zone with permanent grass, and agricultural advisory efforts to improve nitrogen efficiency. The protection zone and agricultural advisory efforts were not enough, so in 1992, a new protection strategy was established (1992-2017) consisting of:

- Increased (6,5 ha) inner protection zone with very low nitrate leaching from:
 - Permanent grass where the areas was bought by the waterworks
 - Exchange of fields between farmers to secure productive areas
- Long-term commitment (1992 -2017) set-a-side with clover + grass (EU-support) in an area (7 ha) owned by a single farmer, who was willing to sell, due to retirement plans.
- Best practise implemented for crop production:
 - Improving of nitrogen efficiency with fertilizer plans
 - Improving tools to place fertilizer
 - Soil quality improvement (solve soil compaction etc.).

As a result, the nitrate concentrations have decreased from more than 150 mg NO₃/l to approximately 25 mg NO₃/l in the most polluted abstraction well, which makes the Tunø case an example for effective drinking water protection in an agricultural setting. This was complemented with information campaigns directed to the farmers.

The Tunø case is used because there are many lessons learned, but also because it can be an example of how to sustain a long-term project and long-term farmer and stakeholder commitment under changing administrative structures, which are current dilemmas in many drinking water protection projects.

There is no MAP at present, but the analysis will focus on the platform that was set-up in at the end of the 1980s and how this has changed over time and what kind of consequences this has had for long-term drinking water protection.

Arenas and actors

The historical MAP consisted of the local water works, two local farmers, the municipality, the local agricultural adviser, and the former regional authority (the county).

The municipality (Odder Kommune) is the current authority responsible for the governance of Tunø Waterworks, in the 1980s the county was responsible of the drinking water protection. The waterworks was and still is maintained by a board, which has been developed over time and adjusted to the inevitable changes in administration and ownership of agricultural fields in the protection zones over time.

The waterworks continuously monitor trends in groundwater and drinking water quality and follow the trend. If they see a continuous increase in e.g. nitrate or pesticides, they start to take action in close collaboration with the municipality. By legislation, the permit limit is defined.

The farmer is responsible for management of his own fields. He takes his decisions partly based on information from different decision support tools and agricultural advisors. Farmers are restricted in their choice of farming practice, use of fertilizers, manure and pesticides, measures etc. due to current legislation.

In FAIRWAY, the development and structure over time of the former MAP has been analysed. It will be considered if a new MAP should be established.

In the Danish MAP of Tunø the following questions are asked:

- How to achieve farmer commitment to solve drinking water problems?
- How to sustain a long-term project under changing administrative structures (long-term project management > 20 years)?
- How to get measures accepted by farmers (including time to accept)?
- How is farming practice affecting nitrate in groundwater?
- Is the current groundwater protection strategy the most cost-effective?

Five interviews have been conducted with key representatives of the MAP that was in action in the 1990s.

4.1.2 Problem identification and shared understanding

From interviews with regional authorities and the farmers that were affected by the groundwater protection regulation and that were responsible for intensive agriculture on the Island of Tunø, there was not a shared understanding between them and the regional authorities of what the problem was or how to address the problem. The farmers, still claim today that there were no nitrate problems in the 1980s- and early 1990s and that it came as a shock, that something had to be done (there was huge media coverage of the nitrate pollution of drinking water on the Island of Tunø on national television and newspapers). As this quote from one of the farmers illustrates: *"(...) it was not as bad as they said, some reporters added 200mg extra and then it didn't stop (...) It would have resolved itself over time (nitrate would decrease with time)"*. On the other hand, the former head of the regional authority, was very sure about the issue and how it could be fixed. This was backed up by technical reports and research on the issue. Therefore, the regional authorities started to develop scenarios of what to be done to protect the drinking water.

4.1.3 Achievements

The success with introducing drinking water protection at Tunø, and hereby reducing nitrate concentrations, was partly due to the governance structure and technical reports that enabled the achievement of farmer commitment to solve the drinking water problem. The media was very much part of the picture, where journalist presented the problem to the whole of Denmark leaving the farmers with nothing to do besides participating in the MAP.

From a scientific/technical perspective the Tunø case is a success and an example of how to implement groundwater protection through the use of permanent grasslands. The permanent grasslands showed that it was possible to reduce nitrate concentrations to a tolerable level for humans. However, from a farmer's perspective and from a long-term monitoring perspective, the problem is that commitment is not something that comes easily and if long-term groundwater protection is implemented there needs to be a shared understanding of the issue. The farmers perceive the whole MAP and regulation not as a success, but as a top-down development they had no share in. The farmers believe that many of the farmers would have retired anyway and that it would then have been easy for the authorities to buy some of the land and pass this on to the affected farmers (land consolidation was used as a measure).

4.1.4 Engagement process and participation

The process with engaging farmers in drinking water protection was mainly based on trying to convince farmers of the problem with nitrate pollution and the relation between nitrate leaching and horticulture practices. This process was mainly based on information supply and many meetings and with engagement or stakeholder participation.

4.1.5 Trust

Even though there was not a shared understanding of the problem and little stakeholder engagement, there were high levels of trust between the farmers and the regional authority, built up over time and created by having many physical meetings in the fields. These meetings meant that the farmers felt the authorities took them seriously. At the same time, the farmers felt they were treated fairly by the authorities, not just getting compensation, but also new land and more land than they were obliged to get. The programme was required to provide each farmer with a minimum area, so that a farmer who lost 1ha to the abstraction protection zone gained 1ha from outside the area.

4.1.6 Conflicts

Conflicts were avoided as farmers were given new land and compensation.

4.1.7 Future sustainability of MAP

Now that the FAIRWAY project has revisited Tunø Island 30 years after the scheme began, we are well positioned to address some key questions. Especially the question of how to maintain groundwater protection for long periods of time in the face of challenges such as:

- New ownerships (both farms and citizens and waterworks etc.)
- New administrative units, borders and governance structures
- Agreements are old and the 20-year leases have expired.

Because the actors at Tunø did not have a shared understanding of the issue of nitrate, this might be important to work with when the administrative authorities of the future must evaluate how groundwater protection should be done at Tunø.

4.1.8 Lessons learned

The findings are relevant for other islands, regions and countries struggling with high levels of nitrate in their drinking water and where issues of how to sustain a long-term project and long-term farmer and stakeholder commitment under changing administrative structures are dilemmas in drinking water protection.

The Tunø case is a successful example of groundwater protection on a small island with one small waterworks where the aquifer is vulnerable to nitrate pollution and salt-water intrusion. The case will be used as a “lesson learned”:

- Use of the measure; permanent (set-aside land for) grass is very efficient in groundwater protection
- Groundwater protection is time-consuming, and it is important that the process is given the necessary time.
- Durable (permanent) instruments are relevant
- Collaboration with local farmers is necessary – however a shared understanding of the issue and problem is necessary for long-term commitment
- Effect measurements are an important part of adjusting the effort.
- Monitoring is essential for evaluating instruments
- Expect changes in policy and ownership
- A credible forecast is essential for planning and acceptance.

4.2 MAP: AALBORG, DENMARK

4.2.1 Description of MAP

The Aalborg area is one of the most vulnerable areas in Denmark with regards to pollution of groundwater. A monitoring program was established, and many observations and quantitative data are available for a long period. The data shows that the water contains variable amounts of nitrate and traces of some pesticides. For these reasons the municipality and the local waterworks (water cooperation Aalborg) have adopted action plans in several areas where the drinking water abstraction is vulnerable from pollution from agriculture. These action plans mean that water cooperation Aalborg have implemented measures for protection of the groundwater resources against nitrate and pesticide pollution. If there is a need for groundwater protection, the water cooperation Aalborg uses different measures. They either buy up the farmers land, make a declaration for afforestation, use targeted protection with a declaration on the farmers field for how he is allowed to cultivate with the limitations that max. 25 mg nitrate/l is leaching. This declaration is mainly used for pasture, fallow or forest with a declaration on either no pesticide use, low grazing pressure: 0.7 animal units/hectare, no additional application of fertilizer, ploughing - maximum of every 5 years, avoidance of soil without plant cover, non-nitrogen-fixing crops, including clover, non-use of very water consuming crops, e.g. willow. Another measure used is exchange of land (land consolidation).

If the farmers and the waterworks/municipality cannot agree on a voluntary basis, the municipality will require the farmers to do so or use expropriation.

Water cooperation Aalborg have worked with these voluntary agreements since 1998. Where the farmers get paid by the waterworks/consumers in order to change the land use or stop the agricultural practices. This concept has been a successful measure the past 15 years, according to the water cooperation Aalborg. Approximately 60 voluntary agreements have been made on 1400

ha of farmland. However, the water cooperation Aalborg finds it more and more difficult to make voluntary agreements on groundwater protection.

A MAP has been established to find out how to improve the collaboration between farmers and water cooperation Aalborg so that a common understanding and acceptance on protection of groundwater can be found.

A “Groundwater board (Grundvandsrådet)” is maintained by the municipality of Aalborg. The Groundwater board consist of app. 20 members with different interests e.g. agriculture, environment, nature, forest, groundwater etc. Water cooperation Aalborg is responsible for negotiation of agreements on groundwater protection with the farmers as part of the local action plans for drinking water protection.

After a stakeholder analysis was conducted in the Aalborg area, an Aalborg group was established. This group mainly consisted of members of the municipality (Water Collaboration Aalborg) and the farmer advisory organisation, Agri-Nord and SEGES.

Separate meetings have been conducted with farmers in the area that have, or are in the midst of, negotiating with the water cooperation Aalborg about groundwater protection and action plans.

4.2.2 Problem identification and shared understanding

There is currently not a shared understanding between Water Collaboration Aalborg and the farmers on the need for implementation of additional groundwater protection. In the Aalborg case the challenge is that there are clear disagreements and conflicts between the farmers and Water Collaboration Aalborg.

4.2.3 Achievements

Meetings with farmers and Water Collaboration Aalborg have been held separately, these are meant as a first step towards finding a common space for dialogue and groundwater protection in the Aalborg area.

4.2.4 Engagement process and participation

At the moment, the process is poor or not happening as there is no engagement or participation. Meetings are held separately between farmers and Water Collaboration Aalborg.

4.2.5 Trust and conflicts

Due to ongoing conflicts this will be a theme explored in the future work with the Aalborg MAP.

4.2.6 Future sustainability of MAP

In the Aalborg MAP, five working hypotheses have been developed to improve the collaboration between farmers and the waterworks on groundwater protection:

1. Shared understanding of each other's perspectives and goals as well as better dialogue can increase the possibility of combining groundwater protection and agricultural production
2. Documented and recognized agricultural practices and technology development can improve groundwater quality
3. "Participatory monitoring" can give farmers better involvement in groundwater protection
4. Barriers to groundwater protection have been identified
5. Cost-effective solutions for the benefit of both farmers and waterworks have been identified

The main goal with the Aalborg MAP is to improve the dialog on the scientific basis for groundwater protection and the creation of a common understanding of the actual problems. The existing MAP will eventually be further developed and extended to meet these objectives.

Suggested plans for future work are; that the MAP for Aalborg could be connected to the municipality "Groundwater board" and could be extended from "Water Collaboration Aalborg" to include water supply companies, private well owners, landowners, state forestry, Arla (the major dairy cooperative), farmers and agricultural advisory etc.

4.2.7 Lessons learned

Through interviews with farmers on how to make groundwater protection succeed, key lessons learned have been that four key themes are essential: Advice, dialogue, the process and consequences and compensation.

Advice; it is important the municipality also gets agronomic advice. **The advice** for the farmers should be free of charge or paid by the municipality and should be individual. **The process** should be good and transparent, there should be individual negotiations between the right stakeholders involved. And there should be put forward information and knowledge on the consequences. **The dialogue**, should be present and sincere, and should be based on listening and responsiveness to new solutions. The dialogue should understand that interventions and taking land out of production is life-changing for the individual farmer. **The compensation** should be indemnified, fair and there should be an acknowledgement that compensation is expensive, and money should be allocated for this.

4.3 MAP: ANGLIAN REGION, ENGLAND

4.3.1 Description of case study and MAP

The Anglian Region case study is a social science study, focusing on farmer engagement approaches, practiced by Anglian Water to address agricultural diffuse pollution, primarily of pesticides, in surface waters. Anglian Water (AW) is a private water supply company supplying drinking water to 4.2 million customers covering 27,500km².

The case study compares two established farmer engagement approaches currently used by Anglian Water. Firstly, 'Slug it Out', a payment for ecosystem services (PES) across seven reservoir catchments. Farmers receive incentives to practice product substitution for slug control, namely replacing metaldehyde with ferric phosphate, since metaldehyde cannot be easily removed from drinking water. Secondly, 'network engagement' in the Ancholme catchment. The AW catchment adviser proactively and expertly facilitates knowledge exchange to farmers and the wider industry. The third area, the Cringle Brook catchment, is the 'control', and has received little

intervention from AW and is the focus for the Multi-Actor Platform (MAP) and the development of innovative, 'bottom-up' farmer/industry engagement. The three catchments are shown in figure 3.



Figure 3: The Anglian Region case study catchments

To compare the three farmer engagement approaches, UoL together with AW and ADAS, with academic rigour in survey design and method provided by ADAS, conducted approximately 100 face to face interviews with farmers across the three catchments in 2018/19; the surveys are being repeated in 2020. A report will be disseminated to Anglian Water and FAIRWAY in 2021.

In 2017, the Cringle Brook MAP was embryonic and required development. Following a 'textbook' approach, a steering committee was initiated, inviting stakeholders including a farmer, agronomist (commercial), Anglian Water, cover crop seed merchant, Environment Agency, researcher (metaldehyde) to attend, with leadership and facilitation provided by UoL. The identification of the stakeholders was relatively easy for UoL to achieve yet finding commonality in a meeting date was difficult and took several months, especially within the farming community; there were cancellations and substitution of stakeholders on the day.

The steering committee agenda incorporated MAP activities based on The MSP Guide (Brouwer et al. 2016) and The MSP Tool Guide (Brouwer and Brouwers 2016), to include stakeholder identification, analysis, links, sphere of influence and importance, and their role in the MAP. The initial activities made it very apparent, even in a small catchment, that there was a saturated 'market' providing advice and knowledge exchange to farmers, and a diverse range of organizations involved (e.g. commercial fertilizer/pesticide companies, farmer groups, catchment groups, ENGOs and the water companies). Was there really scope to add another layer to the current complexity of farmer engagement?

The MAP was re-structured, comprising of a core group (UoL, AW catchment adviser) joined by members from the MAP subgroup, for example ADAS, experts, academics and the administration support network; the composition varied depending on the task in hand. The focus of the MAP was to develop bespoke engagement activities based on input from the farmers in the Cringle Brook catchment – these were named the Knowledge and Innovation Days (KIDs). The KIDs would draw on the wealth of existing expertise and knowledge both in and outside the Cringle Brook catchment; these experts would become flexible and transient members of the MAP. The KIDs would, in time, extend their influence beyond the Cringle Brook catchment, provide a platform to launch increased farmer led engagement, and extend the MAP to include other 'users' of the river

in the Cringle Brook Catchment. It is envisaged the Cringle Brook MAP would enable discussions and inform policy for a more farmer centric approach to farmer engagement.

The KID 2018 was informed by feedback/requests derived from face to face farmers interviews in the Cringle Brook and from then on, the KIDs are informed based on feedback from the previous KID event. The Knowledge and Innovation Days were innovative in content as they were as driven by farmers yet provided an opportunity to extend the knowledge through access to research outcomes and highly proficient experts in their field.

The KIDS were innovative in the design, as they were created by the MAP coordinator, a successful professional educator and knowledge exchange facilitator (J E Rowbottom). The KID events were designed to accommodate a range of learning styles (visual, verbal, and kinesthetic) provided by: -

- i. Interactive field demonstrations with exemplary demonstrators. The demonstration sites were provided by the farmers in the Cringle Brook MAP.
- ii. Short 8-10-minute presentations/PowerPoints, with question and answer(Q&A) sessions, and
- iii. Providing an ambience for discussion

For many, asking questions or offering feedback in a Q&A forum is daunting. To address this the KID provided a sit-down lunch with a rare opportunity to discuss topics on a one to one basis with the expert presenters (at no cost), fellow farmers and advisers. This process begins the development of trust, a lasting relationship and engagement, not only with UoL and AW, but also with industry bodies such as the Environment Agency (EA), Agriculture and Horticulture Development Board (AHDB), National Farmers Union (NFU) and the Catchment Sensitive Farming (CSF) group; more farmers voices are beginning to be heard by policy makers.

4.3.2 Problem identification and shared understanding

Metaldehyde is used for slug control on arable farms and has been seen by farmers as an important in addressing their problem of slugs. Anglian Water needed to reduce the metaldehyde entering the drinking water resources at catchment level, since the long-term cost and challenge of removing metaldehyde from drinking water is prohibitive – AW'S problem. So the same product with different viewpoints and different problems.

The face to face surveys identified blackgrass (a Gramineae weed) and its increasing resistance to herbicides as a huge concern for farmers (metaldehyde was not a problem for the farmers). This provided the opportunity to ask the farmers 'what can we do for you?', and by so doing the conversation on pesticides and best management principles could begin, which in time can overflow to metaldehyde.

KID 2020 was based on KID 2018 feedback which requested more information on cultivations. Research has shown tramlines (for sprayers) are well known as conduits for accelerated soil erosion, run off and associated agricultural 'pollutants'. For KID 2020, a field demonstration was organized to show an alternative cultivation and tramline arrangement in field which could address run off and soil erosion. This was presented to the farmers as a method to prevent valuable losses of their nutrients and chemical from the field, so improving soil management, economics, efficacy, and efficiency. In the long term this could benefit AW and the status of the drinking water quality.

This approach 'what can we do to help you?' provided an excellent starting point for the MAP and generated a commonality and a positive way to move forward to address AW's issue of the legal requirements for metaldehyde and pesticides in a wider context, in drinking water. Improved farm input management would also benefit the farming community.

4.3.3 Achievements

The KIDs as a farmer engagement tool have been viewed as a particular success. KID 2018 had 24 participants, mainly agronomists; KID 2020 had 38 participants, with farmers as the main group. KID 2020 also widened the participant diversity to include, very importantly agricultural students, and also technical farming organisations such as the AHDB, CSF, and the Soil Association. At both KID events, 100% of participants requested further KID events.

An independent agronomist who has attended both KID events, stated that they are very useful in bringing people together to facilitate discussion. It was stated that farmers can gain a lot of knowledge and practical advice from attending these events, helping to improve practice in the area. The agronomist praised the University of Lincoln's work for the KIDs and had a strong relationship with the core MAP participants. Additionally, engaging agronomists is viewed as important for successful farm practice change because agronomists visit farms regularly and typically have long standing relationships with their farmers.

The KID 2020 field demonstration took place on a farm in the MAP area with the cultivation system being put in place 6 months earlier. The farmer already practised the alternative tramline arrangement, but it was not a common practice in the area, and so the demonstration provided a working example of its success. The role of farmers running field demonstration and as presenters at the KIDs has been and is critical, since this gives a sense of reality and knowledge that it is both practical and achievable.

KID 2020 also saw an association develop between the presenter of herbicide resistance/blackgrass control and AW. Development of these industry relationships can only be beneficial for the drinking water resources; AW will also gain respect from their farmers by demonstrating their prioritization and the importance in seeking the best advice for their farmers.

Farmer engagement matures with time and trust, and so after just two KID events it is difficult to ascertain their precise influence on best practice adoption by farmers in the MAP area or the influence on the policy makers, but so far it looks encouraging. The influence on drinking water quality will be very long term and any best management practice adopted has to address not only current inputs, but also legacy factors.

At KID 2020, there were agronomists who had attended KID 2018 and keen to return; and the NFU representative having attended KID 2018, asked to present at KID 2020. In addition, the KID 2018 success generated support and funding from the Environment Agency for KID 2020, and further, for 2020/21, the Environment Agency is likely to provide funding for the Cringle Brook. This will finance Cringle Brook phase 3, a five-month continuous passive monitoring of the Cringle Brook, encompassing all users of the watercourse (farmers, golf courses, highway, AW sewage works). To advise and support the project, the Cringle Brook MAP has engaged with temporary members of the MAP - the University of Portsmouth and The West County River's Trust. Phase 3 will involve an engagement process, which will be built on in phase 4 in 2022/3. Farmers frequently comment on the 'other polluters' of water bodies; this holistic approach to catchment monitoring encompassing all users will address this and extend the Cringle Brook MAP community at ground level. UoL and AW are working collaboratively on phase 3, with the AW catchment adviser driving the engagement process for phase 3 and hopefully into phase 4. This is intentional in order to ensure a long-term MAP process of engagement and delivery.

At KID 2020, the AW catchment adviser spoke about the Innovative Farmer Labs, an initiative by the Soil Association. Innovative Farmers Labs are driven by farmers to address an interest/issue to meet their needs. This is very much in keeping with the ethos of Cringle Brook MAP. Several farmers were interested, and they have presented their ideas to the AW catchment adviser, so progress is being made. UoL will act as the support research organization.

Increased involvement of the AW catchment adviser in farmer engagement in the Cringle Brook MAP has progressed UoL's vision of the MAP, which is to embed the engagement process, the KIDs, and the MAP into the domain of AW and the wider industry.

4.3.4 Engagement process and participation

The initial MAP process of mapping the stakeholders, their networks and influence was a very useful exercise. It identified the mature and frequently oversubscribed market of advice available to farmers and knowledge transfer events and workshops held; on recent Twitter accounts (prior to KID 2020), farmers were commenting on the huge volume of events they perceived were covering the same content and with nothing new in the offering - are farmers becoming jaded with the overuse of workshops? There are also many organizations involved in the delivery of the advice and knowledge transfer, often following their own agenda and needs, rather than addressing joint needs and commonality between themselves and the farming community. The transient membership (such as KID presenters) of the Cringle Brook MAP also increases the awareness for farmers of the expertise available to them and how to access it post KID events.

The review and restructuring of the Cringle Brook MAP was a very important part of the process. The new approach will most likely increase the opportunity for success as it builds on and borrows from existing networks, rather than adding to the 'noise' of a saturated knowledge exchange market.

In an area which has received minimal prior engagement, knowledge transfer and intervention by UoL, AW or other organizations, engagement of farmers was difficult, and promoting the KID events and the MAP has demonstrated this (though we have experienced an unprecedented weather conditions for farmers between 2018 – 2020).

For the KID 2018, 50 invitations were sent by post to farmers in the Cringle Brook and wider catchment and followed up by phone calls; at the event there were 3-4 farmers from the area. Later, many farmers could not recollect the invitation, often another person was responsible for the mail. In 2020, invitations were sent by email, and post, if no email was available; in addition, promotion through known existing networks was used; successful coverage was noted since recipients reported they had received the invitation from several sources! KID 2020 had a 63% increase in attendance, but still the number of local farmers was not representative.

With the growing complexity of the farming industry, farmers are increasingly reliant on their agronomists to guide their farming decisions; it is the agronomists who provide the conduit to farmers for championing best practice, so it is important to work closely with agronomists to ensure we are all delivering the same message. This was highlighted by an independent agronomist who has been involved on the periphery of the MAP, had attended KID events, and praised the MAP for strengthening relationships. They also stated that since being involved they received very good communication from Anglian Water, regarding pollution issues, and that farmers have increasingly become more aware of their environmental impacts and 'By building trust, mutual knowledge and communication, collaboration and problem solving can be strengthened and objectives become aligned'..

4.3.5 Trust

The comment above from the independent agronomist sums up the importance of trust. Time to build relationships and trust is vitally important, but for this project, time is in short supply. Frequently funding for projects is short term, after which there are no resources, the

personal/catchment advisers move on and it becomes difficult for farmers to develop the all-important relationships.

Water companies and their role in catchment advice to farmers are a crucial part of the mix; increasingly water companies are employing personnel with expertise in both farming (agronomists) and environmental protection. This will increase the trust/confidence of farmers, especially as advice is offered free of charge, and good advice matters in best practice adoption.

4.3.6 Conflicts

Conflicts such as developing a MAP in an oversubscribed engagement market and potential risk of divergence between AW and the farming community in the Cringle Brook MAP were identified early and managed by above mentioned processes.

4.3.7 Future sustainability of MAP

The Cringle Brook MAP will succeed if:-

- i. The industry sees a value in the MAP and the KIDs
- ii. As a result of perceived value, the industry adopts the KID events and the MAP concept going forward
- iii. The industry is able to find the funds to finance the KIDs and the MAP concept
- iv. The industry can find an ongoing core group to drive the MAP and KID events

If the KID events and MAP become reliant on one person in one organisation, it will be difficult to sustain. It is far better to have shared responsibility and resources to drive the MAP forward. All too frequently initiatives such as the KIDs and MAP stop when the project stops; continuation is dependent on industry support, but this takes time to develop, which at the moment is in short supply.

For the farming and wider community engagement in this catchment, the AW catchment adviser is enthusiastic, determined to be successful and to build on the projects currently happening in the Cringle Brook and wider catchment.

If external funding can be ongoing, the Cringle Brook catchment offers a case study of best practice to be scaled up and an example of a burgeoning MAP to be presented to policy makers involved in catchment management and farmer engagement.

4.4 MAP: LOWER SAXONY, GERMANY

4.4.1 Description of MAP

The federal state of Lower Saxony is composed of 37 municipalities and 8 urban districts. In many of them already some kind of engagement platform has been initiated. These MAPs are called "*Runde Tische Nährstoffmanagement und Wasserschutz*" (Round table discussions for Nutrient Management and Water protection). They work in such a way, that the farmer's representative (*Kreislandwirt*) invites all relevant actors (with administrative help of LWK, meaning that LWK organize and follow the MAPs) to joint discussions on how to achieve nutrient reductions and work

on an environmentally-sound nutrient management in agriculture. The case study area covers two MAPs with joint municipalities in the southeast of Lower Saxony, both located in arable farming regions (1. municipalities of Wolfenbüttel, Goslar and Salzgitter, 2. municipalities of Hildesheim and Northeim). The goal of the MAP is to find a viable compromise of how the farm manure surplus in the northwest region can be reduced, but at the same time maintaining or even improving water quality in the southeast of Lower Saxony.

Participants in the MAPs are representatives of district authorities for water and agriculture and local advisory services. A district representative of farmers is the official promoter of the meeting. However, other farmers do not participate. The **chairmanship by farmer's representatives of the five respective districts** has a high degree of legitimacy since they were elected by the farmers of their districts. However, they cannot reflect the opinion of each farmer in their district. Since they are the official chairmen, it is made sure that important issues for farmers and the current situation in their districts will be regarded. The role of the chairmanship is to raise issues occurring in practical agricultural management and challenges farmers are facing. On the one hand, they try to draw the attention of decision-makers (such as authority for fertilization or district representatives) to farmer's problems. On the other hand, they know about their power since (voluntary) participation by farmers is inevitable to successfully establish the project. Besides, one of the farmer's representatives is also the head of the agricultural chamber (LWK).

The LWK of Lower Saxony (*Landwirtschaftskammer Niedersachsen*) is a body which is half-financed by the farmers (they are obliged to be members and pay a yearly fee) and half-financed by the county of Lower Saxony (the federal ministry of agriculture). LWK runs an (independent) advisory service for farmers, writes technical reports, administers the EU-subsidies, and works on projects related to agriculture. A separate, independent part of it controls the farm's compliance with agricultural law (also on farm).

The ministries of agriculture (ML) and nature conservation (MU) of the federal state of Lower Saxony direct tasks to specialized public institutions. For the MAP, the relevant authorities are the chamber of agriculture (LWK), the authority for nature protection (NLWKN) and the authority for mining, energy and geology (LBEG). At the district-scale, monitoring is undertaken by the local water authorities (Untere Wasserbehörden). Furthermore, water supply companies, which have to guarantee drinking water quality, are also major players.

Representatives of the administration of five rural and urban districts (department of water, environment, etc.):

They have to approve various requests of farmers concerning the application and storage of farm manure. Furthermore, they are the local authorities for water. Therefore, they have to make sure that the targets set by the Water Framework Directive (WFD) are met. Lately they have been asked by the federal minister of environment to establish so-called "Round Tables" in order to find ways to improve water quality in terms of nitrate.

They represent the environmental interest in their respective districts. However, they are also in charge of the waste management of their districts, e. g. production and selling of compost to the farmers in the district. Thus, their roles can be quite complex.

Head and representatives of the federal authority for fertilization (LWK - Düngbehörde):

The federal authority for fertilization specifies national law (concerning fertilization) in the whole district of Lower Saxony. These specifications are legally binding for the farmers. The establishment of this authority is quite recent (01.01.2017) and coincides with new legal requirements on national scale.

On the meetings of the round table, it is important for them to have a strong presence and inform about their responsibilities, activities and contact persons. They have the final say concerning legal

interpretation of national law on district scale. Besides, the head of this federal authority was the official overall project leader of the “joint program farm manure management”.

Representatives of the authority for mining, energy and geology (LBEG) and representatives of the federal authority for nature protection (NLWKN): They represent the environmental interest on the scale of whole Lower Saxony.

They have high interest to release pressure on environmental resources in the northwest but are worried about water quality in the southeast. The LBEG also uses agricultural data of the districts to calculate the potential (still environmentally-sound) uptake of farm manure in the southeaster region (“emission monitoring”).

Heads of two district offices of the federal chamber of agriculture and case study

coordinator: The district offices of LWK are directly involved in the question of farm manure transport since many agricultural specialists and advisors work here. The case study coordinator knows best about the status quo of the project and about further steps to be taken. Their role is primarily moderators, to facilitate the process.

Cooperation has existed only at the local level but no project covering the whole district of Lower Saxony including relevant officials existed before project start. Some district authorities and farmer’s representatives have initially been quite hesitant. The coordinators of the joint project “farm manure management” have organized information days. This included:

- meeting of farmers of the north-western region with farmer of the south-eastern region,
- information events about specific topics (current fertilization law, farm manure application techniques, etc.),
- intensive (personal) discussions with district officials beforehand,
- exemplary application of imported manure to check how the logistic chain works in the field.

The arena

Who is invited to the meetings is agreed by the authorities in charge and the farmer’s representatives. Interests of currently involved actors differ a lot and since the topic of farm manure distribution is very sensitive (e.g. many municipalities fear the consequences of farm manure import), the MAP first aimed at building trust between the actors and to discuss critical issues in a group of powerful actors. At the beginning, the MAP started with some selected participants in order to build trust and then expanded the arena with invitations to more (also more controversial) actors like critical farmers or advisors or NGOs or local representatives for the environment. In this way, the MAP became more stable over time. From the FAIRWAY survey of 2019, half of the respondents reply that all relevant actors are involved, however the other half also claim that nature/environmental organisations are missing/should be invited.

67 percent of the respondents describe the reasons for establishing MAPs as being the need to reduce the high nitrate levels in groundwater measuring points, also known in Germany as the “Wenzel-decree” i.e. the claim of the ministry of environment that at many measurement points nitrate levels are too high.”). The remaining 34 percent of the respondents state that the purpose for the MAPs is to establish manure management and find ways to export manure from surplus region to the arable farming region and how it should be guided.

The questions in the survey were answered by 12 respondents.

4.4.2 Problem identification and shared understanding

There is some consensus among the respondents that the MAPs have two issues to resolve: both reducing diffuse nitrate pollution from agriculture and finding ways of improving inter-regional

manure transport. However, some respondents are more detailed in their open-ended responses and define the issue in another way, as being more a matter of knowledge transfer/sharing of knowledge and acceptance. Illustrated in the below quote: *“Sharing of knowledge about supra-regional nutrient management, determination of the actual situation on regional scale, determination of the uptake potential of manure on regional scale, presentation of the results of the nutrient report for the whole of Lower Saxony, discussion about suitable measures”*. The difference in understanding of what constitutes the main issue, can be seen in the answer to the question: *“To what extent do the participants in [the MAP] have a shared understanding of the issue?”* Here approximately 60% indicate the level of shared understanding to some extent and only 33% to a large extent.

4.4.3 Achievements

Half of the respondents considers that the MAPs success in addressing the issue is limited. A large number of respondents also consider the MAP to not be successful in addressing the issue, the respondents main arguments are the following:

- “MAP primarily serves as information source”
- “(...) the legal framework and incentives of the market (e.g. fertilizer prices) determine the uptake of manure regardless of the MAP meetings”
- “(...) MAPs help for advisory purposes and to create a common understanding but do not solve the issues itself”
- “The MAP does not agree on concrete measures”.

The varying perception of the success should however be seen in relation to the differences in problem identification above.

One respondent considered that the MAP was, to a large extent, successful in addressing the issue, whilst approximately 40% of respondents felt that the MAP was only successful to some extent, arguing that: “Creation of transparency and increased knowledge among participants is the greatest success of MAP so far”.

Some of the respondents (1/3) state that new insights mainly have been about getting to know the point of view of the other participants, including farmer’s representatives who appreciated the opportunity to raise agricultural issues in front of the authorities. Others, predominately representatives from local authorities, claim that new insights mainly have been about getting new information on manure processing, whereas the rest stated new insights on other actor’s interests in the MAPS: “The local authorities are primarily focussed on their own interests (e.g. selling their local compost)”.

The respondents have different views on the changes observed as a result of the activities in the MAP. More than half (60%) indicate that there are no changes yet, and that no measures have been taken. The rest of the respondents indicate that the major changes are a reduction in sceptics and fear of what will happen. Knowledge has been increased and awareness has been raised on the topic of nutrient management. The latter part of the respondents indicate that meetings and MAPs have created the basis for cooperation and that *“meetings fostered an increased understanding for each other among participants. Technical knowledge was essential for that”*.

4.4.4 Engagement process and participation

As shown earlier, half of the respondents reply that all relevant actors are involved. However, the other half also claim that nature/environmental organisations are missing/should be invited.

Depending on their individual roles, actors have had considerable power to shape the initial ideas of the MAP. Besides, recent developments influence the power level of the different actors substantially. This includes recent legal changes at both national level (amendment of the national fertilizing directive) and province level (change in provincial government), findings and results of the joint project farm manure management, public pressure, etc.

Elements that were brought forward on the support of the discussions held were that everybody got the opportunity to state their opinion; everyone were taken seriously, discussions were followed till the end; and finally that unclear issues were collected and information on them was provided on the subsequent meeting.

Up to now, all institutions involved were enabled to raise their voices in reference to different questions/worries. Especially the representatives of the districts (both authorities and farmer's representatives) came up with multifaceted topics, e.g.:

- Some districts deal a lot with compost and other organic fertilizers already (small substitution potential of mineral fertilizers), while others have higher substitution potential for fertilizers but lack the experience in handling
- Topography in individual districts (hilly vs. flat/plains)
- Willingness of farmers to participate differs.

The feedback from the MAP reflected that the discussions are very complex. Generally, the province-wide concept has to be kept in mind, but at the same time regional particularities must be taken into account.

Respondents have different views on the ability to influence the priorities in the MAP. 1/3 indicate that they have the ability to influence the priorities in the MAP. Half of the respondents state that they partially have the ability, owing to the fact that they had greater influence in the beginning. Now, more local and regional actors are of greater importance. However, 10 out of 12 considers the MAP to be a successful platform for engagement. This is mainly argued because all relevant stakeholders have been engaged, meaning that a successful MAP is also about securing equality in representation in Lower Saxony.

4.4.5 Trust

The most important trust-building factors are official and informal meetings (2/3). Also transfer of knowledge is ranked as the most important trust-building factor for the work in the MAP by 1/3 of the respondents. 3/4 of the respondents indicate that nothing has contributed to weakening the trust in the MAP, while the remaining 1/4 state that mandatory agreements or official mandates are missing and that this is weakening the trust.

4.4.6 Conflicts

There has been conflicts in the MAP, and the local authorities in the MAP are quite aware of the fact they have a lot of power. (Farmers need their permission for building storage facilities etc.) There has for instance been threats to leave the MAP if their needs are not 'fully met'. 10 out of 12 have responded to the open-ended question on how conflicting priorities and differences of opinion were solved within MAP. Many of the conflicts and critical points have been solved through intensive discussions. Also, the knowledge transfer has helped by easy and prepared

presentations of agricultural expert knowledge in a way that everyone could understand. Technical points which were not clear to everybody were explained in detail. Additional information was compiled after the meeting and presented at the subsequent meeting.

4.4.7 Future sustainability of MAP

Regarding the future sustainability of the MAP, the respondents see different threats, such as:

- There is no clear legitimisation of the MAP - hence there is no (monetary) funding and no means to implement concrete measures. (The MAP does not have the mandate to agree on concrete measures, Legal restrictions designed elsewhere determine the frame)
- There were some conflicting goals, especially if (personal) interests of participants fundamentally differ. Limitations exist "at the horizon of each participant"
- In the future MAPs could be used to improve networking between agricultural actors and others.
- "MAP focusses very much on the question of manure transport, a perspective could be to further use it in the future for other well-matching topics (but this depends very much on the topic)."
- Some problems cannot be solved at the regional scale (In Lower Saxony the total amount of manure is too high).
- The economic framing conditions (e.g. prices for mineral fertilizers) are of higher importance.

4.4.8 Lessons learned

Regarding the lessons learned, four respondents indicate no lessons. The other respondents indicate a wide variety of lessons:

- MAPs are tedious work and consume a lot of time. Many participants are not aware of practical agricultural issues. It all revolves around a lack of funds.
- The worthwhileness of transporting manure from the animal intensive region in the west to the arable farming region is very limited.
- All participants are willing to deal with problems of other participants.
- Many participants miss agricultural expert knowledge.
- It is complicated to deduce measures from MAP discussions.
- MAP helps to build trust.
- The process of the MAP is very complicated and takes a lot of time. There are no quick solutions. But with patience they can be a vital component to solve the nutrient problem.
- Points of view of participants are often diverging.

4.5 MAP: DERG CATCHMENT, NORTHERN IRELAND

4.5.1 Description of MAP

The MAP of the Derg case in Northern Ireland is the 'Source to Tap' (StT) project aimed at reducing the impact of land-use on drinking water in the Derg River Catchment. This INTERREG VA funded project is led by NIWater (Northern Irish Water Utility company) and partners including AFBI, Irish Water, University of Ulster (UU), The Rivers Trust (TRT) and East Border Regions (EBR). The project will address both forestry and agriculture. However, the main focus is on mitigating losses of MCPA, sediment and DOC from agricultural land in the catchment. During the project, a farm incentive scheme will be implemented on a cross border basis and will incentivise farmers to take-up measures to mitigate MCPA and colour/turbidity arising from farm practice in the Derg Catchment.

The scheme is delivered by dedicated TRT catchment officers who are responsible for community engagement and knowledge exchange within the catchment. Improvement in water quality arising from the implementation of the farm incentive scheme is monitored and evaluated and a UKWIR cost-benefits assessment will be done. Monitoring and evaluation is carried out in two adjacent-catchments with the incentive scheme implemented (Treatment Catchment) in the Derg, while in the second catchment has no scheme activity (Control Catchment). These catchments are monitored for discharge and water quality before, during and after the implementation of the scheme.

Stakeholders are engaged in the Derg Case Study at a number of different levels:

- *The Northern Ireland Environment Agency (NIEA) and the Environmental Protection Agency (EPA)* (Republic of Ireland) have overall responsibility for the implementation of the Water Framework Directive (WFD) in the catchment and there are *regional catchment officers* who work with stakeholders on the ground. The Department of Agriculture, Environment and Rural Affairs (NI) and the Department of Agriculture, Food and the Marine (RoI) are responsible for the implementation of the Nitrates Directive Regulation and cross compliance regulations and for reporting on their implementation to the EU. NIEA & the EPA are responsible for the water quality monitoring and reporting to the EU on the WFD
- The Source To Tap (StT) project is a voluntary initiative, which will build on the existing statutory requirements of the EU Water Framework Directive, EU Nitrates Directive and EU Drinking Water Directive. The StT project is being led by NIWater and includes a consortium of stakeholders including Irish Water (Water Utility Company) AFBI (Research Organisation), The Rivers Trust (Environmental NGO) University of Ulster (Academia) and East Border Regions (Network of cross border local authorities). The StT project will be overseen by a steering committee of cross border stakeholders, such as Environmental Protection Agency, Department of Agriculture, Farmers Unions, Local Authorities, National Parks and Wildlife Services etc. (This steering committee is currently being established)
- NIWater has already implemented a voluntary catchment initiative called SCAMP through which they engage local and regional NGOs, community groups, farming groups and regional government stakeholders in the implementation of measures to improve drinking water quality in selected catchments. At national level the SCAMP Initiative links with the Water Catchment Partnership (WCP). The WCP is a forum that brings together representatives of Ulster Farmers Union, Northern Ireland Water, Northern Ireland Environment Agency, Department of Agriculture, Environment and Rural Affairs, College of Agriculture, Food and Rural Enterprise,

to discuss and coordinate activities related to the protection of drinking water in Northern Ireland, with a particular focus on pesticides.

Experiences from this MAP were collected by way of interviews. 9 individuals were interviewed: one representative of national authorities, one agricultural advisor, one researcher, and four representatives of the water supply sector. No farmers were interviewed.

As described above, the MAP has broad representation of different and relevant stakeholder groups. More than half of the respondents indicated that all relevant and required actors were part of the MAP. Representation in the MAP of the following stakeholders or organisations was called for by the respondents indicating that the MAP is incomplete: non-professional pesticide users such as homeowners; groups that might not be aware of the threat of pesticides, such as the Gaelic Athletics Association; The Forestry Service; and farmers representatives.

4.5.2 Problem identification and shared understanding

Most respondents defined the main issue facing the MAP as being to improve protection of drinking water by addressing pesticide use.

Secondary objectives were also highlighted, such as:

- Achieving better compliance with regulations on pesticides in drinking water
- To implement catchment management measures in raw water as an alternative to treatment, i.e. to tackle problem at source, rather than at abstraction
- Encourage best practice on sustainable land management or nutrients management, and facilitate landowners to manage catchment better for water quality
- Develop community engagement/involvement and raise community awareness.

The respondents all answered that there is a large degree of shared understanding of the issues; only one indicating that this is *only to some degree*.

4.5.3 Achievements

Several new insights that were due to the project were mentioned by the respondents. These relate to knowledge, awareness, stakeholder involvement and multi-actor processes.

That the project so far has led to increased knowledge and understanding was brought up by many of the respondents, such as an increased understanding of the function of water treatment works, and of pesticide use and misuse. New knowledge on pesticides' persistence and mobility in the environment, and increased understanding of temporal patterns based on monitoring was emphasised as particularly rewarding.

Many informants also emphasised the need for awareness raising, both at the national level and at the local level, to communicate that people's actions impact on their drinking water. A point was also made that generic messages do not work, and that information should be targeted to specific audiences. Some also brought up that providing information that speaks against widespread myths surrounding MCPA is important.

It is also clear in the feedback from the MAP participants that the multi-actor engagement is seen as valuable for facilitating change and understanding, but also that new thoughts on who should take part in the processes and be part of the MAP has become clear. For instance, some flagged the need to include *householders*; others that the engagement with the forestry sector is rewarding. Irish Water made it clear that these types of groups are good for relationship building, and that such opportunities don't come up much otherwise.

Lastly, there were several reflections on new insights on the multi-actor processes:

- Introduction of mitigation schemes doesn't fix the problem immediately
- Building trust takes time, but projects don't always allow for this
- One needs patience to see the results
- Achieving buy-in by local people takes time

Further, the informants highlighted several changes that have been observed in relations to their participation in these processes:

- Relationship building between partners has developed well, but it is not yet clear if community engagement has translated into longer-term changes. In particular, the improved engagement between water companies and land-owners is highlighted.
- Increased awareness (in the public mind, amongst farmers, also in non-target groups), but it is too early in the project to give definite answers on whether people have changed. One informant does however argue that there are substantial changes observed in the attitudes and behaviours of farmers in the area.
- More dedication to communication efforts, including more national and local press activity.
- There is an increased understanding of farmers' perspectives, through surveys.

Many of the informants also flagged, despite reflections above on the time-consuming processes of changing practice, that one indeed does observe better protection of drinking water supplies.

"Last two years has seen a big decrease in the number of exceedances of drinking water limits by pesticides – [this] group is making an impression"

"MCPA exceedances have been down by ~ 50 - 60% in the last 2 years"

"There is a downward trend in the number of contaminated supplies points and the number and extent of exceedances experienced"

However, some of the respondents also argued that there are no direct observations yet of the impacts of the group, and that water quality changes are still to be seen, so these achievements might not have been well communicated, or seen as novel by all.

4.5.4 Engagement process and participation

On the issues of whether the MAP participants can influence priorities within the group the picture is unclear, and the responses vary. This might relate to the discussion below on conflicts and differences of opinion. One informant pointed out that although *"everyone has their opportunity to voice their opinions, [...] it is not always possible to influence the group"*. This does not necessarily mean that there is a skewed power balance, but rather that consensus-oriented process does not work in everyone's favour.

4.5.5 Trust

The elements that most respondents found important for trust building were "Improved water quality" and "increasing the knowledge-base". Those pointing to "better understanding of other perspectives" and "informal contact" emphasised that *farmers' perspectives* and informal contact *with farmers* was particularly important.

The national level respondent pointed out that the range of expertise present in the group, which covers nearly all actors who can influence water quality from pesticides, is a trust building element

in itself. If that perspective is shared also outside the group, it can certainly be important for the legitimacy of any recommendation or results of the multi-actor process.

When it comes to what has weakened the trust in this group process, the issue of funding was raised by a few of the informants. Examples given are that farmers that believed items would be bought for them, had to buy and claim reimbursement; and that stringent financial guidelines on the project has led to slows progress on mitigation measures.

4.5.6 Conflicts

It is clear from the feedback that there are no major conflicts in the MAP, although the confrontation of different perspectives can be a challenge. There is an overall agreement that the processes in the MAP are consensus-based, as these quotes are testament to:

“The MAP operates by consensus so if no agreement on an issue is reached, we don’t proceed as a group”

“Within meetings there is talk and debate, then majority rules after everyone talks”

“Differences of opinion are talked out”

“The chairman leads the group to consensus. Conflicts have not been seen in practice”

4.5.7 Future sustainability of MAP

Some common issues are of concern for the MAP participants when it comes to challenges for future sustainability: funding, resources/commitment, impact, and external factors.

Funding

“The group lacks direct funding and relies on various agencies involved in the group”

There should be funding in place *“for the MAP to assess impacts of work and for farmers to continue to adopt new measures*

Resources/Commitment

A risk factor is staff changes within the MAP; *“Catchment engagement requires dedicated staff to be effective”*. Also, long-term engagement requires willingness of organisations to be involved. It is pointed out that it might be a challenge that there is no legal compulsion for organisations to be engage with the group, and participation is happening if there are expected benefits.

Impact

Long term engagement is also dependent on actual results from the project:

“If no positive outcome on the ground with water quality, that would be seen as a challenge to the long-term quality of the group”

Getting results might take time, which again might jeopardise the engagement processes.

“Not getting enough farmers engaged in the first place [would lead] to scheme abandonment as change is too small”. This relates to another important factor, that the catchment should be seen as a whole. There were also concerns raised with catchment engagement being a new and untraditional approach, and whether it therefore would lose momentum after some time.

External factors

Some factors outside the influence of the MAP were also mentioned, such as:

- changing national policies
- uncertainty in the agricultural sector

- new, emerging pesticides

4.5.8 Lessons learned

The lessons learned so far in the project, summarised in the following, mainly relates to the engagement process.

- Buy-in from farmers needs an inducement (carrot) as well as regulation (stick) - reward positive behaviours
- Using advertising and media outlets makes it much easier to contact farmers on the ground
- Farmers'/Interviewees' time is not paid for by the project, but if they weren't there the meetings their priorities would get lost
- It is important to spell out to farmers exactly how the funding and the scheme works from the beginning

In addition, it was also commented that water quality is a difficult issue in Ireland, more so than in many other countries, as many water supplies are surrounded by pasture. Another respondent raised the cross-border aspect as particularly interesting, as it allows to see how similar organisations have different approaches to the same problems.

4.6 MAP: OVERIJSEL, NETHERLANDS

4.6.1 Description of MAP

The case study Overijssel started in the recharge areas of 5 vulnerable drinking water abstractions in the province of Overijssel, the Netherlands and consists of 6 +1 areas today. Soils are mainly sandy soils with groundwater tables typical at 2 – 4 m-sl. Land use consists of agricultural land use (mainly dairy farming with 80% grass and 20% maize), nature and some urban areas. The measures to be implemented are focused on reduction of the nitrate and pesticide leaching towards groundwater in the recharge areas of vulnerable abstraction sites in Overijssel, at the same time improving the operational result of the farm by better nutrient management and more specific use of pesticides.

Typical nitrate concentrations in the upper phreatic groundwater at the start of the pilot were averages of 92 – 161 mgNO₃/l in maize and 64 – 86 mgNO₃/l in grassland. All groundwater abstractions show an increase in hardness of the water due to manure application in the past. In individual abstraction wells, the nitrate standard is exceeded in Herikerberg/Goor, Wierden and Archemerberg, while in Hoge Hexel nickel concentration exceeds the standard of 15 µg/l as a result of pyrite oxidation. In addition, Bromacil exceeds the standard in Wierden and Bentazone exceeds 75% of the standard in Herikerberg/Goor regularly in individual abstraction wells. In the mixed water, standards are not exceeded. In addition, farmers from the abstraction Espelose Broek are involved in the project. This abstraction site has no issues with nitrate, only with pesticides.

In 2011 the province of Overijssel and the water company Vitens initiated the 'Farmers for Drinking Water' project and continue to fund the project. The consortium have taken responsibility for leading on a number of aspects of the project (e.g. RHDHV: overall management, groundwater quality, WFD; WUR: agricultural advice, prototyping farm management; Countus: agricultural

accountants; and Stimuland: regional rural development & communication) Farmers who owned land parcels in recharge areas of 5 vulnerable abstractions were invited to regional meetings where field demo's also other farmers (neighbours, ...) as well as agricultural contractors, municipalities and regional press (to literally 'spread the news' regarding groundwater & farmer friendly measures) have been invited to facilitate the implementation of measures which are believed to be relevant measures for both the farmer and the groundwater quality. The objectives of the case study are:

- 50 mgNO₃/l in the upper phreatic groundwater below agricultural area.
- 0,1 µg/l pesticides in the upper phreatic groundwater below agricultural area.

Targets for agricultural management of the participating farmers are:

- N-soil surplus of max. 80-100 kgN/ha calculated by the Annual Nutrient Cycle Assessment (ANCA).
- Max. 100 Environmental Impact Points (EIP) of individual pesticides and max 500 EIP for the total of all pesticides used.

Since 2017 the pilot Farmers for Drinking Water is part of a larger regional project (Fertile Cycle Overijssel - Vruchtbare Kringloop Overijssel - VKO). In this project, additional financing stakeholders are involved: Water boards (Drents Overijsselse Delta, Vechtstromen and Rijn&IJssel), farmers lobby organization LTO, cattle feed companies (Agrifirm and ForFarmers) and financial institutes like the most common agricultural bank (Rabobank). These regional stakeholders of VKO are not particularly active in the pilot Overijssel, although on the other hand the implementation of measures, knowledge & experience from the pilot Overijssel can now more be used in the bigger regional project because all relevant stakeholders + project structure is available.

In 2019 the project is extended within the framework of the 6th Nitrate Action Programme. The project consists of more vulnerable abstraction sites (Archemerberg, Herikerberg/Goor, Holten, Hoge Hexel, Wierden and Manderveen + Espelose Broek) and more farmers (approximately 80 dairy farmers) and approximately 10 growers. As a result, DLV and HLB also joined the project to advise the farmers and CLM to identify measures to reduce the risks of pesticides.

Respondents mention various reasons to join the MAP:

- Advisors mention the input of knowledge or that Farmers for Drinking Water is a measure/project following the assessment of the risks of the individual drinking water abstraction sites in Overijssel.
- Farmers mention that they have been invited to participate or mention that they prefer to look for common ways to solve the issue rather than being confronted with new and additional rules and regulations.
- The agricultural lobby organisation mentions their position as a connecting link between farmers and policy.

The questions in the survey were answered by 10 respondents, among them farmers [4], agricultural advisers [5] and the agricultural lobby organization [1]. The province of Overijssel and the water company Vitens as main stakeholders did not respond.

4.6.2 Problem identification and shared understanding

There is broad consensus with the stakeholders about the central problem: improving groundwater quality (nitrate < 50 NO₃/l) by improving the efficiency of the use of nutrients through a mutual gain approach. One of the respondents mentioned the element of integrating theory and practice as an approach to meet and resolve this issue.

Respondents are unanimous in the way they flag the extent of the shared understanding of the participants in the MAP.

4.6.3 Achievements

The stakeholders consider the MAP successful in addressing the issue: 5 respondents mention 'to a certain extent successful', 4 respondents mention 'successful' and 1 respondent mention 'very successful'. The concern of the stakeholders indicating 'to a certain extent successful' relates to the uncertainty in meeting the standards in the groundwater: 'Standards can easily be set, but it is not so easy to meet these standards'. The respondents mention different types of successes:

- The fact that the management target of farmers - N-soil surplus of max. 80-100 kgN/ha calculated by the Annual Nutrient Cycle Assessment (ANCA) – is met, but the nitrate concentration is still above the limit.
- The fact that different stakeholders are sitting together to discuss the issue and strategies to meet the standards.

Stakeholders mention various new insights gained through participation in the MAP:

- 'I am feeding cows for years now, but feeding the soil is new for me'.
- The willingness of farmers to discuss and improve their management.
- The fact that farmers and their points of view are taken seriously. In the MAP stakeholders are 'talking with farmers rather than talking about farmers'.
- Knowledge and trust are essential to identify measures and to help farmers implementing them.

The changes observed by the respondents are directly related to these new insights:

- The willingness of farmers to participate in a MAP to meet groundwater standards and awareness to improve groundwater as drinking water resource.
- An increased awareness in farm and soil management regarding nutrients.
- The MAP enhances the contact of farmers with the province and water company. Farmers are increasingly using the project to discuss other issues. So not only farm management but also engagement has developed over time.
- The exchange of knowledge and experience in the MAP helps farmers with practical issues in their farm management: to grow better catch crops, better valuation of cow feed, lower N-content manure by changes in feed.

Overall, new insights and changes observed by the respondents consist both of the functioning of the MAP as a trust-building platform and an opportunity to discuss different points of view and the functioning of the MAP as platform to exchange knowledge and experiences.

4.6.4 Engagement process and participation

There is broad consensus with the stakeholders that they can influence the priorities in the MAP – at least to a certain extent. They also consider the MAP to be a successful platform for engagement. As reasons for the MAP to be successful, respondents mention:

- The MAP serves as a platform to discuss different viewpoints, understand different stakeholders and enhance awareness of the impact of agricultural management in relation to groundwater quality issues.
- The MAP creates a network in which people can find each other more easily – and farmers use this MAP to also discuss other issues and potential solutions such as the drought-issue.
- The MAP contributes to building trust and exchange of knowledge and experiences.

4.6.5 Trust

The stakeholders mention a wide variety of trust-building factors:

- Understanding each other's viewpoints [4]
- Exchange of knowledge and experiences [2]
- Informal contact [1]
- Other [3]

Half of the stakeholders do not mention anything that has weakened the trust in the MAP. The other half of the stakeholders mention two factors:

- Press releases about the impact of agriculture on water quality by the water company or related organisations without mentioning the fact that Farmers for Drinking Water is the exception when it comes to that impact.
- Farmers mention the fact that every new tender procedure may result in a new staff of agricultural advisors. And history has shown that some are better than others. The current staff is good.

4.6.6 Conflicts

There is broad consensus with the stakeholders that conflicts are solved either by discussions as part of general meetings or as separately organized meetings with the stakeholders concerned. One of the farmers mentions that it takes a lot more time to recover from conflicts regarding a trust-issue, i.e. press releases, than regular issues regarding differences in points of view.

4.6.7 Future sustainability of MAP

Only one respondent doesn't see any limiting factors for the long-term sustainability of the MAP. The reasons mentioned by the other respondents, are:

- If, despite of all effort, the standards are not met and rules and regulations are tightened, everything has been in vain [6].
- Lack of structural measures and financial incentives [1].
- The measures are voluntary and the gain for the farmer is limited. This is a threat for the long-term sustainability of the MAP.

4.6.8 Lessons learned

Regarding the lessons learned, respondents indicate a wide variety of lessons learned about the functioning of the MAP:

- Have trust and give trust – based on equality (and don't get too annoyed by press releases).
- Listen to each other and show the perspective of farm management in solving this issue. A big part of the Farmers for drinking water is to make farmers understand the struggles that the water companies are facing, but also making the province and water company understand the issues farmers face. Together they can come up with solutions.
- Get started in concrete areas to solve real world problems together with farmers – and bring theory to practice and use of practical experience to refine theory!
- Both the approach (MGA) and individual advise on farm management in combination with economic impact on financial results proved very successful. However, voluntary approach & measures may not be enough to meet the standards.

But also lessons regarding effective measures to reduce nitrate leaching or improve plant uptake are mentioned.

4.7 MAP: NOORD-BRABANT, NETHERLANDS

4.7.1 Description of MAP

The case study region is located in the south of The Netherlands, in the province of Noord-Brabant. This province has an area of 4.919 km² and it is populated by 2,48 million inhabitants. The northern border follows the Meuse (Maas) river westward to its mouth in the Hollands Diep strait, part of the Rhine–Meuse–Scheldt delta. The province of Brabant is important for the Dutch drinking water supply. Drinking water is abstracted from groundwater at 39 locations in the province with an annual production of 180 million m³. In addition, Brabant is part of the catchment area of the river Meuse. The surface water of the Meuse is a drinking water resource for 3 million people in the western part of the Netherlands. The abstraction sites for drinking water in Brabant vary in depth and vulnerability. The shallow and most vulnerable sites are surrounded by groundwater protection areas.

The case study focuses on pesticide reduction of actual and future drinking water resources considering the national and European regulations and laws. The monitoring program carried out by Brabant Water and the provincial authorities shows that the use of pesticides is a threat to the groundwater in 11 of the 39 abstraction areas. Pesticides are used in agriculture, but also in urban areas. The strategy to produce high quality tap water revolves around prevention but, if necessary, also water purification may be applied.

The province of Noord-Brabant, water company Brabant Water and the water boards (Waterschap Brabantse Delta, Aa en Maas, de Dommel en Rivierenland) initiated and are funding the project. The agricultural organization (ZLTO) is contributing to the project in-kind by facilitating communication to their members and offering links to agricultural education. Until 2011 the consortium (CLM: overall management and communication, Delphy: agricultural advice, EcoConsult: advise to greenkeepers and gardeners) invited farmers and contractors, discussing new developments and giving advice through group meetings and individual visits. Farmers – or their contractors – were selected if they had parcels of land in recharge areas of 11 vulnerable groundwater abstractions. From 2012 growers of potatoes, strawberry, leek, green beans, ornamentals and contractors from the whole of Noord-Brabant were invited to participate in the project. This was driven by the desire of the water boards to broaden the focus towards both ground and surface water and by the desire of ZLTO to make ‘mutual gain’ measures more widely available to growers. Pesticide Environmental Impact Points for surface water and groundwater are used to create awareness with farmers and to monitor project successes.

The questions in the survey were answered by 10 respondents, among them the main stakeholders: farmers, the water company, the water board, agricultural advisers and the province.

4.7.2 Problem identification and shared understanding

There is broad consensus with the stakeholders about the problem identification: ‘To reduce the impact of the use of pesticides on groundwater and surface water’. However, some respondents

also mention elements like 'show that less environmental impact is possible by using pesticides in a responsible way' and 'getting all stakeholders aligned to discuss sometimes controversial ways of working and initiatives'.

Despite the broad consensus about the problem identification, 3 respondents indicate merely 'some extent' of shared understanding. The comment shows that they are not referring to stakeholders within the project, but to other farmers and advisors, outside of the project.

4.7.3 Achievements

There is a general sentiment amongst the respondents that the MAP is successful or very successful in addressing this issue. Respondents mention different reasons for the MAP being successful:

- The project has shown that using less pesticides is possible in some important crops. However, not in all crops.
- The project is based on voluntary engagement, so continuity is an issue considering the available budget.
- The project has i) a clear objective ii) quantified by Environmental Impact Points and iii) individual advice of the grower.
- The MAP uses a yearly benchmark of the EIP-scores of the farm compared to other farms.
- Stakeholders listen to each other and the MAP serves as basis for future decisions.
- The MAP is used to share the results and increase the awareness of growers.
- Growers are free to choose the measures that fit in their management.
- Growers are challenged regarding their craftsmanship and skills.

All respondents have observed changes as result of activities in the MAP. These changes are:

- Increased awareness of the impact of agricultural management for the environment.
- Increased awareness regarding the need for cooperation with all partners impacting water.
- Better contact with other stakeholders in the MAP

Nine of the respondents find the project to be successful to very successful, and have gained new insights and observed changes due to the project:

- Government-related members: visualization of the environmental impact is very important for the farmers, as well as insights into the complexity of pesticide use for other MAP members. But also, that a project based on voluntary engagement has its limitations.
- Including the agricultural supply chain in the project and MAP – buyers of the crops – is important but challenging.
- Farmers: success is due to the advice and demonstration of new measures as well as insights in the complexity of pesticide regulations.

The one exception was a farmer who found that, in the last few years, the project has produced fewer innovative measures and has been less visible.

4.7.4 Engagement process and participation

Half of the respondents indicate that all MAP members are equally involved and important, the other respondents found all equally involved, but not all equally important. The latter responded that not all crops have a high environmental impact or are too small to make a difference.

There is broad consensus with the stakeholders that they can influence the priorities in the MAP – at least to a certain extent. They also consider the MAP to be a successful platform for engagement. As reasons for the MAP to be successful, respondents mention:

- The MAP serves as platform to discuss different viewpoints and understand different stakeholders.
- The MAP creates a network in which people can find each other more easily.
- The MAP contributes to building trust and knowledge exchange.

4.7.5 Trust

The most important trust-building factor is the mutual understanding between stakeholders. In addition, respondents mention some additional trust-building factors:

- Regular information and feed-back regarding progress and results, but also regarding challenges.
- For the growers, confidential use of their data is crucial.
- The MAP must be a 'safe environment' in which stakeholders can express their doubts.
- Willingness to change.

4.7.6 Conflicts

Conflicting priorities and differences in opinion are solved by discussing these issues. Respondents stress the fact that the interests are not opposed – all aim for clean water – so the issues are solved by sharing insights and viewpoints. And if necessary, by a differentiation in the financial contribution of the different stakeholders.

4.7.7 Future sustainability of MAP

Only a minority of the respondents don't see any limiting factors for the long-term sustainability of the MAP. The reason mentioned is that the new way of working is fully implemented, and the potential risks can be managed. However, most respondents mention the need for continuous maintenance of the MAP. Growers are part of a very complex arena consisting of the requirements in their supply chain, environmental issues, advisors of pesticide firms approaching them to sell pesticides, etc. They consider future investments in the Clean Water approach by all partners in the water chain necessary to form a counterbalance.

4.7.8 Lessons learned

Regarding the lessons learned, respondents indicate a wide variety of lessons:

- A long project duration for lasting relations and partnerships between the members. Building trust over time is very important.
- Make clear to the farmers what their own environmental impact is.
- Comparing and challenging farmers by benchmarking works is very stimulating.
- Listen to each other. A big part of the Clean Water approach is to make farmers understand the struggles that the water companies are facing, but also making governments and water agencies understand the issues farmers face. Together they can come up with solutions.
- Working and communicating with more than just the farmers, like citizens, local companies and local governments.

4.8 MAP: VANSJØ/MORSA, NORWAY

4.8.1 Description of MAP

The Vansjø catchment is a lake system in south-eastern Norway. Lake Vansjø is used as a drinking water source. The lake Vansjø catchment has a long history of collaboration between actors going back to the 1970s, when poor water quality and signs of eutrophication were first monitored and recorded. In 1999 the Morsa project was established to improve the poor water quality in the watershed. A bad episode of blue-green algae development in the early 2000s further intensified the work to find solutions to the problems, and triggered action that engaged politicians from the national to the local level. Economic incentives using agricultural production funds for reducing the impact of agriculture on water quality, combined with legal requirements for farmers to reduce agricultural run-off to water bodies are used, as well as “soft incentives” such information campaigns including such as advisory farm visits, collaboration with Farmer organisations to present information, and information stands in the municipality.

Forms of collaboration between inhabitants, farmers, and local, regional and sectoral authorities have been ongoing for over two decades, although collaboration primarily has been between authorities at different levels and municipalities (Stokke 2006, Naustdalslid 2015). In addition, many research projects that have focused on the area and their monitoring and research activities have contributed toward identifying and documenting sources of pollution, which have helped to create targeted measures. While the water quality has improved over the last couple of decades, nitrate and phosphorus pollution continue to challenge water quality. Today, Vansjø has high concentrations of nutrients and algae blooms are likely to happen, as it did in summer of 2019. Climate change is moreover likely to aggravate the environmental status of the lake.

The current MAP is formally constructed of a sub-district water board consisting of mayors from 11 municipalities, politicians from the regional county organization and sectoral national authorities, run by an executive committee consisting of the chair, two elected representatives from the board and a secretary. There are also four thematic working groups with representatives from the municipalities: sewage, agriculture, environmental monitoring and the coastal area group. The thematic working groups consist of representatives from the municipalities and the county governors and assess and evaluate measures within their field. They meet biannually and provide advice on regional regulations and other relevant topics, while thematic sub-committees (on agriculture, climate adaptation, and wastewater management) meet 3-4 times a year.

Important research questions for this MAP are:

- How do multi actor platforms on water issues function over time?
- What factors influence the level of engagement and trust to enable collective action and collaboration?

For the MAP analysis a survey was distributed to municipalities (political and administrative personnel), regional counties, sectoral state authorities and other relevant actors. In total, 29 responded with the majority (70 %) working at the municipal administration. Around 45 % of the respondents had worked with the issue for 10 years or longer, underlining the long-standing collaboration in the area. In addition, participant observation of meetings and a number of interviews (N=10) has also informed the analyses.

4.8.2 Problem identification and shared understanding

The majority of informants (13) stated that improving *water quality* in a general sense is what the MAP is set up to resolve, represented by the statement “*ensure a good water quality in the whole*

watershed, and all the measures on land and in water that can enable this". Related to this broad definition were categories related to nutrient run-off from agriculture and sewage (2 respondents), and to reduce run-off from agriculture (3). In these responses, agriculture-related problems that the MAP can solve include reducing soil erosion of cultivated areas to streams and lakes and thereby reduce the phosphorus concentration in the lake. A smaller set of answers focused on the organizational aspects (6 responses) that the MAP, for instance, contributes to the ability to coordinate responsible parties, to steer the municipalities in the right direction and inspire them to prioritize the work.

A shared understanding of what the problems at hand are in Morsa/Vansjø is flagged as an important factor in what has been possible to achieve over the last 20 years (see Stokke 2006, Naustdalslid 2015). In our survey, a common understanding and awareness of the problems is also highlighted as important (4 respondents). This relates to knowledge generation for devising and implementing effective measures (6 respondents). Monitoring efforts have been ongoing for several decades and knowledge-generation has solved some disputes. For example, in the 2000s there was a hypothesis that the lake was self-fertilizing but has been refuted by research which also alleviated conflicts and resistance toward measures. In our survey, 55 % of the respondents stated that the involved actors to a large extent have a common understand on the problems in Morsa (21 % said to some extent while 14 % stated to a very large extent).

4.8.3 Achievements

Our survey indicate that the MAP has contributed the most to solve the problems related to dispersed sewers (59% strongly agreed), followed by agricultural runoff (48% strongly agreed) and municipal sewers (39%). When asked to elaborate on what they believed has been the most important for reaching these accomplishments, collaboration and dialogue appears as the most common explanatory factor. Collaboration is described as taking place between different municipalities, administrative units, disciplines, farmers and political parties. As the following response indicate there has been several surrounding factors such as a salient environmental problem and supportive politicians and administrative leaders, as well as knowledge and funds: *"The collaboration started with a visible problem related to water quality that was important for the inhabitants- knowledge-based management from the start- well-functioning thematic groups, trust within the sub-river district/ political leadership, financial means for a project leader, financial means to gather knowledge and implement projects"*. The importance of proven and efficient measures that show results after implementation is also highlighted.

4.8.4 Engagement process and participation

The organization of the MAP, with political representation on the board, a secretariat and the thematic groups that can be reorganized depending on the needs in the sub-river basin, has been cited as a key to its accomplishments. Previous studies have emphasized that the organization along with a strong leadership, has created a sense of community and joint responsibility over time, and the provision of knowledge has contributed to a shared understanding of the problems at hand. Through the organization of thematic groups, such as the agricultural group, the farmers' association and civil society organizations have been allowed an observatory role. However, engagement of farmers has been carried out through a close relationship between agricultural consultants working for the municipalities, visiting farms and supervising certain measures. There has been a close dialogue with the farmers' associations and farmers in the river basin have been offered environmental advice, for example related to how to reduce nitrogen pollution of water sources for free. Such arrangements are informal, and it has been suggested that the means for farmers and other organizations to formally participate are constrained and should be improved. There are also questions to be asked about the flow of information from the organisation and its thematic groups back to the farmers. In the survey, we asked what organizations could influence and set the agenda for the work in the watershed. The thematic groups were rated the highest with

19%, followed by the municipal administration at 13 %, the Morsa secretariat at 10 % and the County Governor's environmental section (10%). Given that the thematic groups are considered the most important organisation for setting priorities in the watershed, more active participation of a broader group of actors such as farmers and the general public may be desirable. In the survey 72% answered that all relevant actors in Morsa are involved, while 28% answered no. Interestingly, only 52% said that they believed that today's organization allowed for sufficient participation of all actors, whilst 24 % answered that more participation should be encouraged.

4.8.5 Trust

We asked the respondents about trust and trust building measures in the watershed. While a survey may be not be the best means of capturing trust, the results show that the Morsa thematic groups (79%), Morsa secretariat (76%), Morsa VO (52%) and the County governors' agricultural sector (52%) received the most trust from respondents. On the other hand, the County Governor (24%), the Agricultural Agency (21%), Environment and recreation organizations (21%) were stated to be trusted to a lesser degree. On the question of whether the respondents' trust in the actors in Morsa had changed over time, a decreased trust in national actors (17%) and regional actors (10%) is expressed in the survey, whilst increased trust is assigned to local actors (24%) and regional actors (21%). We are unsure whether the regional actors in this case represent similar organizations or if they are different. The most important factors for building trust were stated to be: organization in thematic groups (72 %), increased knowledge level (66%), improved water quality/ aquatic environment.

4.8.6 Conflicts

No conflicts are reported in the survey carried out in this MAP. However, an oft-cited episode in 2013 within the larger river basin is worth mentioning. At that time, national authorities overruled a locally and regionally negotiated agreement on ploughing restrictions to reduce run-off to surface waters (Hanssen et al. 2014, Sundnes et al. 2017). This episode acts as an important reference-point for trust building between actors at different level, and for the conflicting goals that at times surface in these multi-level governance arrangements, at this instance a situation where political priorities of increased agricultural production were pitted against concerns for water quality.

4.8.7 Future sustainability of MAP

Given that the MAP has existed for several decades in various forms, it is pertinent to ask what the MAP may look like in the future and if it in its current form and organization will succeed in improving the water quality. Out of the respondents 38% believed that the existing plans and measures would maintain/improve status quo to some extent, the same number of respondents (38%) believed that it would do so to a large extent and 10% to a very large extent. The long-term challenges related to viability were stated as following:

- political prioritization locally (55%),
- political prioritization nationally (52%)
- financing (45%)
- conflict of interests between sectors (45%)
- political prioritization regionally (38%)
- municipal participation (38%)
- public engagement (21%)
- lack of visible results (17%)

4.8.8 Lessons learned

The Morsa sub-district water board, that constitutes the MAP, represents an arena for information exchange among local authorities and regional authorities and farmers. However, the majority of the farmer community does not necessarily get access to the information shared at meetings, and activities to target information-sharing to involved stakeholders are needed.

Whether this board functions as an active or passive arena for multi-actor engagement is to a large extent dependant on financial support through national structures to enable facilitation.

4.9 MAP: BAIXO MONDEGO, PORTUGAL

4.9.1 Description of MAP

The Portuguese MAP concerns the Baixo Mondego region, which includes the downstream of Mondego basin, and a small part of the downstream of the Vouga basin. Most of the drinking water comes from groundwater extracted near the Mondego and Vouga Rivers, as they leave mountain areas and before entering the plains. These plains are intensively irrigated in both cases. A significant part of the population living from agriculture explore the groundwater aquifers for irrigation and in some cases as drinking water. Both study sites are located at the coastal area of the Portuguese Central Region, and belong to the same regional water authority, although belonging to different Inter-Municipal Communities (Coimbra and Aveiro). A recent study states that almost half of the aquifers monitored in Portugal presented signs of water pollution, derived mainly from arable farming and livestock husbandry (ZERO 2017).

The main problem area in focus is the excess of nutrients added to the soils, since manure and wastewater sludge are increasingly being added to the soil as fertilizers. The poor practices locally associated with intensive husbandry also contaminates both aquifers and superficial water bodies. For this reason, about 42% of the aquifers in the country have nitrates concentration in excess of nitrates standards. In these study regions, some surface and ground-water bodies seasonally exceed the limits of several pollutants for drinking water. In those cases, the surrounding farms see their access to subsidies reduced.

The participant in the MAP are:

- the national environment/planning authority (EA).
- the basin water authority, that works also as regional environment authority.
- The regional agriculture authority (DRAP).
- The regional planning authority (CCDRC).
- The farmers' associations (that also work as professional advisors/consultants and are responsible for the selling and control of pesticides) – we included the “Cooperativas Agrícolas of Coimbra and of Montemor-o-Velho” which cover nearly all the case study area
- Farmers.

Survey responses were received from representatives from most of the stakeholder groups including national and regional authorities, waterworks, farmers, and academia; 6 respondents in total.

According to one of the respondents at national level, the MAP emerged from the need to find a common platform for the dissemination and transfer of knowledge among the various actors in the area, specifically for decision-making support based on holistic and integrated views. A general response is that the group was put together based on their knowledge about the local context and

important stakeholders related to water and agriculture. All the survey respondents of the MAP have participated for more than 5 yrs.

No stakeholders are considered missing from the MAP.

4.9.2 Problem identification and shared understanding

There is a large degree of agreement in terms of what the main issue is for which the MAP is set up to resolve. Most respondents focus on *changing agriculture practices* in order to *improve the water quality*, with some variation in emphasis on the two elements. This is also reflected in the question of whether the MAP participants have a shared understanding of the issue at hand, where the responses range from “*To some extent*” [4] to “*To a large extent*” [2]. One respondent highlights dissemination for stakeholders in the agricultural sector as important, another puts emphasis on creating conditions for developing the circular economy in the agricultural sector. Despite the long-lasting engagement by all respondents in these processes one of them frankly responded “I’m not sure yet” to the question of what the main issue is.

4.9.3 Achievements

There is a general sentiment amongst the respondents that the MAP has only to *some* or *limited extent* been successful in addressing this issue.

One respondent questions the willingness of farmers to follow advice and information provided to change their practices. Another respondent makes the point that interventions like this one, where the aim is to change farming practices through training, will take time, and that one will only have results in the next generation. It was also pointed out that some of the necessary measures identified to reach the goals would go beyond the MAP intervention scale, and would require technical and financial conditions, which may not be available.

On the issue of *new insights* gained during the course of the project, most focused on increased knowledge; either of farm management and current agricultural practices in Baixo Mondego, of the circular economy, or the current state of groundwater quality for some agricultural pollutants. The farmer pointed out the benefits, through dissemination of the FAIRWAY project results, of knowledge about technical innovation for fertilizer application management.

Only minimal results in terms of changes to agricultural practices have been observed by the respondents so far. Greater interaction between actors was put forward as an important achievement, as well as increased knowledge of the variability of opinions about the issue.

4.9.4 Engagement process and participation

The respondents feel only to some or to a limited extent able to influence the priorities of the MAP. This can be interpreted as a skewed power balance within the MAP or as an indication that the priorities are already set.

4.9.5 Trust

All the listed factors in the survey have been flagged as important for building trust

- Increased knowledge-base [4]
- Improved water quality [5]
- Better understanding of other points of view [3]
- Informal contact [5]

One informant pointed out that there should be more activity in the MAP by way of formal meetings, which in turn would lead to people taking this group and its importance more seriously.

4.9.6 Conflicts

There seem to be a low level of conflict in the MAP. Most respondents emphasise that differences are solved through open dialogue and informal meetings and have a focus on *improving water quality* as a common goal. Or as the farmer put it: “*differences are solved with a great sense of agrarian consensus*”.

4.9.7 Future sustainability of MAP

Although there seems to be a general consensus of the core issue on which the MAP is focused, namely on changing agriculture practices in order to improve the water quality, the lack of a common goal was raised by several informants as a challenge for the future sustainability of the MAP. While one respondent was concerned with the possible failure to reach the proposed goal for Baixo Mondego, another respondent called for a realistic and well-defined main goal. One respondent raised the unity between the key actors as a possible future concern: another the need for continued activity and stakeholder engagement.

4.9.8 Lessons learned

A few of the informants had little to report on lessons learned so far in the MAP process. Others brought forward the importance of the MAP for dialogue, for sharing of different perspectives and for good co-operation between key actors, as necessary for common understanding and to set joint strategies for problem-solving.

4.10 MAP: DRAVSKO POLJE, SLOVENIA

4.10.1 Description of MAP

Dravsko polje is an alluvial plain of the river Drava, in north-eastern Slovenia. It covers 293 km² with altitudes between 205 to 364 m.a.s.l. The area is administratively divided among twelve municipalities each one with their individual rights and responsibilities in managing land use policy and wastewaters. As water is a resource of national importance it is regulated by the state. The study area includes two decrees on water protection zones (WPZ), one for the northern and one for the southern part.

The area is suitable for intensive agricultural production (intensive arable and livestock), due to the favourable climate, flat relief, agricultural holdings structure and the size of land parcels. The area under water protection regulations cover 68 drinking water extraction points in 6 water supply systems. Average annual extraction is approximately 3.5 Mm³/year which is distributed to the cities of Maribor and Ptuj and small and medium size villages. The total number of inhabitants relying on drinking water from this area is approximately 130,000. In the area there are two regulations on water protection areas, which protect the aquifer as the primary source of drinking water. Water companies have to mix water from shallow and deep wells to reach an acceptable quality of tap water.

To discuss and solve the issue of agricultural impact on groundwater quality, all relevant stakeholders are present in the MAP, the Clean Drinking Water Partnership:

Farmers: Joined in the civil initiative Dravsko polje. They all work on a voluntary basis and they have agricultural land in the water protection zone, so they are very involved as one of the main polluters. Farmers will be involved developing advising for application of fertilizers and pesticides.

Agricultural Companies: They hire land from state (Farmland and Forest Fund of RS). They are quieter and do not publicly debate the problems.

Agricultural advisers: Chamber for Agriculture and Forestry. A professional organization run by farmers and agricultural companies and partly financed by government. Agricultural advisers are helping farmers to farm in accordance with the demands stated in the legislation.

Drinking water suppliers: Water Supply Company Maribor and Water Supply Company Ptuj are professionally organized companies. These companies provide payments to the farmers which are farming in the water protected zones and also assure data for monitoring.

Governmental organisations: The Ministry of Environment and Spatial Planning (MESP), Slovenian Environmental Agency (SEA), Slovenian Water Agency (SWA), Ministry of Agriculture, Forestry and Food (MAFF), Farmland and Forest Found of RS (FFF) are involved because they are responsible for the legislation for water protection zones. Their aim is to propose efficient legislation.

To present the MAP idea to key farmers, an annual workshop was held for farmers in water protection zones whilst celebrating World Water Day (22nd of March 2018). The workshop was attended by 26 farmers from the area.

The next meeting (11th May 2018) was organized for all other key stakeholders (Ministry of environment and spatial planning, Ministry of Agriculture, Water companies, agricultural advisers, municipalities). The meeting was organized to receive their feedback on the idea and essential topics that would need to be solved in the coming years. The main reason for the meeting was to reduce the tensions and facilitate first-hand exchange of information between farmers and public bodies. We decided that the MAP would be called "Partnerstvo za čisto pitno vodo" - "Clean Drinking Water Partnership". We agreed that the group should not exceed 15 members. By creating a smaller group, we want to give an opportunity for key stakeholders to express their concerns and to be heard, that problems and solutions can be explained to them, and that they make decisions jointly. The stakeholders represent different interest (state, municipalities, public companies, farms, agricultural enterprises) whose goal is to integrate the solution of the problem in question, which relates to the relationship between the provision of clean drinking water and the economic performance of agriculture. In doing so, they jointly support and defend the adopted decision.

The MAP was established less than 2 years ago, although activities in the area have been running for a much longer period. Most stakeholders were selected and invited as part of the FAIRWAY project.

The questions in the survey were answered by 10 respondents.

4.10.2 Problem identification

There is broad consensus with the stakeholders about the problem identification: 'The main goal is to solve the problems of farming in the water protection buffer zones, in relation to discharges into drinking water'. Despite the broad consensus about the problem identification, respondents indicate the level of shared understanding between 'some extent' (60%) and 'large extent' (40%).

4.10.3 Achievements

Most respondents (60%) consider the MAP to some extent successful in addressing the issue. A minority consider the MAP to a large (20%) or a limited (20%) extent successful. Regarding the *large extent*, it was mentioned that farmers can adapt to water safety regimes with positive constructive ideas or measures. While regarding the limiting extent it was mentioned that no funds for new technology are available or that stakeholders can only make a limited contribution to solve the issue.

New insights consist of the fact that the MAP contributes to improvements in communication between stakeholders (50%). But participation in the FAIRWAY project also contributed to wider insight into the situation in other countries (20%) and information regarding certain measures and subsidies (10%). Two respondents have not gained any new insights yet.

The respondents have different views on the changes observed as a result of the activities in the MAP. Half of the respondents indicate that there are no changes yet, just talking. Three of these respondents are farmers with a focus on implementing new measures, farming practices, techniques, decision support tools etc. Half of the respondents indicate that the major change is that all stakeholders are sitting together addressing a common issue to find a common solution. These respondents are representatives from water works and from national and local authorities and agricultural advisors.

4.10.4 Engagement process and participation

Respondents are unanimous that all actors relevant for resolving the issue are involved in the MAP.

Respondents have different views on their ability to influence the priorities in the MAP. The respondent from the national level indicated a large ability while others, especially the farmers, indicate no ability (20%) to influence the priorities. Most respondents indicate that they are able to influence the priorities to some extent (30%) or to a limited extent (40%). This can be interpreted as a skewed power balance within the MAP or as an indication that the priorities are already set.

Most respondents (60%) consider the MAP to be to some extent a successful platform for engagement. These respondents consist of farmers and representatives from the municipality, private sector and water companies. Important for the success of the MAP is the extent to which the conclusions of the partnership are considered by the decision makers. The respondent considering the MAP as being of a limited success, gives the same explanation. So, the MAP as a platform for engagement is considered successful, but the mandate of the MAP and the impact of the conclusions of the MAP in solving the real-world problem is valued differently by the different respondents.

4.10.5 Trust

The most important trust-building factors are formal meetings because these meetings contribute to a better understanding. The respondents mention two types of better understanding, i.e., better understanding each other's points of view and better understanding of the water quality.

4.10.6 Conflicts

Respondents unanimously indicate that issues – not necessarily conflicts – are solved by debates and discussions.

4.10.7 Future sustainability of MAP

Regarding the future sustainability of the MAP, only two respondents indicate that there are no limits so far. The other respondents see different threats for the future sustainability. Reasons mentioned are:

- People within administrations are changing positions too quickly.
- Without the MAP, there is no good connectivity between stakeholders.
- Misunderstanding by decision makers of the importance of problems.
- If the ministries fail to present the platform's conclusions in a timely and professional manner.
- If the expert solutions are not considered by decision makers.
- If the issue is politicized.
- Poor cooperation from government agencies and ministries.

So, the MAP contributed to a better understanding of the different points of view of the various stakeholders and water quality issues. However, future sustainability of the MAP is very much dependent on the ability, ambition and possibility of esp. authorities (administration and government) to sustain the trust and common understanding. Not only as an organization, also in person.

4.10.8 Lessons learned

Regarding the lessons learned, four respondents indicate no lessons. The other respondents indicate a wide variety of lessons:

- It further strengthened my thinking about the importance of groundwater governance, and I received some practical knowledge from abroad.
- It all revolves around a lack of funds.
- The measures so far must be improved.
- Water is precious. One needs to know that it costs something to improve water quality. Farmers complain that there is little success and no results are visible. More initiative is needed from the government, farmers are trying their best already.
- Good listening, different opinions, presentation of arguments and as many formal meetings as possible are important to strengthen the common understanding of the issue and to create conceptual solutions.
- To understand the work and views of other stakeholders is of great importance for a global insight into the issues the project addresses.

A main lesson learned is the importance of formal meetings as a trust-building vehicle as these meetings contribute to a better understanding.

5. OVERARCHING ANALYSES AND DISCUSSION

In the following section, we discuss the overall findings of the functioning of the multi-actor platforms in the FAIRWAY project in light of the framework presented initially on the dimensions of engagement.

5.1 DIMENSIONS OF ENGAGEMENT

Arenas

A wide spectrum of actors are present in the different engagement platforms. The participants originate from different sectors (farmers, drinking water companies, water boards, municipalities, provinces, ministries, advisors, universities, etc.), but also from different levels of authority and decision-making. The MAPs are by design multi-actor, multi-sector and multi-level platforms. Participants, across the board, indicate that this considerably adds to the extent to which the MAPs are successful platforms for engagement.

The importance of getting relevant actors together as early in the process as possible has been highlighted. In some of the MAPs it is, however, clear that not all relevant actors are taking part, either because of different priorities, lack of resources, or that they for different reasons have not been invited or included in the processes. There are also examples of issues being so contested that central actors are not able to sit around the same table and discuss the issues at hand. However, there are also instances where the goals of the MAPs might have broadened or changed, making new actors relevant during the process, exemplified with the Anglian Region case.

Synergies

We observe many instances where the multi-actor processes are considered to have an added value, held against a situation whereby each and every actor working for their individual goals separately. There is a broad consensus that the MAPs function well as platforms for exchange of opinions and ideas, and for sharing information and knowledge. This comes through clearly in the way the MAPs are successful in creating a common understanding amongst actors. This relates both to increasing the science- and experience-based knowledge base of the group, and to the growing understanding and respect of other actors' positions and arguments. One of the MAP participants explains how the involved farmers not only broaden their perspectives on their farming practices but also, the other participants in the MAPs get their perceptions of farmers changed (ref. Northern Irish MAP).

Sharing of different perspectives and good co-operation between key actors does not necessarily lead to the desired impacts but might be a necessary requirement for common understanding and for setting joint strategies and shared goals for problem-solving.

Shared goals

In most of the multi-actor platforms the participants reported that the MAPs have contributed to developing shared goals. Still, in the way the respective goals are spelled out by different actors one can still see that there are often different angles presented to an overarching goal. This might

be a reflection of what by a vast majority of actors is presented as the main value of the multi-actor platforms; the exchange of ideas and broadening of perspectives. This contribution is based on open discussions and the exchange of opinions within the MAP, in which actors can bring forth their views and opinions and discuss possible solutions and their consequences. These open discussions contribute to clarity on overarching goal and might help to change individual objectives into shared goals.

In some cases, the goals are presented in very different ways, despite the reporting of a high level of shared understanding. There are also examples of MAPs where the overarching shared goal might be under-communicated, unstated or missing. While this seems to be the case in the Portuguese MAP, this is also a MAP where the process-dimension of the platforms - the getting together and exchanging ideas - is highlighted, and also a MAP where conflicts are absent. This might be an indication that determining a shared goal does not have to be the starting point but could be worked out later in the process.

For the Danish Tunø case, the lack of a shared understanding was remedied by compensation to farmers; but that the lack of shared understanding is at the projects' peril in the long term.

Although the MAPs might be a good vehicle for increasing understanding amongst the group of participants, it comes out from some of the MAPs' experiences that this might not be sufficient to influence other related and linked actors outside of the MAP, and that the achieved common understanding is precarious. Following from this, although the MAPs are good arenas for exchange and influence, they might not be sufficient to deliver on water quality goals.

Power balance

It is reflected in the experiences in the various MAPs that multi-actor platforms are successful in terms of creating arenas for engagement and for facilitating the sharing of perspectives and increasing understanding across actor groups. While the ideal is to create a level playing field for these engagement processes to unfold, this might still be difficult in practice. While some MAPs report that dominant actors also dominate the outcomes of these processes; it seems like the overall picture is that the MAPs are able to facilitate discussions and exchange of opinions within the groups.

However, it is reported in many of the MAPs that participating actors only to a limited extent feel that they are able to influence the processes. This might be an indication of a skewed power balance within the group. It might also be that consensus-oriented processes by nature do not work in everyone's favour, but instead leads one to seek common solutions based on compromises and least-common-denominators, rather than ideal positions.

Moreover, the MAPs are, in most cases, not arenas for changing the formal power balance between actors as it is often laid down in rules and regulations, which relates to the issues of decision space.

Decision space

An issue that runs through many of the MAP analyses is the lack of decision space for the platforms. While the formal status of the MAPs differs, most are based on voluntary participation and identifying and implementing voluntary measures. This leads to frustration on part of many of the actors when agreements and unified recommendations with a sound scientific basis in the groups do not materialise in immediate changes. This comes out clearly for instance in the German case. While it is emphasised that the MAPs indeed are important and successful in

bringing actors together, the MAPs serve more as platforms for information sharing, rather than platforms for action. A participant in the Slovenian MAP framed it like this; *“There are no changes yet, we are just talking. But we are sitting together”*.

The MAPs within FAIRWAY provide a platform in which different actors work together on the basis of equality and fairness, and a main requirement for this is voluntariness. However, participants in some MAPs also question the fact that standards will not be met when measures can only be identified and implemented in a voluntary fashion. Voluntariness linked to the fact that measures should benefit both the farmer and groundwater quality may in some cases a priori exclude potential effective measures. This is the situation for changing the grazing practices of farmers in the Dutch Overijssel case. Here, the farmers mention the fact that voluntariness also hampers the enforcement of practices carried out within groundwater protection areas by neighbouring farmers not participating in the project. However, farmers at the same time stress the fact that they do not want that measures implemented in their farm management by means of a project-pilot will become obligatory measures forced on them by government rules.

To the extent that the MAPs are able to come up with good agreed-upon measures for changes to farming practices, there is a potential for showcasing measures for agricultural authorities, that might in effect impact on official regulations. In such instance, one could also argue that the multi-actor platforms may broaden their mandate and increase their decision space in the process, through increased “outside legitimacy”.

Adaptability

The issue of adaptability is difficult to pin down in the relatively short duration of the project and its MAPs. While there is a degree of flexibility in the way the MAPs function, and their goals and ambitions, still, as case studies of the larger project there an inherent rigidity in the setup. There are however good examples in the project, e.g. the MAP of the Anglian Region, of changes in the actor group as well as in orientation and priorities, to adapt to the need of the participants, in this case the farmers.

Available resources

We observe that the issue of resources come up in the MAPs in terms of both *financial* resources and *human* resources.

Predictability in terms of human resources is a key issue that is brought up in many of the MAPs. Facilitation of engagement processes is resource- and time-demanding and requires commitment. Moreover, the institutions’ commitment should be such that the turnover of facilitators is not at a frequency that hampers the engagement processes. This comes out clearly particularly in the Slovenian MAP and Noord-Brabant MAP in the Netherlands.

Financial resources are important in different phases of these multi-actor processes. At the outset, there might be need for financial compensation and incentives for some actor groups, like farmers, to be involved in the processes at all. Linked to this, there might also be expectations amongst farmers for support in implementing measures that require new practices and tool. In the Northern Irish MAP, it is evident that uncertainty about such support-mechanisms have constrained the engagement of farmers in the MAP.

In the longer term, financial uncertainty for facilitation of the MAP processes is a key issue that is seen as a threat to the sustainability of the MAPs over time.

Trust

Based on the experiences of the FAIRWAY MAPs, issues of trust appear important in a multitude of ways for the engagement processes. For relations of trust to develop it is reported that regular physical meetings, be it official or informal meeting, or field visits, are essential. Also, a track-record of commitment to working with the actors over time is emphasized as important, relating to the challenges of long-term sustainability of resource limitations. While a lack of tangible outcomes can be a threat to trust in partners and facilitators over time, this is also the situation for cases where the decision space and the mandate of the platform is limited to the extent that changes in farming practices are difficult to enforce.

5.2 CONCLUDING REMARKS

The FAIRWAY MAPs are generally successful in terms of creating arenas for dialogue and exchange. However, many of them - at this point - lack tangible impacts. For the newly established MAPs this should not come as a surprise. It is reported that processes such as relationship building, fostering good relations and common understanding, takes a lot of time. When coupled with awareness-raising amongst key actors, it also takes time for change to take place, for instance in changing farming practices. For the longer-running MAPs this should be an issue of concern. There is evidence from the MAPs of how the lack of impact might jeopardise the MAP-processes, creating disappointment or fatigue on the part of the participating actors. This issue therefore speaks to a need of thinking of engagement processes in a long-term perspective. We also see that for some MAPs, voluntariness in terms of implementation of measures can help in the trust-building process, but on the other hand, can be a reason for why objectives and tangible impacts are hard to reach. There are also apparent differences in perspective within the MAPs, on whether the increased dialogue is to be considered a success-factor in itself, or whether success only can be determined when there are real impacts.

The issue of *trust* has come up in the process as crucial for successful engagement platforms, and essential for the achieving tangible outcomes in the longer run. Trust has been included in the framework set up for analysing the MAPs, but based on our evaluation of the FAIRWAY MAPs we do however consider that it is an issue that cuts across all of the dimensions in our framework.

5.3 KEY LESSONS FOR MULTI-ACTOR PLATFORMS

- Engagement platforms, if successfully set up as multi-actor, multi-sector and multi-level platforms, can play an important role in bringing actors together and enable information and knowledge sharing.
- By fostering such exchange, multi-actor platforms have a potential to contribute to creating common understanding amongst actors and challenge predetermined ideas, persistent norms, and preconceived impressions of “the other”.
- While knowledge and information sharing and shared understanding can be valuable, there is a number of constraints on MAPs to move from this stage to reach established goals and achieve real change in farm management or regulations.
- Moving from a toolkit approach to engagement processes to a more process-oriented approach, highlights the fact that facilitation of engagement processes is resource- and time-demanding and requires commitment over time. Predictability in terms of human

resources for facilitation is a key factor. In some instances, economic compensation to participants is a requirement that needs to be planned for.

- A dilemma for engagement processes is that they need to be conceptualised and planned for in a long-term perspective, while the lack of immediate impacts can be a threat to trust in facilitators and processes over time, which might lead to participant fatigue that jeopardise the processes. Setting ambitions and goals based on who is participating, the mandate and legitimacy of the platform and the governance context is therefore important, as not to create unrealistic expectations.

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ANNEX I. SURVEY QUESTIONS

1	Who do you represent through your participation in [the MAP]
2	For how long have you taken part in [the MAP]?
3	Give a brief description of the establishment of [the MAP] as you know it.
4	What is the main issue that [the MAP] is set up to resolve?
5	To what extent do you consider [the MAP] to be successful in addressing this issue?
5x	Additional comments to 5.
6	What new insights about this issue have you gained through the participation in [the MAP]?
7	What changes have you observed as a result of the activities of [the MAP]?
8	Are all actors relevant for resolving the issue involved in [the MAP]?
8x	If "no" on last question, explain who are missing.
9	To what extent do the participants in [the MAP] have a shared understanding of the issue?
10	Do you feel you are able to influence the priorities of [the MAP]?
11	What are the most important trust-building factors for the work in [the MAP]?
12	Has anything contributed to weakening the trust in the [the MAP]?
12x	if yes, explain...
13	How are conflicting priorities and differences of opinion solved within [the MAP]?
14	List some important "lessons learned" from your engagement in [the MAP]
15	To what extent do you consider [the MAP] to be a successful platform for engagement?
15x	Additional comments to 15.
16	What are the limiting factors for the long-term sustainability of [the MAP]?
17	Any other reflections about [the MAP]