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

Coherence in EU law and policy for the protection of drinking water resources

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Date: 27.04.2021

Version: 4.0

Series: Deliverable 6.1

This report was written in the context of the FAIRWAY project

www.fairway-project.eu

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

DOCUMENT SUMMARY	
Project Information	
Project Title	Farm systems that produce good water quality for drinking water supplies
Project Acronym	FAIRWAY
Call identifier	H2020-RUR-2016-2
Topic	RUR-04-2016 Water farms – improving farming and its impact on the supply of drinking water
Grant agreement no	727984
Dates	2017-06-01 to 2021-05-31
Project duration	54 months
Website addresses	www.fairway-project.eu www.fairway-is.eu
Project coordination	Stichting Wageningen Research, NL
EU project representative & coordinator	Lara Congiu (REA)
Project scientific coordinator	Gerard Velthof
EU project officer	Gaetan Dubois (DG Agri)
Deliverable information	
Title	Coherence in EU law for the protection of drinking water resources
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Author email	Froukje.Platjouw@niva.no
Deliverable number	D6.1
Workpackage	WP6
WP Lead	Sandra Boekhold
Type and dissemination level	
Editor	Gerard Velthof
Due date	31 May 2019
Publication date	
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Version History		
Number & date	**Author**	**Revision**
Version 1.0 10.05.2019	Froukje Maria Platjouw, Harriet Moore	Susanne Wuijts, Susanne Klages, Isobel Wright, Morten Graversgaard
Version 2.0 24.05.2019	Froukje Maria Platjouw, Harriet Moore	Gerard Velthof
Version 3.0 31.05.2019	Froukje Maria Platjouw, Harriet Moore	
Version 4.0 25.04.2021	Platjouw et al	Revisions pursuant to the Fairway reviewers' suggestions

EXECUTIVE SUMMARY

Safe drinking water is vital for human health and the economy. Throughout the EU, diffuse pollution by nitrogen and pesticides from agriculture is one of the main obstacles to meeting drinking quality targets. The **H2020 FAIRWAY** project aims to review approaches for the protection of drinking water resources from pollution by nitrogen and pesticides. The project also aims to identify and further develop cost-effective and innovative measures and governance approaches that will protect drinking water supplies while increasing agricultural sustainability.

1. AIMS OF THE REPORT

WP6 analyses governance arrangements and legal structures. WP6 aims to examine the coherence and consistency of EU directives, national policies, instruments and means and explores how these apply to farm water management from farm scale to national scale and how to overcome possible shortcomings. Coherence and consistency are key factors for a successful EU regulatory and policy regime that aims to prevent and to manage diffuse pollution of vulnerable drinking water resources due to agriculture. More specifically, WP6 examines the coherence and consistency of EU directives and policies (WP6.1); compares governance arrangements in a range of case studies (WP6.2); identifies lacks of coherence and possible spill-over effects from challenges at the EU level to national, regional and local levels (WP6.3); identifies cost-efficient and coherent management models (WP6.4); and develops legitimate governance arrangements (WP6.5). While task 6.1 primarily focuses on directives and policies at the EU level, task 6.2 provides an overview of the implementation of these EU directives and policies, and governance arrangements, within 13 case study areas across Europe. Both reports (D6.1 and D6.2) form the foundation for further research to be carried out later in WP6. Good governance requires a coherent, efficient and effective governance approach. *Effectiveness* can be measured through analysing the implementation of EU directives and policies at the national, regional and local level. This has been the primary focus of task 6.2 and the national level of the directives' implementation has been comprehensively assessed in the D6.2 deliverable. In task 6.1 we analyse primarily *the level of coherence* within the EU legal framework.

This report presents the research conducted in **task 6.1**. In task 6.1, we reviewed relevant EU directives and policies, identified legal requirements, and assessed *their degree of coherence* with the overarching objective of the FAIRWAY project, i.e. the protection of drinking water resources against pollution caused by pesticides and nitrates from agriculture practices **('vertical coherence')**. In addition to assessing vertical coherence of the legal framework with the overarching aim of protecting drinking water resources, we also assessed the degree of **horizontal coherence** amongst the five core EU directives, to identify any potential negative interactions between directives. For example, we scored to what extent the requirements of the Drinking Water Directive (DWD) are coherent with the requirements of the Water Framework Directive (WFD), the Groundwater Directive (GWD), the Nitrates Directive (ND), and the Pesticides Directive (PD. Horizontal inconsistencies, gaps, overlaps and counterproductive regulations and legal requirements could potentially jeopardize the attainment of the overall purpose of protecting drinking water resources and carry the potential to undermine the effectiveness of the overall legal framework. For that reason, both vertical as well as horizontal coherence needs to be investigated. The distinction between vertical and horizontal coherence is demonstrated in Figure 0.1 with the example of vertical coherence between the WFD and the FAIRWAY objective, and horizontal coherence between the WFD and other directives.

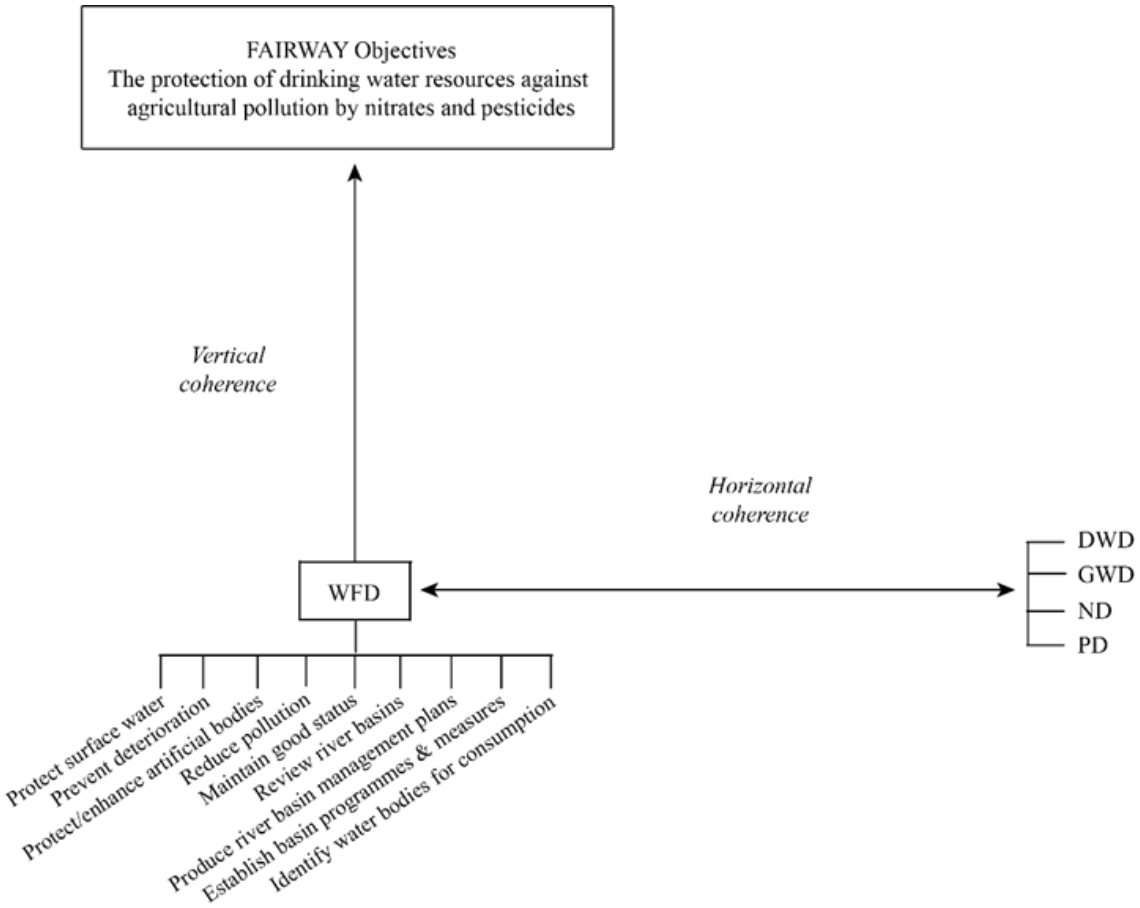

Figure 0. 1 Demonstration of vertical and horizontal coherence using the example of the WFD

The focus in task 6.1 is on **legal requirements**. The directives and policies that have been reviewed contain a range of different types of requirements, including monitoring requirements; reporting requirements; requirements related to coordination between sectors, authorities and countries; requirements related to instrument choice (such as voluntary or economic instruments, in addition to legal rules), and requirements related to the enforcement and implementation of these requirements. All these categories of requirements have been identified and compiled in Appendix I. The main focus of this report though is on two types of requirements in particular:

1. **Requirements to protect/improve** natural resources that contribute to water quality, including:
    a. general requirements, such as those to generally protect, enhance, or improve quality status or conditions, and;
    b. specific requirements, such as setting fixed thresholds levels
2. **Requirements to establish the institutional frameworks** for achieving improvements in water quality
    a. requirements related to establishing criteria, frameworks, catchment management plans and so forth.

These requirements have been identified, screened, scored and analyzed in terms of their vertical coherence with the overarching FAIRWAY objective of protecting drinking water resources against pollution by pesticides and nitrates from agricultural practices, and horizontal coherence with each other.

2. SCOPE OF THE REPORT

The report presents a comprehensive review of ten different directives and policies that are relevant for the protection of drinking water resources against agricultural pollution. The directives and policies that were part of the assessment as shown in table 0.1.

The following directives have been subject to review in task 6.1:	
The Water Framework Directive (WFD)	[Council Directive 2000/60/EC of 23 October 2000 establishing a framework for the Community action in the field of water policy]
The Drinking Water Directive (DWD)	[Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption]
The Nitrates Directive (ND)	[Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources]
The Groundwater Directive (GWD)	[Council Directive 2006/118/EC of 12 December 2006 on the protection of groundwater against pollution and deterioration]
The Sustainable Use of Pesticides Directive (PD)	[Council Directive 2009/128/EC of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides]
The Habitats Directive (HD)	[Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora]
The EIA Directive (EIA)	[Council Directive 2014/52/EU of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment]
The Industrial Emissions Directive (IED)	[Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control]
Rural Development Regulation (RDR)	[Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005]
EU Common Agricultural Policy (CAP)	[Common Agricultural Policy (CAP) 2014]

Table 0. 1 Overview of legal directives and policies reviewed

Currently, there are several interesting ongoing developments. Firstly, an evaluation of the CAP reform is due soon. Secondly, nutrient and pesticides-related EU regulations for fertilizers will soon enter into force and replace the EU fertilizer regulation 2003/2003 for mineral fertilizers. Adjustments will be made to product-related EU regulations for pesticides. These regulations are directly applicable to member states without the need for transposition into national law. The regulations are relevant for the protection of drinking water resources against pollution since they regulate the entering into markets of products that can affect water quality. They also set quality standards. In this report, these regulations will not be further discussed. However, later in WP6, we aim at incorporating relevant reflections upon these instruments.

3. METHODOLOGY

We explored a variety of possible methodologies to assess the level of vertical and horizontal coherence, including the use of external expertise. The task, however, requires a high level of understanding of EU legal directives and policies, a breadth of knowledge and perspectives, and a variety of views from respondents in different roles and positions. The Fairway partners judged the chosen method to be the most appropriate for the task as it ensures the representation of a wide number of perspectives across sectors and scales, from different geographical areas in Europe, and wide variety in roles and positions. The Fairway partners represent 13 different European countries. Using in-house expertise, rather than involving external consultancy expertise, also entailed an advantage in terms of understanding the purpose of the research and task and the existence of prior knowledge on the various directives. This enabled a cost-effective and sound methodology to complete the task.

For the assessment of vertical and horizontal coherence, we applied a **four-step procedure**. In a first step, we **identified** the key requirements and objectives of the various directives and policies. The purpose of the inventory step was to get a comprehensive overview of the requirements and objectives of all directives and policies. In the second step, we created a **screening matrix** that displayed all the different requirements and objectives in Excel spreadsheets. We created different matrices; the first matrix displayed all requirements and objectives from the directives in relation to the overarching FAIRWAY objective to enable a vertical coherence assessment. A further five matrices were developed to display the requirements of five individual directives on the vertical axis against the requirements and objectives of other directives on the horizontal axis for the purpose of a horizontal coherence assessment. In the third step, we **evaluated and scored** the vertical coherence of 10 directives and policies with the overarching FAIRWAY objective, and the horizontal coherence between 5 directives by using online **surveys**. Based on the results from the vertical coherence assessment, five directives were identified as highly relevant for the attainment of the Fairway objective. For that reason, the horizontal coherence assessment analyses these five directives thoroughly. The delimitation to these five directives, enabled a more thorough and in-depth horizontal coherence assessment than what would be possible if all directives had been included in this final analysis.

Survey One investigated opinions of ten FAIRWAY partners about the contribution of directives to the protection of drinking water resources. Survey's Two-Six were based on the five specific matrices developed in Step 2, each addressing horizontal coherence amongst the legal requirements of the most central directives. These surveys were completed by five partners, each of them completing one survey for a specific directive. The scores were generated based on an internal elicitation within the partner institutions. In most cases at least two contributors discussed a given interaction and provided their assessment of what the score 'should be'. Some partners also called on additional expertise of those working in the industry. When relevant, the partners provided explanations and examples for the given scores. In a fourth step**,** we **analysed the data**, including quantitative and qualitative analysis.

All surveys included two types of items; quantitative Likert-scale items and qualitative open-ended items. The quantitative items asked respondents to give a numeric score representing their perception about the interaction of a directive with either the overarching aim of FAIRWAY (Survey One), or with other Directives (Survey's Two-Six). The scale was based on the **typology and seven-point scale** presented by Nilsson et al (2016) to assess the degree of coherence.[1] Pursuant to the seven-point scale, interactions may be scored as either positive (indivisible' (+3), 'reinforcing' (+2) or 'enabling' (+1)) or negative ('cancelling' (-3)', 'counteracting' (-2) or 'constraining' (-1)); or the

[1] Måns Nilsson, Dave Griggs and Martin Visbeck, 'Map the interactions between Sustainable Development Goals' (2016) 534 *Nature* 320-322.

respective legal requirements may be entirely 'neutral' (0) with each other, incurring no significant positive or negative interactions whatsoever, perhaps no interaction at all.[2] Each survey also contained open-ended survey items to help interpret the quantitative data. These items asked respondents to give their opinion about the scorings and to describe potential positive or negative interactions. This approach allowed us to highlight certain interactions or uncertainties that are worthy of further investigation in successive tasks of WP6.

Seven-point scale of scoring coherence		
+3	**Indivisible**	The strongest form of positive interaction in which one of the requirements or objectives is inextricably linked to the achievement of the other
+2	**Reinforcing**	One objective or requirement directly creates conditions that lead to the achievement of another
+1	**Enabling**	The pursuit of one objective or requirement enables the achievement of another objective
0	**Neutral**	A neutral relationship where one objective or requirement does not significantly interact with another or where interactions are deemed to be neither positive nor negative
- 1	**Constraining**	A mild form of negative interaction when the pursuit of one objective or requirement sets a condition or constraint on the achievement of another
- 2	**Counteracting**	The pursuit of one objective counteracts another objective
- 3	**Cancelling**	The most negative interaction is where fulfilment of one requirement or objective makes it impossible to reach another requirement/objective

Table 0. 2 Seven-point scale scoring of Nilsson et al (2016)

It needs to be underlined that the coherence assessments between the directives and the overarching FAIRWAY objective (Survey One), and between individual directives (Survey Two-Six) outlined in this report are based upon **respondents' perceptions and opinions**. As such, some bias in the scorings and explanations is unavoidable. The vertical coherence assessment (Survey One) was carried out by ten WP6 partners. The five horizontal coherence assessments (Survey Two-Six) were divided among the partners to task 6.1 specifically. Given that each survey (for the WFD, GWD, DWD, ND and PD) has been carried out by one partner, this might affect the scoring rates. To increase accuracy of scoring rates, the surveys have been distributed in accordance with the partners' main fields of expertise.

4. FINDINGS RELATED TO VERTICAL COHERENCE

The overarching FAIRWAY objective is to find solutions to the protection drinking water resources against pollution by pesticides and nitrates from agricultural practices. The legal framework is both very comprehensive and fragmented. Many directives apply directly and/or indirectly to the FAIRWAY objective and many of these directives impose different types of legal requirements upon EU member states to comply with. Attainment of the overarching objective depends on the strength, coherence and effectiveness of the applicable legal framework.

Based on the scorings of the ten project partners, none of the directives is considered to have a negative average score. Five directives are perceived to be highly important and contributive very

[2] Ibid. See also David McCollum et al, 'Connecting the sustainable development goals by their energy inter-linkages' (2018) 13 *Environmental Research Letters*.

positively to the attainment of the FAIRWAY objective. These are the Water Framework Directive, the Groundwater Directive, the Drinking Water Directive, the Nitrates Directive, and the Sustainable Use of Pesticides Directive. As evident from figure 0.2, average scores for these directives varied from 2 to 2.6 suggesting that respondents considered these directives to be reinforcing (+2) or even indivisible (+3) to the protection of drinking water resources. For all the remaining directives, all average scores are significantly lower yet still positive. Respondents consider the Habitats Directive, the EIA Directive, the IED, and the RDR to be neutral (0) to or enabling (+1) the FAIRWAY objective. Average scores varied from 0.4 to 0.8, suggesting these directives have a slightly positive effect on the protection of drinking water resources. The lowest average score is given to the Habitats Directive (0.4). The CAP is given an average score of 1.7 and is considered to enable or reinforce the overall objective.

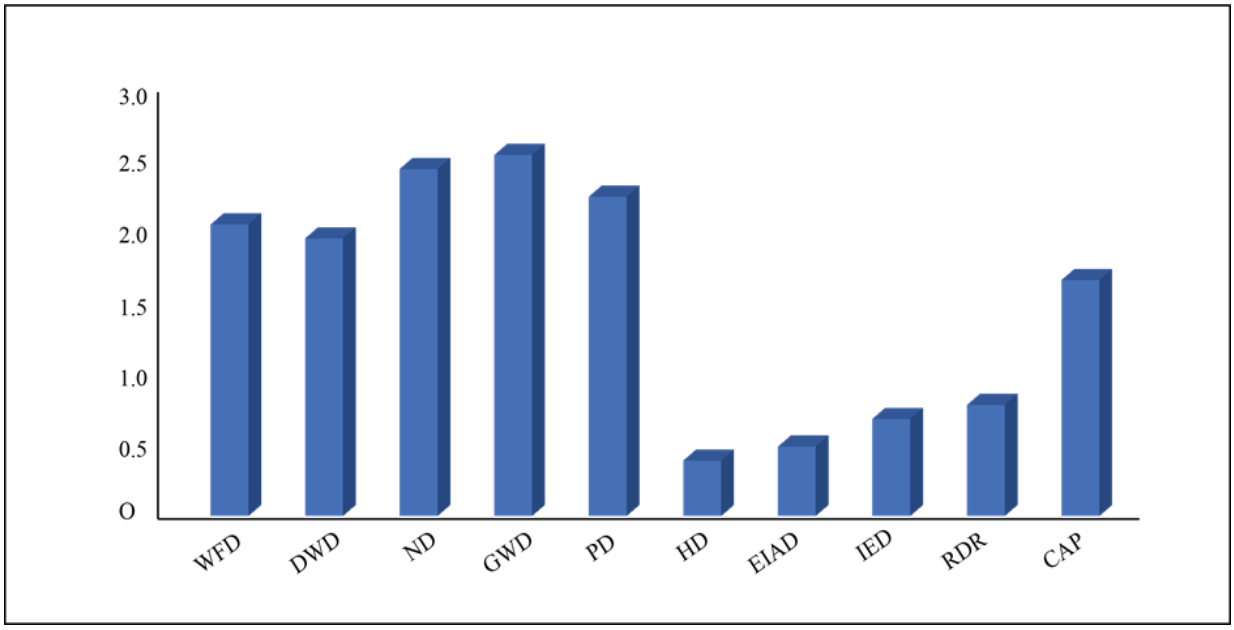

Figure 0. 3 Comparison of average contribution scores per directive. Requirements and objectives of each directive are scored by ten respondents as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling'

In general, it could be argued that the overall legal framework is likely to be fit for purpose. Yet to what extent this purpose will be realized depends to a large degree on implementation.[3] Concerns include how consistently requirements are implemented by member states, and the ambiguity of key terminology. These factors could have both positive and negative impacts on the vertical coherence of the directives with the FAIRWAY objective. Several directives, including the Habitats Directive and the Environmental Impact Assessment Directive, were perceived to have contributive potential, probably more than indicated by the average scoring rate alone. If this potential is realised fully under implementation, the degree of vertical coherence increases.

To illustrate, conservation measures under the Habitat Directive can include both site-specific measures (i.e. management actions and/or management restrictions), and general measures that apply to many Natura 2000 sites over a larger area, for instance, measures to reduce nitrates pollution. The Habitats Directive could also require restoration measures to achieve favourable conservation status for key Natura 2000 habitats that have been damaged by pressures from intensive agriculture. Restoration actions may involve reversing soil enrichment and re-introducing vegetation, reseeding to restore plant species diversity, controlling scrub, controlling invasive weeds and alien species and restoring hydrological management (e.g. by reversing drainage, restoring

[3] Implementation of the directives and governance arrangements throughout case study sites is subject to review in task 6.2 and deliverable D6.2.

groundwater levels and regimes, and flooding and river regulation).[4] This might contribute positively to the protection of drinking water resources, if these Natura 2000 sites and drinking water resources coincide.

Summary of the specific contribution of each directive to the Fairway objective	
WFD	Numeric responses indicate that participants feel that all articles of the WFD are enabling, reinforcing, or indivisible from the FAIRWAY objectives. Qualitative data suggests that the requirements of the WFD are reinforced by institutional frameworks at the state level, although the plans, programs and measures in place are not necessarily sufficient. Respondents identified important cross-over or interdependencies between the WFD and other directives, such as the Nitrates Directive; while this interdependency is intuitive (the ND must be upheld to achieve the objectives of the WFD), the interaction is informal. **A potential action could be to formalise the interaction institutionally by requiring cross-referencing with regards to monitoring and enforcement.**
GWD	Numeric responses indicate that participants feel that articles of the GWD related to threshold values and preventative measures are enabling, reinforcing, or indivisible from the FAIRWAY objectives. Qualitative data indicates some division between respondent perspectives. Most suggested the GWD positively reinforces the FAIRWAY objectives, while some suggested threshold requirements are not necessarily sufficient. There are clear interdependencies between the WFD and the GWD; **formalising interactions between surface and ground water with cross-referencing may reinforce institutional frameworks to support these interdependencies.**
DWD	Numeric responses indicate that participants feel that the articles of the DWD related to protection and controlling harmful substances are mostly indivisible with the FAIRWAY objectives. Articles related to new infrastructure were viewed neutrally. Qualitative data emphasizes interdependencies between the DWD and other Directives, such as the ND. Respondents expressed some uncertainty about how requirements related to pollutants under the DWD and requirements under the ND interact. **This suggests that cross-referencing is required to ensure that the requirements of each Directive support each other**.
ND	Numeric responses indicate that participants feel the articles of the ND are mostly indivisible, reinforcing or enabling of FAIRWAY objectives. One exception relates to livestock manure limits for land application for which opinions were divided. Most participants agreed limits contribute positively to FAIRWAY objectives while one suggested that limits are constraining. Reasons for this variation are suggested in the qualitative data. Respondents felt that catchment scale limits and targets may be more appropriate than farm scale limits; the cumulative effect may be more important than the individual application of manure. Similarly, the impact on water quality varies geographically.

[4] European Commission, 'Farming for Natura 2000' (Guidance on how to support Natura 2000 farming systems to achieve conservation objectives, based on Member States good practice experiences) 2014, p. v.

	Interactions between the ND and other Directives may be influenced by these geographical dynamics, **highlighting the need for cross-referencing**.
PD	Overall, respondents considered that all requirements of the PD interact positively with the FAIRWAY objectives. Articles related to protection and requirements to establish a framework and national action plans were mostly viewed to be indivisible or reinforcing. Articles related to infrastructure were viewed to be indivisible, reinforcing, enabling, or neutral. Qualitative responses again emphasized the geographical dynamics of limits and targets, **suggesting that set requirements may be more or less sufficient depending on wider context.**
EIA	Quantitative scores reflecting perceptions of interactions between the requirements of the EIA and FARIWAY objectives varied considerably. Most considered requirements related to adopting effective measures and identifying and assessing impacts to be neutral or enabling, however, others considered these requirements to be constraining, counteracting or indivisible. Qualitative data indicated that some respondents felt that the requirements of the EIA lack the necessary specificity to support other related Directives, such as the ND. **These issues could be addressed by formalising some interactions between requirements across Directives.**
IED	Most respondents indicated that the requirements of the IED are enabling, however, there was some variation, with minority views including that requirements are cancelling, constraining, neutral or indivisible. Respondents highlighted the interdependence of the IED and the ND in relation to large intensive livestock farms. Some comments indicated that respondents feel the IED is most relevant to industry practices rather than the full range of practices that contribute to the FAIRWAY objectives, which may explain the variance in scores and views.
HD	Scores suggest that respondents generally believe that the HD contributes only minimally to the FAIRWAY objectives. All responses suggest the requirements of the HD are either enabling or neutral. Some comments suggest that conservation areas are of relevance to the DWD and GWD because these spaces are less likely to involve use of fertilizers and pesticides. **These positive interactions are not formalised and could equally benefit from cross-referencing as would more negative interactions. Comments also indicated the importance of effective implementation.**
CAP	Most respondents suggested that the requirements of the CAP enable or reinforce the FAIRWAY objectives, however there was some variability regarding views of farm requirements and compliance, with some suggesting these requirements are indivisible, enabling or reinforcing and a minority suggesting they are counteracting. Qualitative data indicated that some CAP requirements interact with requirements of the ND, including those related to buffer zones for reducing concentrations of pollutants. Further, there are strong institutional incentives for compliance; funding is contingent on compliance. One issue of cross compliance identified was that farmers are incentivised to use pesticides to maintain certain vegetation to be eligible for the BPS, thus increasing pesticide run-off and impacting water quality. Another example of cross compliance identified was that farmers in the Netherlands may plough their land after 5 years to avoid being considered permanent grasslands in CAP, thus increasing nitrate leaching. Overall, while the funding mechanism offers incentives for compliance in some regards, there are multiple cross compliance issues

	related to the interdependence of other Directives. **There are opportunities with the CAP to formalize interactions with the ND and establish cross-referencing.**
RDR (CAP Pillar II)	Overall, respondents suggested that the requirements of the RDR enable the FAIRWAY objectives. Most respondents agreed that requirements to protect and enhance ecosystems are reinforcing or indivisible while the requirement to promote resource efficiency is enabling. Views on requirements to implement measurements and to enhance farm varied considerably, from reinforcing and enabling to neutral and constraining. Qualitative data indicates that on the one hand, market engagement has driven innovation and sustainability. On the other hand, increasing competition is likely to increase pressures on water resources which may have negative outcomes. Market competition may incentivise less sustainable environmental practices, which may counter the benefits of innovation. Thus, there are competing incentives within the RDR framework.

Table 0.3 Summary of contribution of each instrument to the Fairway objective

Based on the scorings and comments provided by project partners, we identified **four reoccurring themes** that emerged from respondents' scores and comments about the coherence of the directives with the objectives of FAIRWAY. These are:

- Divided opinions between respondents about the effectiveness of fixed threshold values. Some respondents suggested fixed thresholds are effective, while others raised the concern that effectiveness may vary depending on scale and geographic location;
- Some directives are more supported by wider institutional frameworks compared to others;
- Respondent scores may be dependent on knowledge and understanding of biophysical processes, and the impact of EU policies on biophysical processes;
- In many cases, participants assigned more positive scores to interactions between requirements with more direct links to the FAIRWAY objectives, and less positive (and occasionally negative) scores to interactions with indirect links to FAIRWAY objectives.

These themes are expounded below.

The effectiveness of fixed thresholds for achieving the FAIRWAY objectives

There appear to be divided opinions between respondents about the effectiveness of fixed threshold values. Some respondents suggested fixed thresholds are effective, while others raised the concern that effectiveness may vary depending on scale and geographic location. To, illustrate, it has been argued that threshold levels of nitrates (50 mg/L) and pesticides (0.1 µg/L) are not necessarily sufficient for controlling pollution. In the case of pesticides, fixed thresholds could limit the leakage of less harmful pesticides to the environment, while not being stringent enough for other more harmful types of pesticides. Despite overall positive scores, respondents were also divided about the effectiveness of the explicit limit to the amount of livestock manures applied on land (170kg/ha each year). Thus, it was suggested that differentiated threshold levels could be more appropriate, providing a leeway to take into consideration scale and geographic variation when setting threshold levels. The respondents' comments underscored the limitations of 'blanket' approaches to setting limits, thresholds, regulations across diverse geographical landscapes.

Some directives are more supported by wider institutional frameworks compared to others

Legal requirements that are supported by wider institutional frameworks are often scored more positively than those that are not. To illustrate, respondents emphasized the difficulty of ensuring the non-deterioration of large groundwater bodies with variations in quality. And respondents believed there may be disconnect between the large time scales between impacts and effects on groundwater quality, and the timescales over which measures are taken to assess groundwater quality. Thus, in practice it may be difficult to prevent deterioration if measures do not reflect ongoing causes and

rates of deterioration. These concerns warrant further investigation into the effectiveness of institutional requirements of environmental directives, such as requirements to establish frameworks (Art. 1 WFD) and national action plans (Art. 4.1 PD)

> *In many cases, participants assigned more positive scores to interactions between requirements with more direct links to the FAIRWAY objective and less positive (and occasionally negative) scores to interactions with indirect links to the objective to protect drinking water resources.*

Scores suggest that project partners viewed direct interactions between the requirements of directives and the protection of drinking water resources more positively than indirect interactions. To illustrate, the requirement related to remedial action (Art. 8 DWD) targets a different temporal scale of management compared to the FAIRWAY objective. Remedial action includes restoration of degraded resources, while the FAIRWAY objective is perhaps more focused on long term prevention of pollution. Thus, respondents may perceive a less direct relationship between the long-term goals of FAIRWAY, and the more immediate reactive purpose of restoration.

Moreover, the requirement to ensure that water used for human consumption should be free from any micro-organisms, parasites and substances which, in numbers or concentrations, constitute a potential danger to human health (Art.2, annex 1 DWD) might be unclear in terms of their relevance for pollution by pesticides and nitrates. Several respondents were uncertain about the applicability of this requirement to the protection of drinking water resources against agricultural pollution.

Also requirements from apparently less relevant directives, such as the Habitats Directive, scored generally lower. This could suggest that there is some uncertainty with regard to the relationship between habitats and the protection of drinking water resources against nitrates and pesticides pollution. However, these scorings and comments may also be related to knowledge about biophysical processes. For example, restoring habitats often involves revegetation, which can create a buffer for pollutants and prevent agricultural runoff from entering waterways and decreasing water quality. However, this interaction is much less direct and transparent than more positively scored requirements related to other directives. The distinction between direct and indirect interactions between requirements of EU Directives and the objectives of FAIRWAY is an important finding that may speak to more institutional barriers between conceptualization of water quality policy, and on ground practice. These findings should be addressed further in successive tasks in WP6.

5. FINDINGS RELATED TO HORIZONTAL COHERENCE

For the assessment of horizontal coherence, project partners scored the coherence between the legal requirements of the Water Framework Directive, Groundwater Directive, Drinking Water Directive, Nitrates Directive and Pesticides Directive. The purpose was to identify interactions between legal requirements and objectives that could hinder the attainment of the overall goal related to safe drinking water quality or reduce the contributive effect of any one directive or requirement towards achieving the overall goal.

On average, the respondents scored the interaction between the directives positively. However, the scoring for individual requirements indicates that some potentially negative interactions were identified. While these assessments are subjective, and likely to reflect varying degrees of knowledge, the negative scorings may indicate interactions that may impede the effectiveness of some components of EU legal frameworks. While some fragmentation between legal frameworks is likely to be inevitable, and in many cases unproblematic, in some instances fragmentation may become problematic, such as cases of significant inconsistencies between directives. Further, in some cases, it is possible to identify gaps where two directives could support the objectives of each more cohesively. Inconsistencies, and gaps that point to unfulfilled opportunities for greater

coherence, could jeopardize the overall aim to protect drinking water resources, and potentially undermine the effectiveness of the wider legal framework.

The following figure displays the results of the horizontal coherence assessment. The figure presents a synthesis of findings from analysis of horizontal coherence between the five directives.

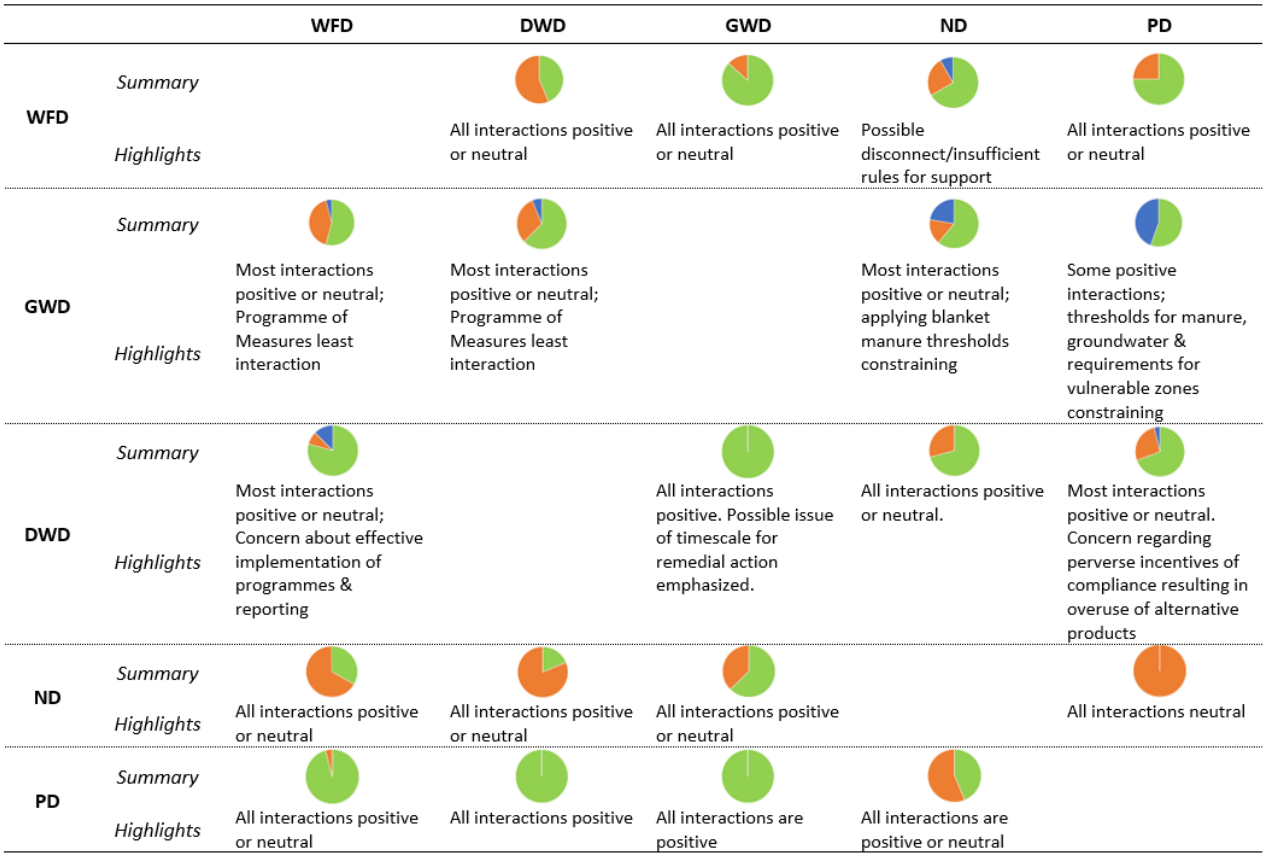

Figure 0.3 A synthesis of findings from analysis of horizontal coherence between the WFD, DWD, GWD, ND, and PD, including a visual summary of interactions between each Directive and highlights. Visual summaries (pie charts) demonstrate the proportion of interactions between the requirements of each Directive that respondents judged to be positive (green), neutral (orange) and negative (blue).

Emphasized highlights	
WFD	Potential disconnect between ND and WFD; in practice drinking water requirements rarely extend to the wider catchment, spatial disconnect. Nitrate requirements should target drinking water quality directly, as well as water quality in the wider catchment because the two are clearly connected. These ideas warrant further investigation in successive tasks of WP6.
GWD	Article 4.1 of the ND related to reducing pollution could offer an opportunity to formalise cross-referencing between the GWD and the ND. While the interaction is viewed to be positive, there is currently no requirement for cross-referencing.
DWD	There may be unintentional negative outcomes of setting restrictions on pesticides without considering the alternative products used by farmers. National action plans may not be sufficient

	for addressing the spatial dynamics of the entire aquifer. These concerns could be followed up in successive tasks of WP6. Perceptions of interactions between the DWD and other Directives appear to reflect a range of beliefs, including those about cohesion between requirements, as well as wider confidence, or lack of confidence in process and implementation. How these concerns might be addressed, and the appropriate scale of governance to address these concerns could be considered in successive tasks of WP6.
ND	Overall, the requirements of the ND are viewed to interact positively neutrally with other directives' requirements. However, there is room for improvement. According to the respondents, only a restriction of breeding intensity or a restriction on the number of animals per hectare could support the 170kg/ha limit positively. It should be stressed here that there appear to be diverging interpretations of the requirement related to livestock manure limits; is this requirement about the amount of manure contribute from cattle or about the amount of manure that farmers can use on crops and apply themselves like a fertilizer. As there are diverging views on the scope of this requirement, this is worthy of further investigation later in WP6. There appears to be a need for increased specificity in the directives to avoid unclarities.
PD	Overall, many positive interactions have been identified. The WFD, DWD and GWD are generally considered to contribute positively to the achievement of the PD directive.

Table 0. 4 Emphasised highlights of the horizontal coherence analysis

6. REFLECTIONS

Three important themes emerge from the analysis of scores and comments about interactions between the requirements of the WFD, DWD, GWD, PD and ND. Some of these themes reinforce the findings related to vertical coherence, while some are unique to the analysis of horizontal coherence. The key themes are:

- Emphasis on the fact that the effectiveness of fixed threshold values compared to more general terms about protecting resources, reducing pollution, and performing restoration is subject to diverging views and lower scores;
- The tendency for project partners to score direct interactions more positively, and indirect interactions less positively, or occasionally negatively, and the possibility that varying degrees of knowledge about biophysical processes may have influenced these judgements;
- That, with minor exceptions, the scores for requirements related to environmental outcomes, including protecting resources, reducing pollution, and remediation, tended to be more positive than scores for requirements related to the institutional arrangements for achieving environmental outcomes, such as requirements to establish frameworks.

These key narratives are expounded in the following.

The effectiveness of fixed threshold values

Chapter Two emphasized the perceived limitations of fixed thresholds for achieving the FAIRWAY objectives. The scores and comments given by project partners in Chapter Three reinforce these perceptions. This is not surprizing given that the same work package partners were involved in both

stages of the research. However, the results of the five surveys conducted about interactions between the directives suggest that fixed threshold values may also impede EU laws from supporting each other.

Project contributors perceive more general requirements related to protecting water quality and preventing pollution more positively than requirements associated with fixed thresholds. This seems to be due to the risk that a fixed threshold may be appropriate in some contexts, and insufficient in others. Thus, one potential area for improving coherence may be including terms in requirements to necessitate more strict thresholds under certain environmental conditions. For example, it may be possible to identify biophysical conditions that pose a greater risk to groundwater quality than others, and thus, determine that stricter thresholds should be adopted.

There were two exceptions to the tendency for contributors to score general requirements about achieving environment outcomes more positively than requirements about specific fixed thresholds. Firstly, in the context of groundwater limits, project partners did not consider any negative interactions between fixed limits and the requirements of the WFD, GWD, DWD and PD. These results contrast with scores given to other requirements related to specific threshold values; in other instances, project partners presented conflicting perspectives suggesting that there are negative risks associated with adopting fixed thresholds. Overall, the scoring for groundwater limits suggests that project partners feel the fixed thresholds related to nitrates may be more appropriate than other fixed thresholds, such as limits to contaminants in groundwater. Secondly, fixed thresholds related to the ND were viewed positively, compared to other fixed thresholds examined in relation to other directives. This may reflect the varying opinions of multiple project partners. Alternatively, the fixed thresholds related to nitrate concentrations may not produce the same risks as those identified in relation to other directives, such as concentrations of contaminants in groundwater.

Another issue raised in relation to fixed thresholds was the potential disconnect between drinking water requirements and requirements that affect water quality in wider catchments. For example, in theory, the requirements of the ND related to the amount of livestock manures applied on land, to apply common criteria for water pollution, and to limit values of 50 mg/l nitrates should target both drinking water quality and wider ecological conditions that impact water quality in catchments. In practice, these linkages are seldom realised due to various complexities (see further WP3 FAIRWAY). Importantly, these perspectives are subjective and warrant further investigation.

Direct versus indirect interactions & the influence of knowledge

Scores suggest that project partners view direct interactions between the requirements of directives more positively than indirect interactions. However, these judgements may also reflect the varying knowledge of project partners about biophysical processes, and how specific management practices may influence those processes. Thus, the findings presented in this report should be considered in the context of scientific literature about the relevant processes. We recommend a robust literature review to complement these findings.

For example, in the context of the ND, numerous interactions were viewed to be ‘neutral’. There are several explanations for this. In some instances, it is likely that these perspectives reflect a genuine lack of connectivity between ND objectives and other directives, particularly with regards to requirements under the PD. However, in some cases, these perspectives may reflect the more complex nature of interactions between nitrate levels and other environmental concerns. This is consistent with the conclusions of Chapter Two which suggested that *less direct* interactions may be more difficult to identify and score accurately.

Differences between requirements to achieve environmental outcomes & requirements related to institutional frameworks

Overall, the scoring suggests that requirements related to achieving environmental outcomes are viewed more positively than requirements related to the institutional frameworks that are used to implement environmental policy on the ground. For example, most requirements to protect resource, prevent pollution, and implement remediation are scored highly positively, such as those requirements under the DWD and GWD. By comparison requirements to establish a programme of measures, establish frameworks, and establish national action plans were viewed less favourably. For example, no positive interactions were identified between the requirement to establish a programme of measures and other directives. This may reflect disconnect between the environmental objectives of the directives, and the institutional processes required to ensure those objectives are achieved. Similarly, respondents suggested that national action plans may be ineffective as these are often not targeted at a specific source, but a whole aquifer. Thus, it may be necessary to introduce stricter measures in targeted areas.

Several respondents suggested that the disconnect between environmental objectives and the institutional frameworks employed to achieve those outcomes stems from time-lag between the causes of degradation, observable degradation, and the timescales over which condition monitoring and assessment is performed. One example given was related to groundwater contamination and the time required before measures of condition are likely to correctly identify concentrations of contaminants. However, there was also some variation in scores. For example, institutional requirements of the PD were viewed more favourably than the institutional requirements of other directives. This may reflect genuine differences in coherence between legal requirements related to environmental outcomes and requirements related to institutional arrangements under the PD compared to other directives. However, these judgements are subjective and may also reflect bias.

7. FURTHER RECOMMENDATIONS

This report (D6.1), together with the report produced in task 6.2 on governance arrangements in case study areas (D6.2), forms the basis for research to be carried out in successive tasks of WP6.

In general, we recommend further investigating the reoccurring themes that have been described above. In particular, the effectiveness of the legal framework to attain the objective of protecting drinking water resources against agricultural pollution, might be adversely affected by fixed threshold values and ‘blanket’ approaches to setting limits, thresholds, and regulations across diverse geographical landscapes. Furthermore, the distinction between direct and indirect interactions between requirements of EU Directives, and the objectives of FAIRWAY is an important finding that may speak to more institutional barriers between the goals and aims conceptualization of water quality policy, and on ground practice. These findings should be addressed further in successive tasks in WP6. For example, the goal to reduce agricultural pollutants is very clearly linked to FAIRWAY objectives. The fact that institutional requirements, such as establishing frameworks, are perceived as contributing less may indicate a disconnect between frameworks, implementation, and environmental outcomes.

In addition to these reoccurring themes, we recommend investigating several potential inconsistencies or gaps more thoroughly. The three challenges that we consider most worthy of further investigation are the following:

- **The relationship between the Drinking Water Directive and the Water Framework Directive**

Respondents emphasised that there appears to be a potential gap between the risk-based approach to improve drinking water quality at the tap as adopted in the DWD and the wider goal to protect protection of drinking water resources under the WFD. One suggested reason for this disconnect may be related to the physical distance between urban areas and river catchments. Respondents

may be concerned about the fact that there are many sources of pollutants in river catchments that are not addressed at the tap. However, it is unclear whether these subjective perspectives reflect genuine risks to water quality. This gap also came forward in the evaluation of the Drinking Water Directive (98/83/EC) as an area for improvement.

Another example of this disconnect is related to groundwater bodies. Respondents highlighted that, the WFD only takes into consideration, the number of groundwater bodies used for drinking water purposes, without taking into account the water volume size of these bodies. Thus, a member state could use the size of a groundwater body to get a more favourable outcome. The member state could have a very small groundwater body with 'good status', while also having a very large groundwater body with 'poor status' requiring additional measures. By a mere focus on number, this would equal to 50% compliance while the actual quality status of all sources would be poorer.

The recent revision of the DWD (EU/2020/2184) introduces a risk-based approach from source to tap, including risk identification, risk assessment and risk management, following the methodology of 'Water Safety Plans' as was introduced by the WHO (WHO 2009). This risk based approach aims to strengthen the links between de DWD and the WFD and the GWD and connects to WFD-methodologies regarding characterization of water bodies and pressures, risk based monitoring, and the objectives of Article 7 (2000/60/EC). This enables authorities to concentrate on potential risks to water quality at the source and its catchment (Article 8, DWD) onto distribution, but also requires adequate programmes of measures to prevent and mitigate risks and monitoring programmes to identify effects of these measures. Timelines are being aligned to the WFD. Furthermore, monitoring should be risk based including possible emerging contaminants. The WFD is not yet so explicit in the monitoring of emerging contaminants. The revised DWD should transposed by MS within 2 years from the introduction. As it seems, the gap identified seems to be resolved by the revision of the DWD. However, the first set of data for the DWD needs to be delivered at the formal end date of the WFD (2027). So, it remains somewhat open how these linkages will develop in practice.

- **The relationship of the Water Framework Directive and the Nitrates Directive**

Respondents suggest that there is a potential disconnect between drinking water requirements under the Nitrates Directive and requirements that affect water quality in wider catchments pursuant to the Water Framework directive. For example, in theory, the requirements of the ND related to the amount of livestock manures applied on land, to apply common criteria for water pollution, and to limit values of 50 mg/l nitrates should target both drinking water quality and wider ecological conditions that impact water quality in catchments. However, the objectives of the ND are primarily related to drinking water quality and only to ecology in the context of eutrophication. Some respondents therefore argue that existing requirements related to the use of fertilizers and manures are not comprehensive enough to support WFD ambitions. Respondents had different views on the nature of the relationship between the WFD and the ND though, and therefore we recommend this issue to be examined further later in WP6.

- **Potential negative effects of the funding mechanism under the Common Agricultural Policy**

Some respondents identified potential negative consequences of the CAPs funding mechanisms on the protection of drinking water resources. To illustrate, the Basic Payment Scheme (BPS) linked with CAP and cross compliance could means that farmers are keeping land in production just to receive this payment. In certain areas, farmers are spraying pesticide to remove rushes, so that the land is eligible under the BPS. This is resulting in an increase in pesticide run-off to the river. In addition, the areas declared for the BPS are also used to calculate the farm's organic N loading for the Nitrates Directive. For that reason, a farmer can legitimately increase his/her stocking density up to 170kg/ha organic N, even though the land may not be able to support this agricultural intensity.

Furthermore, farmers may also plough their grasslands within 5 years, to avoid that their grasslands will be considered as permanent grasslands in CAP, with more strict regulation. Ploughing of grasslands can strongly increase nitrate leaching. Overall, the CAP is perceived to contribute positively to the protection of drinking water resources against nitrates and pesticides pollution from agricultural resources. However, the funding mechanism and its implementation might also have some drawbacks that could affect drinking water quality adversely. This needs to be explored further.

8. SPECIFIC SUGGESTIONS FOR CROSS REFERENCING AND FORMALISING INTERACTIONS IN THE EU LEGAL FRAMEWORK

- WFD, DWD, GWD were viewed to be interdependent on one another, however, the connectedness is not formalised in any way. There are opportunities here for cross referencing. One option would be to include these requirements as an additional component to existing requirements related to institutional frameworks, such as WFD Article 1, 'To establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater, *with reference to, and in collaboration with parallel frameworks put in place with the DWD and GWD'*. Another example might be the WFD Article 13.1, 'To ensure that a river basin management plan is produced for each basin district lying entirely within their territory, *including actions and objectives for ensuring compliance with the thresholds and *requirements* of the DWD and the GWD'.* Similar adjustments could be made to articles referring to programmes of measures (e.g., WFD Article 11.1) to reflect the interdependence of Directives, such as ensuring that programmes of measures consider the thresholds and relevant requirements in the DWD and GWD.

- There is also interdependence between the EIA, IED and ND suggesting that the implementation of these Directives would benefit from cross referencing. There are opportunities to improve the outcomes of the ND by ensuring consistent specificity between the ND, EIA and IED towards achieving the FAIRWAY objectives.

- Views expressed on the CAP and RDR raise concerns about competing incentives for farming communities to simultaneously innovate towards sustainability and sacrifice sustainable practices to engage competitively in markets. Issues of cross-compliance, such as increasing pollutants to remain eligible for funding, suggest a need for cross referencing between the requirements of the CAP and RDR and other directives, such as the ND and the DWD. More specifically, market based instruments work most effectively when implemented within a framework that mitigates potential side-effects, such as 'perverse incentives' associated with increasing pesticide use to remain eligible for financial support. This, and other such 'perverse incentives' should be revisited and the introduction of guidelines or additional peripheral requirements for the CAP and RDR to uphold the underlying principles of other Directives, including the ND, such as Article 4.1 related to a code of conduct.

ACKNOWLEDGEMENTS

We would like to express our sincere gratitude to all partners for their excellent contribution to the research behind this report. In particular, we owe thanks to the National Institute for Public Health and the Environment (RIVM), the Netherlands; the Thuenen Institute, Germany; University of Lincoln, UK; The Aarhus University, Denmark; the Coimbra Agriculture School (ESAC), Portugal; University of Ljubljana, Slovenia; Agri-Food and Biosciences Institute (AFBI), UK; ADAS, UK; University of Thessaloniki, Greece; Royal HaskoningDHV, the Netherlands; Wageningen University and Research, the Netherlands; Bureau de Recherches Geologicques et Minieres (BRGM), France; and the Norwegian Institute for Water Research (NIVA), Norway.

CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

BAT	Best Available Techniques
BPS	Basic Payment Scheme
BQE	Biological Quality Elements
CAP	Common Agricultural Policy
DWD	Drinking Water Directive
EIA	Environmental Impact Assessment
EU	The European Union
FCS	Favourable Conservation Status
GWD	Groundwater Directive
HD	Habitats Directive
IED	Industrial Emissions Directive
IPM	Integrated Pest management
M	Mean (average)
N	Nitrogen
NAP	National Action plans
ND	Nitrates Directive
NVZ	Nitrates vulnerable zones
PD	Sustainable Use of Pesticides Directive
RDR	Rural Development Regulation
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SWOT	Strengths, Weaknesses, Opportunities, and Threats
WFD	Water Framework Directive

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Coherence in EU law for the protection of drinking water resources

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1. INTRODUCTION

1.1 BACKGROUND AND AIM OF THE REPORT

Globally, agriculture and water play a substantial role in the 2030 Agenda for Sustainable Development as reflected in the Sustainable Development Goals (SDGs). Sustainable water management (SDG6, Clean water and sanitation) and sustainable agriculture (SDG2, Zero Hunger) are both primary goals, and neither one can be achieved independently of the other.[5] In the EU, the productivity of agriculture has greatly increased during the last decades. This increase has been enabled in part through the increased availability of fertilizers, manures and pesticides, which has led to pollution of groundwaters and surface waters from nitrates and (residues of) pesticides.[6] Throughout the EU, nitrates and pesticides are currently among the major sources of pollution of drinking water resources.[7] This raises concerns since safe drinking water is vital for public welfare and an important driver of a healthy economy.[8]

Farming activities, which occupy nearly half of the EU territory, are thus one of the causes of pressures on water bodies, impacting on the health of vital water ecosystems and drinking water resources.[9] To address the pollution by nitrates and pesticides from agricultural practices, the EU has developed an extensive set of directives, guidelines and policies over the last few decades. To illustrate, the requirements of the Drinking Water Directive (DWD) set an overall minimum quality for drinking water within the EU and provide a situation where a minimum level of provision of drinking water quality is guaranteed. Other directives aim at decreasing the losses of nitrogen and pesticides to the environment and specifically aim at decreasing the leaching of nitrogen to groundwater and surface waters (the Water Framework Directive (WFD), Nitrates Directive (ND) and Groundwater Directive (GWD)). The Directive on the Sustainable Use of Pesticides (PD) was adopted to achieve a sustainable use of pesticides by promoting the use of integrated pest management and alternative approaches or techniques. Other policies address efficient and clean use of resources or wider agriculture-environment issues (e.g. Common Agricultural Policy (CAP), Rural Development Programme, or nature conservation through the Habitats Directive (HD)) and may also have significant implications for the use and losses of nitrogen and pesticides from agriculture.

Despite this evolving water, environmental and agriculture legislation, it has also been recognized in various studies and working groups that several EU directives, nutrient and pesticides-related EU

[5] European Commission, 'Agriculture and Sustainable Water Management in the EU' (Commission Staff Working Document) SWD (2017) 333 final, p.2.

[6] Sutton et al (eds.), *The European Nitrogen Assessment* (Cambridge University Press 2011).

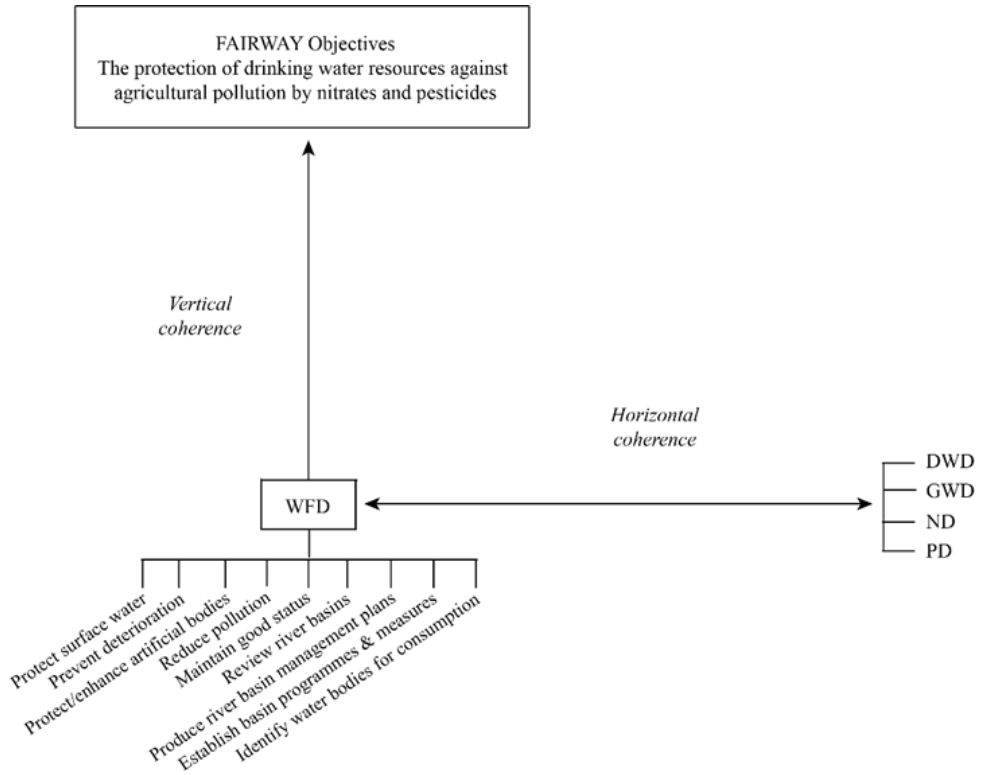
[7] http://ec.europa.eu/environment/water/water-framework/links/index_en.htm

[8] European Citizen Initiative (ECI) 'Right2Water'. http://www.right2water.eu/

[9] European Commission, 'Agriculture and Sustainable Water Management in the EU' (Commission Staff Working Document) SWD (2017) 333 final, p.2.

regulations, and the Common Agricultural Policy should be better integrated when focusing on the protection of drinking water resources. As part of its Smart Regulation policy, the European Commission announced in its Work Programme for 2010 that, "to keep current regulation fit for purpose, the Commission will begin reviewing, from this year onwards, the entire body of legislation in selected policy fields through "Fitness Checks".[10] The purpose was to identify excessive burdens, overlaps, gaps, inconsistencies and/or obsolete measures which may have appeared over time.

This report has a comparable aim. Many EU directives and policies are directly or indirectly relevant for the protection of drinking water resources from agricultural practices. Each of these instruments has its own objectives and requirements. **The aim of this report is to review relevant EU directives and policies, to identify legal requirements, and to assess their degree of coherence with the overall objective of the FAIRWAY project, i.e. the protection of drinking water resources against pollution caused by pesticides and nitrates from agriculture in the EU, ('vertical coherence') as well as their horizontal coherence**. An assessment of horizontal coherence between a number of directives enables the identification of any potential negative interactions between these directives. For example, we scored to what extent the requirements of the Drinking Water Directive are coherent with the requirements of the Water Framework Directive, the Groundwater Directive, the Nitrates Directive, and the Pesticides Directive. Horizontal inconsistencies, gaps, overlaps and counterproductive regulations and legal requirements could potentially jeopardize the attainment of the overall purpose of protecting drinking water resources and carry the potential to undermine the effectiveness of the overall legal framework. For that reason, both vertical as well as horizontal coherence needs to be investigated. The distinction between vertical and horizontal coherence is demonstrated in Figure 1.1 with the example of vertical coherence between the WFD and the FAIRWAY objective, and horizontal coherence between the WFD and other directives.



[10] European Commission, 'The Fitness Check of EU Freshwater Policy' (Commission Staff Working Document) SWD (2012) 393 final, p. 2. For pesticides, the fitness check 'REFIT – Evaluation of the EU legislation on plant protection products and pesticides residues' is currently in progress. See https://ec.europa.eu/food/plant/pesticides/refit_en, accessed 21 May 2019.

Figure 1. 1 Demonstration of horizontal and vertical coherence using the example of the WFD

In general, coherence concerns how well different laws and policies work together. Ideally, the objectives of different laws and policies should complement each other, and antagonistic interactions should be avoided. Coherence is therefore a key factor for a successful EU regulatory and policy regime that aims to prevent and to manage diffuse pollution of vulnerable drinking water resources due to agriculture. Coherence can be defined as an attribute of law and/or policy that "systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives".[11] A sectoral policy can be effective in achieving its specific objectives without being coherent in relation to the objectives of other policy areas.[12]

This report provides the results of the research carried out in work package 6.1 of the H2020 FAIRWAY project. Work package 6 aims to examine the coherence and consistency of EU directives and policies (WP6.1); to compare governance arrangements in a range of case studies (WP6.2); to identify lacks of coherence and possible spill-over effects from challenges at the EU level to national, regional and local levels (WP6.3); to identify cost-efficient and coherent management models (WP6.4); and to develop legitimate governance arrangements (WP6.5). Thus, while the present report (D6.1) analyses the degree of coherence at an EU level, report D6.2 provides an overview of the implementation of these EU directives and policies, and governance arrangements, within 13 case study areas across Europe. Both reports will form the foundation for further research to be carried out in later in WP6.

Good governance requires a coherent, efficient and effective governance approach. *Effectiveness* can be measured through analysing the implementation of EU directives and policies at the national, regional and local level. This has been the primary focus of task 6.2 and the national level of the directives' implementation has been comprehensively assessed in the D6.2 deliverable. In task 6.1 we analyse primarily the *level of coherence* within the EU legal framework.

The focus in task 6.1 is on **legal requirements**. The directives and policies that have been reviewed contain a range of different types of requirements, including monitoring requirements; reporting requirements; requirements related to coordination between sectors, authorities and countries; requirements related to instrument choice (such as voluntary or economic instruments, in addition to legal rules), and requirements related to the enforcement and implementation. These categories of requirements have been identified and compiled in Appendix I. The main focus of this report however is on two types of requirements in particular:

1. **Requirements to protect/improve natural resources that contribute to water quality**, including:
    a. general requirements, such as those to generally protect, enhance, or improve quality status or conditions, and;
    b. specific requirements, such as those setting specific threshold values or other fixed limits
2. **Requirements to establish the institutional frameworks for achieving improvements in water quality**
    a. requirements related to establishing criteria, frameworks, catchment management plans and so forth.

[11] Måns Nilsson et al, 'Understanding Policy Coherence: Analytical Framework and Examples of Sector-Environment Policy Interactions in the EU' (2012) 22 *Environmental Policy and Governance* 395-423, 396.
[12] Nilsson et al 2012, p. 395.

These requirements have been identified, screened, scored and analyzed in terms of their vertical coherence with the overarching FAIRWAY objective of protecting drinking water resources against pollution by pesticides and nitrates from agricultural practices, and horizontal coherence with each other. The following table provides an overview over the instruments that were reviewed in task 6.1. The methodology for the coherence assessment will be further explained in the 'Methodology' section.

The following instruments have been reviewed:	
The Water Framework Directive (WFD)	[Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy]
The Drinking Water Directive (DWD)	[Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption]
The Nitrates Directive (ND)	[Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources]
The Groundwater Directive (GWD)	[Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration]
The Sustainable Use of Pesticides Directive (PD)	[Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides]
The Habitats Directive (HD)	[Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora]
The EIA Directive (EIA)	[Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment]
The Industrial Emissions Directive (IED)	[Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control]
Rural Development Regulation (RDR)	[Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005]
EU Common Agricultural Policy (CAP)	[Common Agricultural Policy (CAP) 2014]

Table 1. 1 Overview of legal directives and policies reviewed

Currently, there are several interesting ongoing developments. Firstly, an evaluation of the CAP reform is due soon. Secondly, nutrient and pesticides-related EU regulations for fertilizers will soon enter into force and replace the EU fertilizer regulation 2003/2003 for mineral fertilizers. Adjustments will be made to product-related EU regulations for pesticides. These regulations are directly applicable to member states without the need for transposition into national law. The regulations are relevant for the protection of drinking water resources against pollution since they regulate the entering into markets of products that can affect water quality. They also set quality standards. In this report, these regulations will not be further discussed. The revision of the Drinking Water Directive has some implications for its contribution to the Fairway objective and the horizontal coherence with other directives. Reflections upon the revision have been incorporated in section 4.2.

Relevant instruments not included in the report	
EU Common Agricultural Policy	[CAP reform 2020]
Circular Economy Package	[COM (2016) 157 final 2016/0084 (COD) Circular Economy Package - Proposal for a Regulation of the European Parliament and the Council laying down rules on the making available on the market of CE marked fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009]
Regulation on plan protection products and pesticides residues	[Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC]
SEA Directive	[Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment]
Sewage Sludge Directive	[Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture]
National Emissions Ceilings Directive	[Council Directive 2016/2284 of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC]
Directive on Environmental Quality Objectives	[Council Directive 2008/105/EC of 16 December 2008 on environmental quality standards in the field of water policy]

Table 1. 2 Legal directives excluded from the review

1.2 METHODOLOGY

We explored a variety of possible methodologies to assess the level of vertical and horizontal coherence, including the use of external expertise. The task, however, requires a high level of understanding of EU legal directives and policies, a breadth of knowledge and perspectives, and a variety of views from respondents in different roles and positions. The Fairway partners judged the chosen method to be the most appropriate for the task as it ensures the representation of a wide number of perspectives across sectors and scales, from different geographical areas in Europe, and wide variety in roles and positions. The Fairway partners represent 13 different European countries. Using in-house expertise, rather than involving external consultancy expertise, also entailed an advantage in terms of understanding the purpose of the research and task and the existence of prior knowledge with regard to the various directives. This enabled a cost-effective and sound methodology to complete the task.

The assessment of vertical coherence, i.e. the contribution of the legal framework towards the overarching aim of protecting drinking water resources, and horizontal coherence, i.e. the cohesion amongst the various requirements and directives, consists of several steps.

Steps towards a coherence assessment of EU legal requirements	
Step 1	Inventory of all requirements
Step 2	Identification of interactions between these requirements / screening matrix
Step 3	Evaluation of nature and strength of interactions (scoring)
Step 4	Qualitative analysis of critical interactions

Table 1. 3 Steps towards a coherence assessment

1.2.1 Step 1 – Inventory of all requirements and objectives

In a first step, we **identified** the key requirements and objectives of the various directives and policies. The purpose of the inventory step was to get a comprehensive overview of the requirements and objectives of all instruments. This is a descriptive analytical task.

We designed a template for the review of the relevant instruments. The template distinguished between different categories of requirements (ecological requirements, and requirements related to reporting and monitoring, public participations, and coordination). The template was discussed and tested out in September 2017 for the Water Framework Directive. The template was slightly adjusted and then approved by the group of actors, consisting of ten of the partners to the FAIRWAY project.

After this, the instruments were divided among the partners. Sub-groups were established consisting of two participants from different partners. Together these participants reviewed the instrument designated to them. This review took place in the period between October-November 2017.

At the annual meeting for the FAIRWAY project in Naples (23-24 November 2017), a special session was devoted to task 6.1. In this session, the group of participants carried out an additional check of the completed reviews to assure its correctness, completeness and quality. Each review was re-assessed by a new subgroup of two participants. The final reviews are compiled in and presented in Appendix I - Complete reviews of EU Directives and Policies**.**

1.2.2 Step 2 – Screening matrix

In a second step, we created a **screening matrix** that displayed all the different ecological requirements and objectives in Excel spreadsheets. We created different matrices; the first matrix displayed all ecological (including drinking water quality) requirements and objectives from the ten directives in relation to the overarching FAIRWAY objective to enable a vertical coherence assessment. A further five matrices were developed to display the requirements of five individual directives on the vertical axis against the requirements and objectives of other directives on the horizontal axis for the purpose of a horizontal coherence assessment. These five matrices focused on the most central directives; the Water Framework Directive, the Groundwater Directive, the Drinking Water Directive, the Pesticides Directive and the Nitrates Directive. For the purpose of screening and scoring, we focused primarily on the ecological and environmental requirements and objectives of the directives. Based on the results from the vertical coherence assessment, five directives were identified as highly relevant for the attainment of the Fairway objective. For that reason, the horizontal coherence assessment analyses these five directives thoroughly. The delimitation to these five directives, enabled a more thorough and in-depth horizontal coherence assessment than what would be possible if all directives had been included in this final analysis.

1.2.3 Step 3 – Scoring

In a third step, we **evaluated and scored** the contribution of the various legal requirements towards the overarching FAIRWAY objective using six online surveys. Survey One investigated participant opinions about the contribution of directives to the Fairway objective. This survey was based on the first screening matrix developed in Step 2 (above). We distributed Survey One to ten participants during the period of March-April 2019. Survey's Two-Six were based on the five specific matrices developed in Step 2, each addressing horizontal coherence amongst the legal requirements of the most central directives. These surveys were completed by five partners over the same time period. The surveys were distributed, mostly, in accordance with the partners' involvement in the review process in 2017. For example, the partners who contributed the most to the review process for the WFD in 2017 were given the survey focusing on the coherence between the WFD and other directives. This ensured that the partners, as far as possible, assessed and scored the legal directive within their main field of expertise. Some partners have called on additional expertise of those working in the industry.

The partners have completed one survey each. The scores were generated based on an internal elicitation within the partner institutions. In most cases at least two individuals discussed a given interaction and provided their assessment of what the score 'should be'.

All surveys included two types of items; quantitative Likert-scale items and qualitative open-ended items. The quantitative items asked participants to give a numeric score representing their perception about the interaction of a directive with either the overarching aim of FAIRWAY (Survey One), or with other directives (Survey's Two-Six). Survey One contained 53 of these quantitative items. Each item addressed a different specific requirement of the target directives. For example, 9 items were included on Survey One to measure partner opinions about interactions between 9 requirements of the WFD and the overarching FAIRWAY objectives. These quantitative items were scored on a seven-point Likert-Scale from -3 to +3. The scale was based on the **typology and seven-point scale** presented by Nilsson et al (2016) to assess the degree of coherence.[13] Pursuant to the seven-point scale, interactions may be scored as either positive (indivisible' (+3), 'reinforcing' (+2) or 'enabling' (+1)) or negative ('cancelling' (-3)', 'counteracting' (-2) or 'Constraining' (-1)); or the

[13] Måns Nilsson, Dave Griggs and Martin Visbeck, 'Map the interactions between Sustainable Development Goals' (2016) 534 *Nature* 320-322.

respective legal requirements may be entirely 'neutral' (0) with each other, incurring no significant positive or negative interactions whatsoever, perhaps no interaction at all.[14]

Scoring interactions among legal requirements		
+3	**Indivisible**	The strongest form of positive interaction in which one of the requirements or objectives is inextricably linked to the achievement of the other
+2	**Reinforcing**	One objective or requirement directly creates conditions that lead to the achievement of another
+1	**Enabling**	The pursuit of one objective or requirement enables the achievement of another objective
0	**Neutral**	A neutral relationship where one objective or requirement does not significantly interact with another or where interactions are deemed to be neither positive nor negative
- 1	**Constraining**	A mild form of negative interaction when the pursuit of one objective or requirement sets a condition or constraint on the achievement of another
- 2	**Counteracting**	The pursuit of one objective counteracts another objective
- 3	**Cancelling**	The most negative interaction is where fulfilment of one requirement or objective makes it impossible to reach another requirement/objective

Table 1. 4 Seven-point scale scoring based on Nilsson et al (2016)

Each survey also contained open-ended survey items to help interpret the quantitative data. These items asked respondents to give their opinion about the scorings. For example, open-ended items in Survey Two-Six asked respondents to explain their scorings and give examples.

1.2.4 Step 4 – Data analysis

In a fourth step**,** we analysed the data, including quantitative and qualitative analysis. The scores from Survey One assessing vertical coherence between the directives and the overarching aim to protect drinking water resources against agricultural pollution were analysed by computing averages. Each survey item was given a score on the 7-point Likert-scale by ten separate respondents. For each item we computed the average value.

In contrast, only one partner completed each of the five surveys about the interaction between individual directives. Each survey compared the requirements of one key directive to multiple requirements of each other key directive. For example, in Survey Two, a partner gave scores about the interaction between 4 requirements of the WFD and 4 requirements of the GWD. To analyse this data, we considered each individual interaction, as well as computing the average score of

[14] Ibid. See also David McCollum et al, 'Connecting the sustainable development goals by their energy inter-linkages' (2018) 13 *Environmental Research Letters*.

interactions between all GWD requirements and each single WFD requirement. This approach enabled us to identify on average which directives had the most positive and most negative interactions with each other.

We also conducted a qualitative analysis of respondent answers to open-ended items in each survey. To do this we evaluated the key themes in each response and considered the frequency of occurrence of each theme. This approach allowed us to highlight critical areas where better understanding is needed. Thus, we produced a summary of potential challenging interactions that appear somehow uncertain or are subject to diverging views, and therefore are worthy of further investigation later in WP6.

1.2.5 Delimitations of the methodology

The assessments of the degree of coherence between the directives and FAIRWAY objective (Survey One), and between individual directives (Survey Two-Six) outlined in this report are based upon **respondents' perceptions and opinions**. As such, some bias in the scorings and explanations is unavoidable. The horizontal coherence assessment (Survey One) was carried out by ten WP6 partners. The five vertical coherence assessments (Survey Two-Six) have been divided among the partners to task 6.1 specifically, for budgetary reasons. Given that each survey (for the WFD, GWD, DWD, ND and PD) has been carried out by one partner, this might affect the scoring rates. To increase accuracy of scoring rates, the surveys have been distributed in accordance with the partners' main fields of expertise. Despite the delimitations, the methodology applied offers great value; it allows for the involvement of expert with a high level of understanding of EU legal directives and policies, a breadth of knowledge and perspectives, and a variety of views from respondents in different roles and positions.

1.3 STRUCTURE OF THE REPORT

The report provides an overview of the EU directives and policies that are of relevance for the protection of drinking water resources against agricultural pollution. **Chapter 2** introduces the different instruments with a focus on the ecological requirements and objectives. Based upon the overview of the legal framework and identified legal requirements, chapter 2 also questions whether the overall legal framework is fit for purpose to avoid pollution of drinking water resources by pesticides and nitrates from agricultural practices. This question is answered through an analysis of survey results where the experts have scored the contribution of the numerous requirements to the overall FAIRWAY objective. Finally, chapter 2 describes which directives and requirements are of particular importance, and which are of a more neutral or even contradictory nature.

Chapter 3 provides a thorough examination of the degree of horizontal coherence amongst the various directives and requirements. The focus in this chapter is on the ecological requirements of the five most central directives only. These are the Water Framework Directive, the Groundwater Directive, the Groundwater Directive, the Pesticides Directives, and the Nitrates Directive.

The final chapter, **chapter 4**, provides a synthesis and some final recommendations for further research.

The **appendices** to the report include the full reviews of the relevant directives and policies identifying the ecological requirements and objectives, monitoring and reporting requirements; requirements related to public participation (including farmer organisations); and coordination requirements (Appendix I). Appendix II presents the average scores for the degree of vertical coherence per requirement per directive. Appendix III presents the average scores for the degree of horizontal coherence amongst legal requirements of the five core directives. Appendix IV summarizes the highlights of positive and negative interactions between these legal requirements.

2. THE EU LEGAL FRAMEWORK AND ITS CONTRIBUTION TO THE PROTECTION OF DRINKING WATER RESOURCES

This chapter **introduces and assesses the different EU directives and policies relevant to the protection of drinking water resources against pollution from agricultural practices.** The chapter reviews the Water Framework Directive, the Groundwater Directive, the Drinking Water Directive, the Nitrates Directive, the Directive on the Sustainable Use of Pesticides, the Habitats Directive, the Industrial Emissions Directive, the Directive on Environmental Impact Assessment, the Common Agricultural Policy and the Rural Development Regulation.

The sections present the legal requirements imposed on states and/or the farming industry, with a focus on ecological requirements (including drinking water quality requirements). During the study, monitoring and reporting requirements; requirements related to public participation (including farmer organisations); and coordination requirements have also been identified. All these categories of requirements have been identified for each directive. For a full overview of these requirements for each directive, see Appendix I - Complete reviews of EU Directives and Policies.

The **ecological requirements** and objectives were subject to a **coherence assessment**. The various requirements and objectives have been scored in terms of their contribution to the overall objective of protecting drinking water resources against pollution by nitrates and pesticides from agricultural practices (**vertical coherence**).

The results presented in this chapter are based upon a survey completed by experts from ten different partners. The experts scored the requirements and objectives as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling') or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling'); or the respective requirements may be entirely 'consistent/neutral' (0) with each other, incurring no significant positive or negative interactions whatsoever, perhaps no interaction at all.[15] (see section 1.2.3)

In this chapter, average scoring rates will be presented per directive as well as interesting average scoring rates for certain requirements. For a full overview of all the average scorings per requirement per directive, see Appendix II - Average scores for vertical coherence per requirement per directive.

2.1 WATER FRAMEWORK DIRECTIVE

The 2000 Water Framework Directive (WFD) is the most comprehensive instrument of EU water policy. The WFD and its daughter Directives, including the 2006 Groundwater Directive and the 2008 Environmental Quality Standards Directive, are integrating or progressively replacing other earlier Directives which focused on specific pollutants or objectives. The adoption of the WFD aimed to include all significant surface and groundwater bodies and to set objectives for the achievement of good status for those water bodies. The actions to be taken under the Directive are aimed at managing all the pressures which may prevent the achievement of those objectives including diffuse and point sources or hydro morphological pressures, water scarcity and vulnerability.

The main objective of the WFD is to protect and enhance freshwater resources with the aim of **achieving good ecological status** of EU waters by 2015 or, failing that, by 2021 (or 2027 at the

[15] Nilsson et al 2016 (n 13); McCollum 2018 (n 14).

latest). Simultaneously, all the waters are regulated by the non-deterioration clause, which requires EU member states to implement all the necessary measures to prevent the further deterioration of the water bodies. The assessment of ecological status is primarily based on three or four Biological Quality Elements (BQEs) depending on the water body in question.

The substantive goal of good ecological status is implemented via several **procedural requirements**. First, the Directive requires the member states to **identify all the river basins** in their area, and to ensure appropriate administrative arrangements, including the identification of competent authorities responsible for implementing the WFD. It thus requires EU member states to establish river basin districts that are based on geographical and hydrological criteria instead of administrative or political boundaries.

Second, member states must conduct an **analysis of the characteristics of each water body**, a review of the impact of human activity on the status of waters, and an economic analysis of water use in each river basin.

Third, member states must establish a **register** of all areas lying within each river basin district which have been designated as requiring special protection under specific EU legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water.

Fourth, member states shall **identify**, within each river basin, **all bodies of water used for the abstraction** of water intended for human consumption providing more than 10 m^3 a day as an average or serving more than 50 persons, and those bodies of water intended for such future use.

Fifth, member states must establish **programmes for the monitoring** of the water status. These monitoring programmes are directly linked to a **programme of measures** which must also be established for each river basin. Each programme of measures shall include the basic measures and, where necessary, supplementary measures to achieve the ecological objectives of the directive.

The programme of measures could incorporate requirements deriving from earlier EU directives, such as the Nitrates Directive, as well as some new obligations including control on diffuse sources of pollution and abstraction, protection of drinking water, promotion of efficient and sustainable water use and a water pricing policy. Supplementary measures can be applied in addition to the basic measures, as deemed necessary, to achieve the good status objectives. This might include training and advice, investments and agri-environment-climate operations in Rural Development Programmes.

Where monitoring or other data indicate that the objectives set under WFD art. 4 for the body of water are unlikely to be achieved, the member state shall ensure that the causes of the possible failure are investigated, relevant permits and authorizations are examined and reviewed as appropriate, the monitoring programmes are reviewed and adjusted as appropriate, and additional measures as may be necessary to achieve those objectives are established.

Finally, member states shall ensure that **a river basin management plan** is produced for each river basin district lying entirely within their territory and for transboundary rivers. The river basin management plan shall include the information detailed in WFD annex VII. In practice, a river basin management plan is a summary of the procedural obligations set by the directive.

2.1.1 Contribution of the WFD requirements to achieving FAIRWAY objective

Label	*Requirements and objectives of the WFD*
Protect surface water	To protect surface waters, transitional waters, coastal waters and groundwater, to prevent their further deterioration and enhance their status, and to promote sustainable water use (Art.1)

Prevent deterioration	To implement the necessary measures to prevent deterioration of the status of all bodies of surface water (art.4.1 (a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (art.4.1 (a)(ii))
Protect/enhance artificial bodies	To protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (art. 4.1(a)(iii)).
Reduce pollution	To implement the necessary measures with the aim of progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (art. 4.1(a)(iv)).
Maintain good status	To establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (art. 1)
Review river basins	To identify river basins in their area (art. 3.1); to ensure an analysis of each river basin's characteristics, to review the impact of human activity on the status of surface waters, and to conduct an economic analysis of water use according to the technical specifications set out in Annexes II and III (art. 5.1).
Produce RBM plans	To ensure that a river basin management plan is produced for each river basin district lying entirely within their territory (art. 13.1).
Establish basin programmes and measures	To ensure the establishment for each river basin district, of a programme of measures, in order to achieve the objectives established under article 4 (art. 11.1).
Identify water bodies	To identify all bodies of water used for significant abstraction for human consumption (art. 7)

Table 2. 1 Requirements and objectives of the WFD

Ten respondents gave a score on a 7-point Likert-scale based on their perception about the interaction between requirements of the WFD and the FAIRWAY objective, indicating whether experts believe that the WFD contributes positively or negatively to achieving those objectives. Figure 2.1 demonstrates that respondents perceive that the requirements to protect surface waters (Art. 1 WFD), and to prevent deterioration of surface waters (Art. 1 WFD and Art. 4.1(a)(i)) are indivisible (+3) to the FAIRWAY objective. Further, respondent scores contained little variability. Between 60% and 70% of the respondents gave a score of +3, suggesting they believe that these provisions are highly contributive to the protection of drinking water resources.

Responses related to requirements for protecting and enhancing modified water bodies (Art. 4.1(a)(iii)), reducing pollution (Art. 4.1(a)(iv)), and establishing a framework to achieve or maintain good status of water (Art. 1), suggest that respondents believe that these articles are only moderately contributive to the FAIRWAY objective. Responses were also more varied. For example, only 50%

of respondents gave a score of +3 to the requirement related to modified water bodies. Finally, Articles 5.1, 13.1, and 11.1 WFD, concerning reviewing basin management plans and developing programmes and measures, are perceived to be the least contributive to the protection of drinking water resources. While these scores were still positive, indicating some contributive value, there was much greater variability in responses. For example, only 20% of respondents considered that the requirement to develop a programme of measures (Art. 11.1) is highly important (indivisible +3), while 80% considered that the requirement is enabling (+1) or reinforcing (+2).

Overall, the average value of all responses to all survey items was **positive (M = 2.1)**. This suggests that respondents believe the general requirements of the WFD are considered to contribute positively to the protection of drinking water resources against pesticides and nitrates from agricultural practices.

Responses to open-ended survey items give some **explanation** about the overall positive scores, and the variability between scores for different requirements. Respondents suggested that requirements related to protecting and enhancing water quality impose positive duties upon states to protect surface and groundwaters, and to promote their sustainable use. In contrast, several responses related to the more procedural requirements suggest that management plans, programs, and measures, are not necessarily sufficient to achieve the protection of drinking water resources. Responses also suggest that the effectiveness of WFD requirements to achieve outcomes is further complicated by partly overlapping requirements and objectives of other directives.

For example, one respondent suggested it is necessary to reduce N loads in order to achieve the FAIRWAY objective. Thus, the contribution of the WFD should also be considered in combination with other directives, such as the Nitrates Directive. Nitrate is a core parameter in the groundwater monitoring. Both nitrates and pesticides belong to the group of main pollutants (Annex VIII, WFD) and many pesticides are among the priority substances (Annex X). The ‘one out - all out’ approach of the WFD means that if a water body fails to achieve good status as a result of pesticides or nitrates pollution, the country will be subject to fines and other penalties. The contribution of the WFD to the FAIRWAY objective is generally valued as being **highly positive**, yet also somehow **dependent** upon the implementation of related directives such as the Nitrates and Pesticides Directives.

Overall, the results suggest that some of the requirements are more relevant than others. To illustrate, establishing an overarching framework for achieving or maintaining good water status is imperative for the FAIRWAY objective, while developing management strategies for river basins alone is not sufficient; multiple scales of management are necessary to achieve outcomes. It is also argued that the river basin approach focuses primarily on surface waters, which can be used for many other purposes than only drinking water resources. Importantly though, the river basin management plans and programs of measures could be designed so that they contribute to reductions in nitrates and pesticides. Therefore, these tools contribute positively to the achievement of the overarching FAIRWAY objective, insofar that these plans are accompanied by substantive obligations to decrease pollution. The procedural requirements are vaguely formulated, so their actual contribution does depend on the implementation by member states.

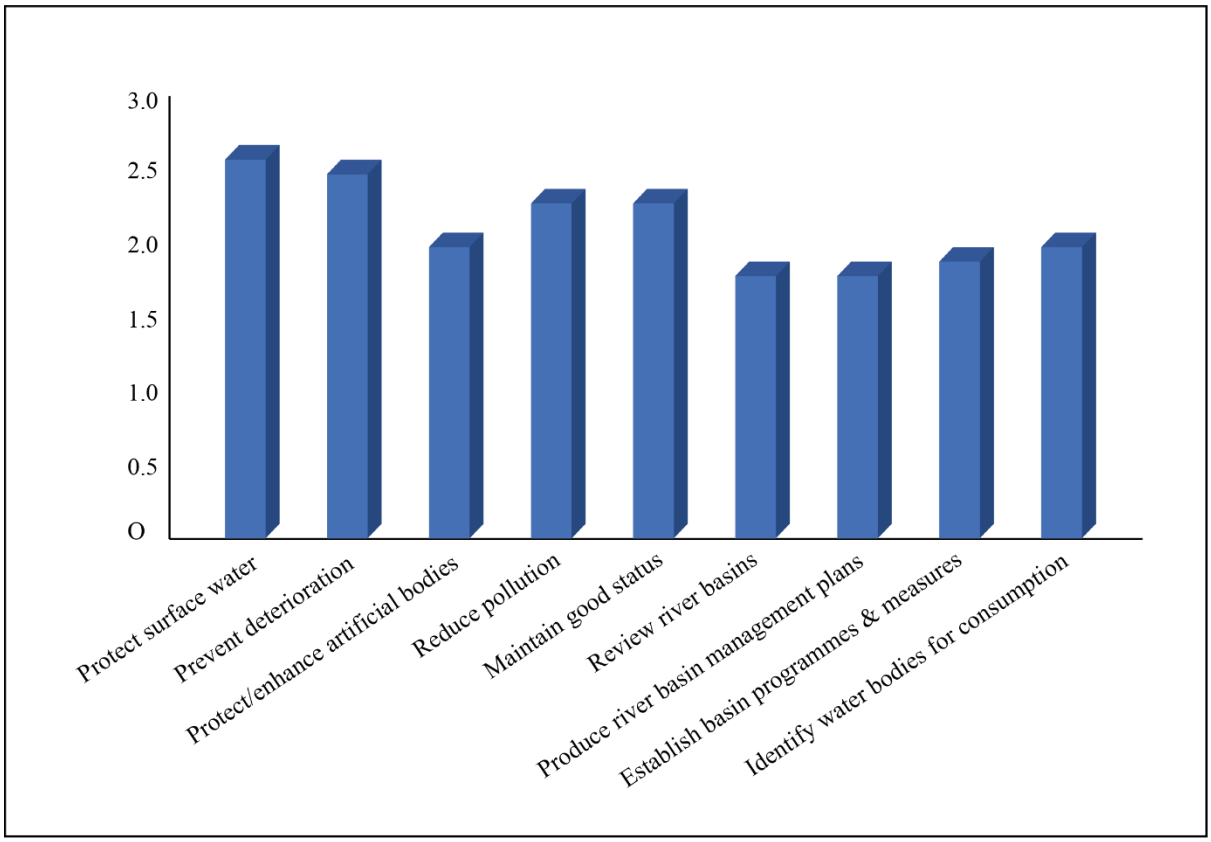


Figure 2. 1 Ten respondents scored the contribution of the various provisions of the WFD to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.2 GROUNDWATER DIRECTIVE

Water bodies are at particular risk from certain hazardous substances which can affect ecosystems and threaten human health. Therefore, under the WFD, **complementary directives** have been adopted on the protection of **groundwater** against pollution and deterioration and on **environmental quality standards** establishing the standards which constitute the chemical status criteria for the Water Framework Directive.[16] Both the Groundwater Directive and the Directive on Environmental Quality Standards follow from obligations under the WFD and are directly relevant to the determination of the environmental objectives and standards specified under the WFD.[17]

To illustrate, the 2006 **Groundwater Directive (GWD)** contains an elaboration of the goals for groundwater specified in the WFD. Groundwater protection is a priority in EU environmental policy for several reasons. Firstly, once contaminated, groundwater is much more difficult to clean than surface water and the consequences can last for decades, if not indefinitely. Secondly, as groundwater is frequently used for the abstraction of drinking water, for industry and for agriculture, groundwater pollution can endanger human health and threaten those activities. Thirdly, groundwater provides the base flow for many rivers (it can provide up to 90% of the flow in some

[16] European Commission, 'The Fitness Check of EU Freshwater Policy' (Commission Staff Working Document) SWD (2012) 393 final, p.4-5.
[17] European Commission, 'Fitness Check of the EU Water Legislation' http://ec.europa.eu/environment/water/fitness_check_of_the_eu_water_legislation/index_en.htm, accessed 1 May 2019.

watercourses) and can thus affect the quality of surface water systems. Fourthly, it also acts as a buffer through dry periods, and is essential for maintaining wetlands.[18]

The GWD establishes **specific measures** to prevent and control groundwater pollution by forming **criteria** for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends in groundwater pollution and for the definition of starting points for trend reversals (Art. 1). Another goal of the GWD is the establishment of **measures to prevent and limit indirect discharges of pollutants into groundwater** (Art. 6).

Groundwater is considered to have a **good chemical status** when measured or predicted nitrates levels do not exceed **50 mg/l**, while those of active pesticide ingredients, their metabolites and reaction products do not exceed **0.1 µg/l** (a total of 0.5 µg/l for all pesticides measured). Furthermore, the levels of certain high-risk substances should be below the **threshold values** set by EU countries. These substances should, at the very least, include arsenic, cadmium, lead, mercury, ammonium, chloride, sulphate, nitrites, phosphorus (total)/ phosphates, trichloroethylene and tetrachloroethylene.

The concentration of any other pollutants should conform to the definition of good chemical status as set out in Annex V to the Water Framework Directive. If a value set as a quality standard or a threshold value is exceeded, an investigation needs to confirm, among other things, that this does not pose a significant environmental risk.

By 22 December 2008, EU countries had to set a threshold value for each pollutant identified in any of the bodies of groundwater within their territory considered to be at risk. As a minimum, they had to set threshold values for the list of pollutants indicated above. For each pollutant on the list, information (as defined in Annex III GWD) must be provided on the groundwater bodies characterised as being at risk, as well as on how the threshold values were set. These threshold values must be included in the River Basin District Management Plans provided for under the Water Framework Directive.

EU countries must identify any significant and sustained **upward trends** in levels of pollutants found in bodies of groundwater. In order to do so, they must establish a **monitoring programme** in conformity with Annex IV GWD.

As described, the Groundwater Directive is closely connected to the **WFD.** These connections are also apparent in the context of preventing and limiting discharges of pollutants. To illustrate, the **programme of measures** drawn up for each river basin district under the WFD must include preventing indirect discharges of all pollutants, in particular those hazardous substances mentioned in Points 1 to 6 of Annex VIII to the Water Framework Directive, as well as the substances mentioned in Points 7 to 9 of the Annex, when deemed to be hazardous. Furthermore, pollutants not listed as hazardous must also be limited if they pose a real or potential risk of pollution.

Except in those cases where other EU legislation establishes more stringent requirements, preventive measures may exclude, among other things, the results of authorized direct discharges, pollutants present in such small quantities that they pose no risk, the results of accidents or natural disasters, or pollutants resulting from discharges which, for technical reasons, the competent authorities consider to be impossible to prevent or limit without resorting to measures that would increase the risk to human health or to the environment or to measures that would be disproportionately costly.[19]

[18] Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration.
[19] Ibid.

In order to ensure consistent protection of groundwater, member states sharing bodies of groundwater should **coordinate** their activities in respect of monitoring, the setting of threshold values, and the identification of relevant hazardous substances.

2.2.1 Contribution of the GWD requirements to the FAIRWAY objective

Label	*Requirements and objectives of the GWD*
Prevent pollution	To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (art. 1)
Establish chemical thresholds	Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (art. 3.1)
Introduce stricter thresholds	Where threshold values from Annex II (50 mg/L for nitrates and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (Annex I)
Ensure sufficient measures	MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment (art.6)

Table 2. 2 Requirements and objectives of the GWD. Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

Figure 2.2 demonstrates that respondents perceive that the requirements related to **threshold values** (Art.3.1 GWD and Annex I) are indivisible (+3) to the FAIRWAY objective. Further, respondent scores contained little variability. Between 70% and 80% of respondents gave a score of +3, suggesting that the participants believe that these provisions are highly contributive to the FAIRWAY objective.

Scores related to requirements to establish criteria (Art.1 GWD) and to include preventive measures in the programme of measures (Art. 6 GWD) suggest that these requirements are also contributive to the FAIRWAY objective. Yet responses were more varied; only 60% of the respondents gave a score of +3 to these requirements. Overall, the average value of all responses to all survey items related to the contribution of requirements of the GWD to achieving the FAIRWAY objectives was **highly positive (M = 2.6)**. A score of +3 suggests requirements are 'indivisible', while a score of +2 indicates requirements are 'reinforcing'. The average value falls between these categories which suggests that participants believe that the general requirements of the GWD contribute positively to the protection of drinking water resources against pesticides and nitrates from agricultural practices.

Responses to open-ended survey items give some **explanation** about the overall positive scores, and variability between scores for different provisions. Most respondents suggest that the GWD requirements are directly reinforcing or indivisible with the FAIRWAY project objectives as they all contribute to improvements in drinking water quality. For example, one participant suggested that

the GWD reinforces the FAIRWAY objectives by influencing industry standards beyond the agricultural sector. Similarly, the threshold values, criteria, and measures stipulated under the GWD reinforce the objectives of other sectors by creating supportive institutional conditions.

In contrast, other respondents suggested that requirements of the GWD related to threshold levels of pollutants do not support the FAIRWAY objectives. For example, threshold levels of nitrates (50 mg/L) and pesticides (0.1 µg/L) are not necessarily sufficient for controlling pollution. One respondent suggested that a fixed threshold level for pesticides is not always effective in all environmental contexts, or for all categories of pesticides. Fixed thresholds could limit the leakage of less harmful pesticides to the environment, while not being stringent enough for other more harmful types of pesticides. Another respondent also questioned the accuracy of how thresholds are calculated. It is possible that the type of evidence needed to inform these calculations might be unclear and not described specifically enough in the Directive.

These varying perspectives from respondents suggest that there are elements of GWD requirements that support the FAIRWAY objective, and elements that may conflict with the objective. For example, setting threshold values may support wider institutional frameworks, however, the effectiveness of thresholds may vary depending on context.

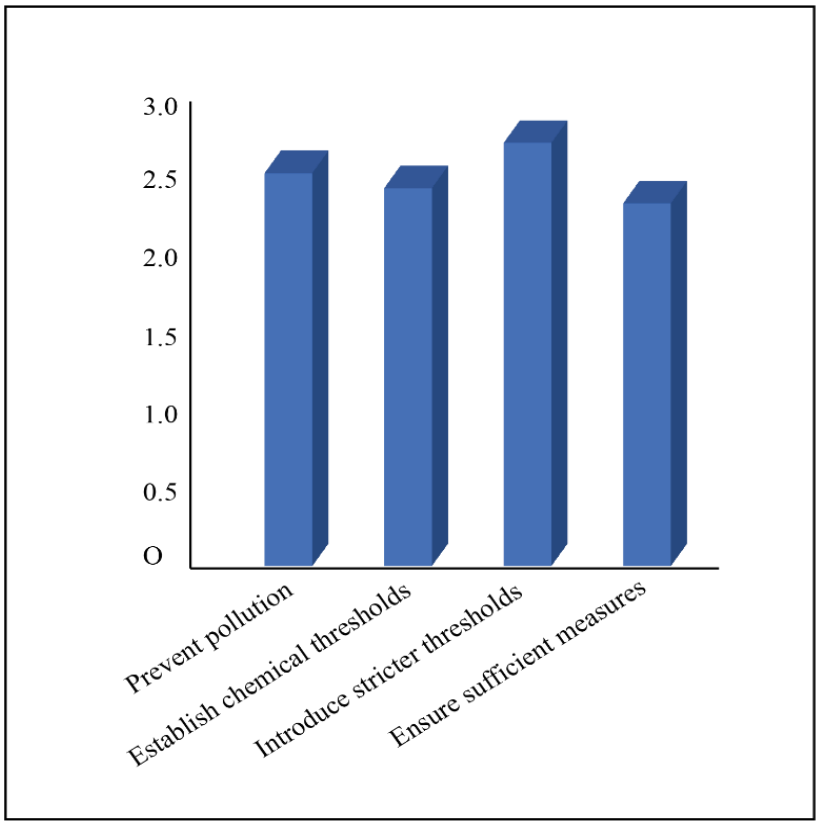


Figure 2. 2 Ten respondents scored the contribution of the various provisions of the GWD to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.3 Drinking Water Directive

The 1998 Drinking Water Directive (DWD) concerns the quality of water intended for human consumption. Its **objective** is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean. The DWD sets minimum quality standards for water intended for human consumption.

The Directive applies to all distribution systems serving more than 50 people or supplying more than 10 cubic meter per day, but also distribution systems serving less than 50 people/supplying less than 10 cubic meter per day if the water is supplied as part of an economic activity. The Directive also applies to drinking water from tankers; drinking water in bottles or containers; and water used in the food-processing industry, unless the competent national authorities are satisfied that the quality of the water cannot affect the wholesomeness of the foodstuff in its finished form.

Member states are required to take all necessary **measures** to ensure that the water intended for human consumption is wholesome and clean and in no circumstances those measures have the effect of allowing any deterioration of the present quality of water intended for human consumption. Furthermore, member states should set the **values** applicable to water intended for human consumption for the parameters set out in Annex I of the DWD. The values shall not be less stringent that those set in Annex I; moreover, they will set values for additional parameters not included in Annex I, where the protection of human health within their national territory of part of it so requires. Member states shall also take all necessary measures to ensure that no substances, materials for new installations, impurities associated with such materials remain in the water intended for human consumption.

Member states are required to **monitor** regularly the quality of water intended for human consumption, and to ensure that any failure to meet the parametric values is investigated and corrected through **remedial action** as soon as possible. Currently, a total of 48 microbiological, chemical and indicator parameters must be monitored and tested regularly, including nitrates and pesticides.

The DWD allows member states to prohibit or restrict the use of the respective water supply if health protection reasons impose it. Consumers should be informed promptly thereof and be given the necessary advice.

Member states may, for a limited time depart from chemical quality standards specified in the Directive (Annex I). **Derogations** can be granted, provided it does not constitute a potential danger to human health and provided that the supply of water intended for human consumption in the area concerned cannot be maintained by any other reasonable means.

On 1 February 2018, the European Commission adopted a **proposal** for a revised drinking water directive to improve the quality of drinking water and provide greater access and information to citizens. The proposal updates existing safety standards in line with latest recommendations of the World Health Organisation (WHO) and ensures that drinking water is safe to use for the decades to come. The proposal also improves access to information for citizens.

2.3.1 Contribution of the DWD requirements to the FAIRWAY objective

Label	*Requirements and objectives of the DWD*
Protect from contamination	To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (art. 1)
Free from harmful substances	To ensure that water used for human consumption should be free from any microorganisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (art. 2, annex 1)

Prevent deterioration and pollution	To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (art. 4)
Take remedial action	If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (art. 8)
Prevent deterioration from infrastructure	Materials used in new infrastructure should not deteriorate in any way the quality of water for human consumption (art. 10)

Table 2. 3 Requirements and objectives of the DWD

Figure 2.3 demonstrates that respondents perceive that the requirement related to the protection against contamination of water intended for human consumption (Art. 1 DWD) is indivisible (+3) to the FAIRWAY objective. Respondent scores contained very little variability as 90% gave a score of +3. This suggests that they believe that this requirement is highly contributive to the FAIRWAY objective. Similarly, the requirement to ensure that measures taken avoid increasing pollution of drinking water resources (Art. 4 DWD) is also perceived to be indivisible (+3) pursuant to 80% of the partners consulted.

Requirements related to ensuring that water is free from harmful substances (Art. 2) and related to taking remedial action (Art. 8) were also perceived to contribute positively to the FAIRWAY objective. However, scores were more varied. Only 50% of the respondents felt that the requirement to ensure water is free from harmful substances is indivisible (+3) to FAIRWAY objective, while 60% felt that requirements to take remedial action were indivisible (+3). With regards to both requirements, 20% of respondents suggested the interaction with FAIRWAY objectives is neutral (0), meaning that these requirements incur no significant positive or negative interactions with the FAIRWAY objective.

Scores given by respondents about the requirement related to the use of materials in new infrastructure (Art. 10 DWD) was not perceived to be of importance to the FAIRWAY objective; 70% of respondents suggested the interaction is neutral (0).

Responses to open-ended survey items give some **explanation** about the variability between scores for different requirements. Comments by respondents suggest that some requirements are more directly relevant to the FAIRWAY objective to protect drinking water resources against pollution by pesticides and nitrates from agricultural practices compared to others. For example, one participant suggested that the requirement related to materials in new infrastructure (Art. 10 DWD) is not contributive to the FAIRWAY objective since the construction of new infrastructure will seldom have an impact on nitrates and pesticides pollution.

These comments suggest that more direct contributions may be perceived more positively than less direct interactions between requirements of directives and the FAIRWAY objective. For example, the requirement related to remedial action (Art. 8 DWD) targets a different temporal scale of management compared to the FAIRWAY objective. Remedial action includes restoration of degraded resources, while the FAIRWAY objective is perhaps more focused on long term *prevention* of pollution. Thus, respondents may perceive a less direct relationship between the long-term goals of FAIRWAY, and the more immediate reactive purpose of restoration.

In addition, the requirement to ensure that water used for human consumption should be free from any micro-organisms, parasites and substances which, in numbers or concentrations, constitute a potential danger to human health (Art.2, annex 1 DWD) might be unclear in terms of their relevance for pollution by pesticides and nitrates. This might explain the more varied responses to this question.

For example, one respondent expressed uncertainty as to how nitrates and pesticides interact with micro-organisms and parasites.

The distinction between direct and indirect interactions between requirements of EU Directives, and the objectives of FAIRWAY is an important finding that may speak to more institutional barriers between conceptualization of water quality policy, and on ground practice. These findings should be addressed further in successive tasks in WP6.

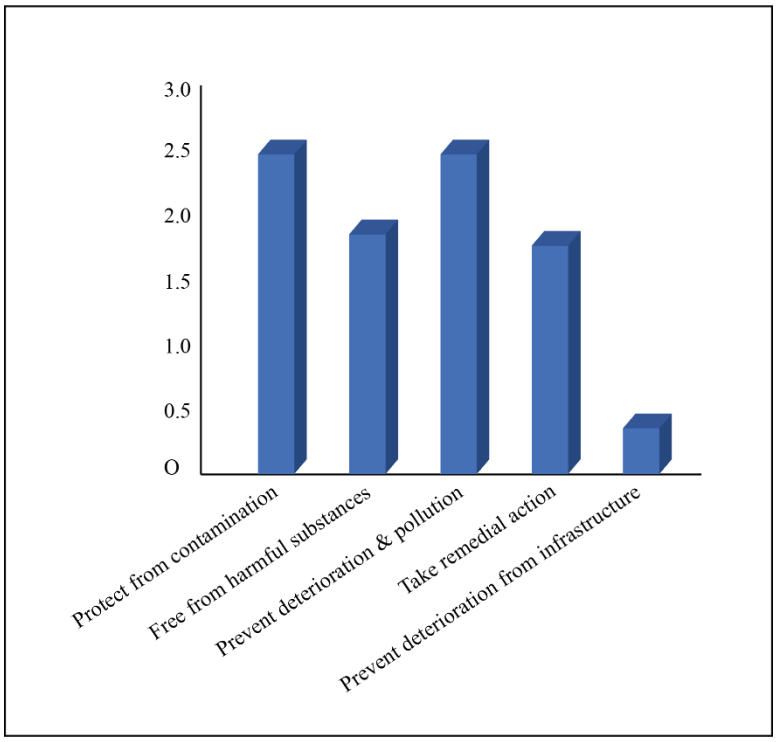


Figure 2. 3 Ten respondents scored the contribution of the various provisions of the DWD to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.4 NITRATES DIRECTIVE

The 1991 Nitrates Directive (ND) deals with the relationship between agriculture and water quality and aims to reduce water pollution caused by nitrates from agricultural sources and to prevent further such pollution. Nitrates pollution from agriculture is a major problem in some parts of Europe, causing eutrophication of freshwater ecosystems and increasing costs to water providers who have to undertake additional treatment of abstracted water to meet drinking water standards. In order to reduce and prevent water pollution caused by nitrates pollution originating from agricultural sources, member states must monitor waters, designate so-called nitrates vulnerable zones and then adopt and implement action programmes and codes of good agricultural practices with the aim of improving fertiliser management and preventing nitrates leaching towards waters. To assess the effectiveness of these actions, monitoring programmes must be put in place.[20] Full implementation of the directive should deliver waters that do **not exceed 50 mg/l of nitrates** and are not eutrophic as a result of agricultural nutrient losses.[21]

[20] European Commission, 'The Fitness Check of EU Freshwater Policy' (Commission Staff Working Document) SWD (2012) 393 final, p.5

[21] European Commission, 'Agriculture and Sustainable Water Management in the EU' (Commission Staff Working Document) SWD (2017) 333 final, p.13-14.

The ND requires that member states establish a voluntary **code of good agricultural practices** available to all farmers throughout the country, and a mandatory **action program**, which should be applied either within nitrates vulnerable zones or throughout the whole country.

Nitrates vulnerable zones (nvz), which are areas that drain into waters that are polluted or at risk of pollution, shall be designated by member states. When establishing the nitrates vulnerable zones, the member states may, instead of designating specific zones, opt to apply an action programme throughout the entire agricultural land.[22]

The member states that designate specific areas need to define the **criteria** for designation. These criteria are based on the definition of polluted waters as set by Annex 1 of the Directive but can vary between member states.[23]

Action programs include measures to limit the period when the land application of fertilizers is allowed; balanced nitrogen fertilization; a limit to the application of manure nitrogen; and limitations to application of nitrogen fertilizers on sloping soils, during wet conditions, and near watercourses. Additional measures that can be taken include land use management, crop rotation, and winter crops. The Directive allows the possibility to derogate from the maximum amount of **170 kg** of nitrogen per hectare per year from livestock manure in vulnerable zones, provided that objective criteria set in Annex III to the Directive are met and that the derogated amounts do not prejudice the achievement of the Directive's objectives.

The standards of management required of farmers who benefit from derogations are higher than those of the action programmes, with additional obligations for nutrient planning and extra constraints on land management. Derogations are granted by means of a Commission Implementing Decision, following the opinion of the Nitrates Committee, which assists the Commission in the implementation of the Directive.

The designation of nitrates vulnerable zones and action programmes should be reviewed at least every four years. Member states are also obliged to submit a progress report on the implementation of the Directive every four years with information on codes of good agricultural practice, nitrates vulnerable zones, water monitoring results, relevant aspects of action programmes.[24]

2.4.1 Contribution of the ND requirements to the FAIRWAY objective

Label	*Requirements and objectives of the Nitrates Directive*
Reduce pollution	To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (art. 1)
Limit livestock manure	Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (Annex III)
Limit groundwater pollution	MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (Annex I)

[22] Ibid, p.10.

[23] Ibid, p.11.

[24] European Commission, 'Report on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2012–2015' (Report from the Commission to the Council and the European Parliament) COM (2018) 257 final, p.2.

Identify vulnerable zones	MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (art. 3.3)
Establish codes of agricultural practice	MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (art 4.1.b). (these measures are obligatory in NVZ)
Establish action programmes	MS shall establish action programmes in respect of the designated vulnerable zones or part of it (art. 5.1 to 5.4)

Table 2. 4 Requirements and objectives of the ND

The average across all scores given by respondents for the interaction between all requirements of the ND and the FAIRWAY objective suggests that respondents perceive these requirements contribute **highly positively (M = 2.5)** to the protection of drinking water resources against nitrates from agricultural practices. However, there was variability between scores for individual requirements. Figure 2.4 demonstrates that respondents perceive that the requirements to reduce pollution by nitrates (Art. 1 ND) is clearly indivisible (+3) for the protection of drinking water resources; 90% of the respondents gave a score of +3 to this requirement. Also the requirement to limit groundwater pollution is considered to be indivisible (+3) pursuant to 80% of the respondents.

Participants suggested that the requirements to identify vulnerable zones (Art. 3.2 ND) and action programmes (Art.5.1 ND) also contribute positively to the protection of drinking water resources; 70% of the respondents agreed the interaction is indivisible (+3), while the remaining respondents scored the requirements either as being enabling (+1) or reinforcing (+2).

The explicit limit to the amount of livestock manures applied on land (170kg/ha each year) (Annex III), is generally considered to be a positive contribution to achieving the FAIRWAY objective. However, there was a high variety among the scores. While 60% of the respondents suggested the interaction is indivisible (+3), other respondents suggested the interaction is reinforcing (+2), enabling (+1), neutral (0), and in one instance, constraining (-1).Thus, expert opinions are more divided about the interaction between this requirement related to a specific value and pollution limit, compared to more general requirements about reducing pollutants, and enacting programmes.

Responses to open-ended survey items give some **explanation** about the overall positive scores, and variability between scores for different provisions. In general, the ND is considered to contribute positively to the protection of drinking water resources against pollution by nitrates from agricultural practices, since the ND is aimed at improving drinking water quality and reducing nitrates pollution. However, experts were divided about the contribution of specific pollution limits, such as the limit of 170 kg N per ha of animal manure. Respondents suggested that having one target for all member states may not be effective as implementation varies significantly between states. One respondent suggested that in some cases it may be appropriate that higher levels of fertilizer use are permitted, providing that the *sum* amount of manure and fertilizer application is appropriate. Similarly, another respondent suggested that in certain catchment areas, threshold levels could be higher without adversely affecting water quality, while in other areas the threshold level should be lower to protect water quality. Further, designation of nitrate vulnerable zones is considered to be helpful to designate zones with nitrate problems and to implement effective measures to decrease nitrates leaching in these areas. The designation in combination with implementing measures and monitoring, as

required by the ND, contributes positively to the protection of drinking water resources. Similarly, a code of conduct, as required by Art. 4.1 ND, should be accompanied by an effective enforcement mechanism to ensure its positive contribution to the FAIRWAY objective.

These findings are consistent with the divided responses given about the contribution of threshold values under the GWD; experts are divided about whether fixed thresholds are effective in all circumstances. Further, some of these responses may be related to knowledge about the Directives. For example, the suggestion that fertilizer and manure contributions should be considered cumulatively, rather than limited by prescriptive thresholds, is accounted for in the actions programmes of the ND. This may reflect the need for increased knowledge about directive requirements within policy and management spheres, and should be considered in successive tasks in WP6.

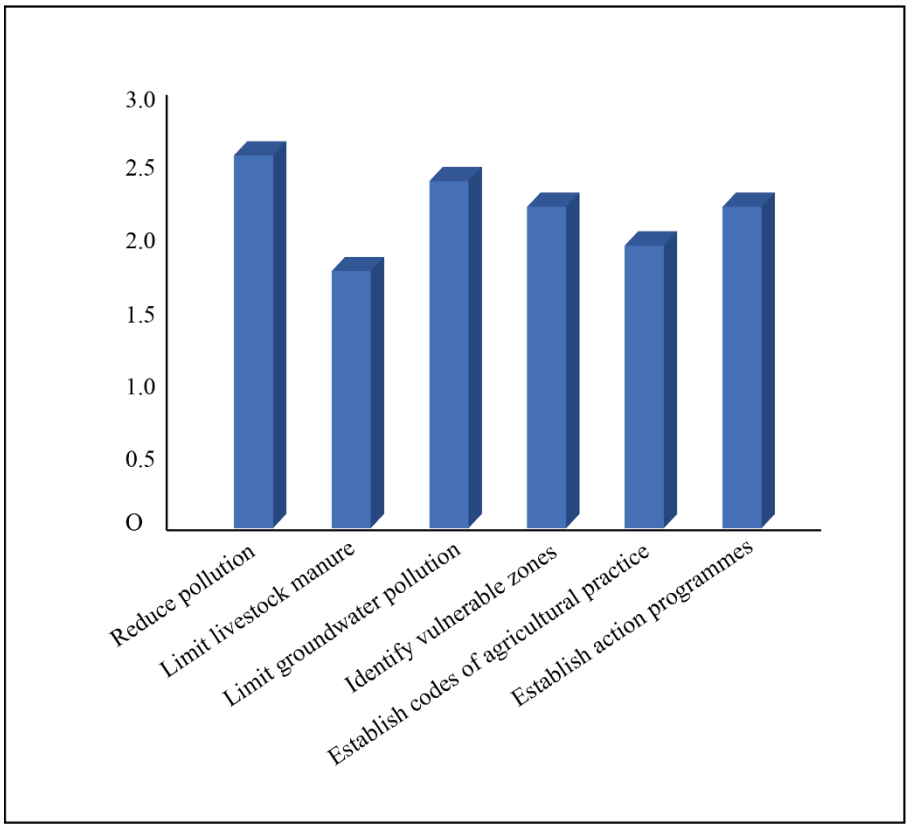


Figure 2. 4 Ten respondents scored the contribution of the various provisions of the ND to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.5 DIRECTIVE ON THE SUSTAINABLE USE OF PESTICIDES

The 2009 Pesticides Directive (PD) provides for a range of actions to achieve a sustainable use of pesticides in the EU by reducing the risks and impacts of pesticide use on human health and the environment and promoting the use of **Integrated Pest Management** (IPM) and of alternative approaches or techniques, such as non-chemical alternatives to pesticides.[25]

Member states were required to adopt **National Action Plans** (NAPs) to implement the (PD) for the first time by November 2012. These plans should contain quantitative objectives, targets,

[25] European Commission, 'Report on Member State National Action Plans and on progress in the implementation of Directive 2009/128/EC on the sustainable use of pesticides' (Report of the Commission to the European Parliament and the Council) COM (2017) 587 final, p.2.

measurements and timetables to reduce the risks and impacts of pesticide use on human health and the environment.[26] The directive identifies specific **measures** that member states are required to include in their plans for proper implementation. The main actions relate to training of users, advisors and distributors, inspection of pesticide application equipment, the prohibition of aerial spraying, limitation of pesticide use in sensitive areas, and information and awareness raising about pesticide risks. These plans should be **reviewed** at least every five years.

A cornerstone of the directive is the promotion of **IPM**, for which general principles are laid down in Annex III to the directive. Article 3 of the directive provides a definition of IPM and Article 14(4) requires member states to describe in their NAPs how they ensure that the general principles of IPM are implemented by all professional users by 1 January 2014.[27] IPM has been described as one of the tools for low-pesticide-input pest management. It involves an integrated approach to the prevention and/or suppression of organisms harmful to plants through the use of all available information, tools and plant protection methods. IPM further aims at keeping the use of pesticides and other forms of intervention to only levels that are economically and ecologically justified and that reduce or minimise risk to human health and the environment. Sustainable biological, physical and other non-chemical methods must be preferred to chemical methods if they provide satisfactory pest control.[28]

Member states need to develop clearly **defined criteria** so that they can assess systematically whether the principles of IPM (PD, annex III) are implemented, and take appropriate enforcement measures if this is not the case. Such tools could confirm that the intended outcome of IPM as specified in the Directive, a reduction of the dependency on pesticide use, is being achieved.

Financial incentives are available, including for buffer zones adjacent to water courses in agro-environmental schemes, capital grants for purchase of low drift nozzles, and construction of bio-beds to capture runoff from sprayer washing.[29]

2.5.1 Contribution of the PD requirements to the FAIRWAY objective

Label	*Requirements and objectives of the Pesticides Directive*
Establish risk framework	To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (art. 1)
Adopt national action plans	MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (art. 4.1)
Establish equipment regulations	MS have to establish regulations about use of application equipment (art. 8)

[26] Ibid, p.4.
[27] Ibid, p.13.
[28] Ibid.
[29] Ibid, p.10. See also European Commission, 'Agriculture and Sustainable Water Management in the EU' (Commission Staff Working Document) SWD (2017) 333 final, p.19.

Prevent spillage	Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (Art.13)
Establish risk indicators	Establish harmonised risk indicators (art. 15)
Establish measures	Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)
Prohibit aerial spraying	Aerial spraying, except under strict regulations, shall be prohibited (art. 9)

Table 2. 5 Requirements and objectives of the PD

The average score across all participants for the interaction between all requirements of the PD and the FAIRWAY objective was **positive (M = 2.3).** This suggests that respondents believe the PD requirements contribute positively to the protection of drinking water resources against pesticides from agricultural practices. Figure 2.5 demonstrates that respondents perceive that the requirement to establish protection measures (Art. 11 PD) is clearly most contributive. 80% of the respondents believe this requirement is indivisible to the FAIRWAY objective (+3).

The requirements to establish a framework (Art. 1 PD), to adopt national action plans (Art. 4.1 PD) are also perceived to be contributive. Respondent scores contained little variability. Overall, 60% and 50% of the respondents respectively believe these requirements are indivisible (+3) with the FAIRWAY objective. The remaining respondents suggested the interaction between these requirements and the FAIRWAY objective is reinforcing (+2).

The remaining requirements (art. 8, 9 and 15 PD) related to application equipment, aerial spraying, and harmonised risk indicators, are also perceived to be positive. However, there was much greater variability in responses. For example, only 40% of the respondents considered the requirement to establish harmonised risk indicators to be indivisible (+3), while 60% considered that the requirement is reinforcing (+2), enabling (+1) or neutral (0).

Responses to open-ended survey items give some **explanation** about the overall positive scores, and variability between scores for different articles. Overall, the requirements are considered to be closely connected to the aim to protect drinking water resources. However, the Pesticides Directive might be considered to be more narrowly designed to reduce pesticide use by implementing a set of prohibitions and a control system based on certification. It is suggested that it might not address drinking water quality specifically enough. Some respondents also highlighted that the requirements related to the risk indicators (Art. 15) and equipment regulations (Art.8) are not specifically contributive to the FAIRWAY objective, which explains the variable scores. For example, some risk indicators may be more suitable for ecological water quality standards, rather than for drinking water quality.

One respondent suggested that the prohibition on aerial spraying (Art. 9) could perhaps be more nuanced by taking into consideration site specific conditions and geographical characteristics. It might be worthwhile to examine the ‘strict regulations’ under which aerial spraying could be permitted. Thus, consistent with the GWD and ND, respondent perspectives about the contribution

of the PD to achieving the overarching FAIRWAY objective also reiterates the limitations of 'blanket' approaches to setting limits, thresholds, regulations across diverse geographical landscapes.

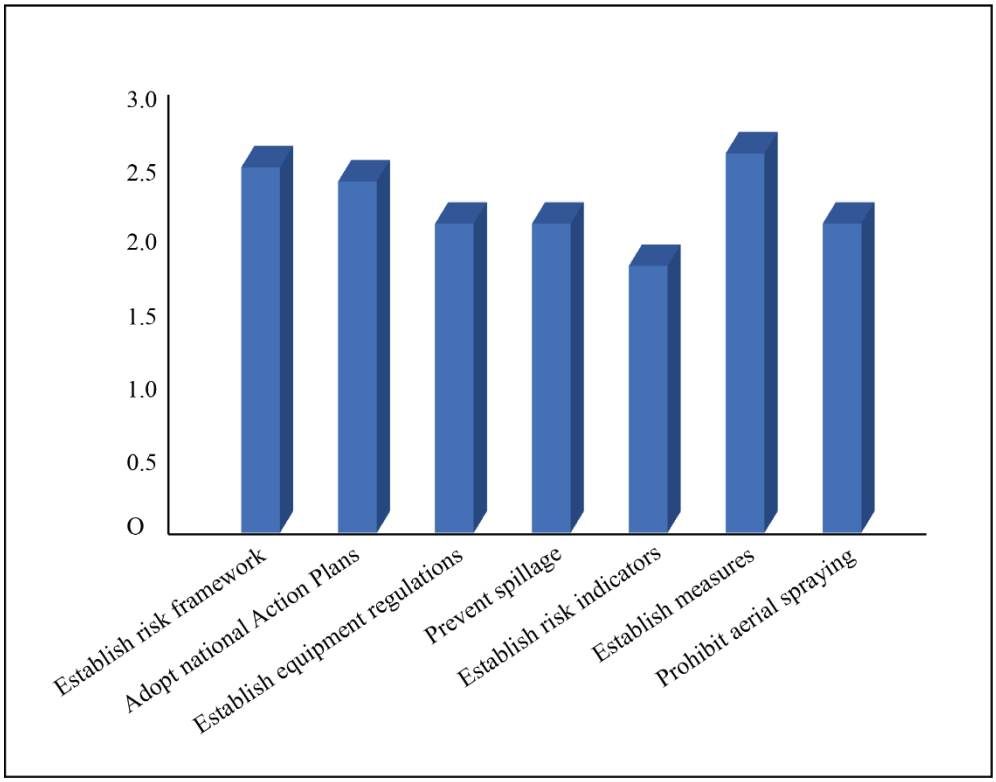


Figure 2. 5 Ten respondents scored the contribution of the various provisions of the PD to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.6 DIRECTIVE ON ENVIRONMENTAL IMPACTS ASSESSMENT

The Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) Directives are important in enabling decision makers to understand the potential environmental impact of plans, programmes and projects. They can assist in preventing unnecessary damage to water bodies and contribute to the objectives of water policies, including the Water Framework Directive.

In particular, carrying out a SEA can be particularly helpful in reducing the environmental impacts of new plans and programmes that can lead to negative impacts on the aquatic environment. For instance, in the case of the development of renewable energy such as hydropower a SEA can help identifying the locations for hydropower plants which would interfere less with water status. Similarly, the EIA can help prevent or mitigate negative impacts on water status from a host of different activities.[30]

More specifically, the 2014 EIA Directive applies to a wide range of defined **public and private projects,** which are defined in Annexes I and II. EIAs are **mandatory** for all projects listed in Annex I. These types of projects are considered as having significant effects on the environment and require an EIA (including long-distance railway lines, motorways and express roads, airports with a basic

[30] European Commission, 'The Fitness Check of EU Freshwater Policy' (Commission Staff Working Document) SWD (2012) 393 final, p.35.

runway length of 2100 m or more, installations for the disposal of hazardous waste, installations for the disposal of non-hazardous waste exceeding 100 tonnes/day, or waste water treatment plants).

For projects listed in Annex II, the national authorities have to decide whether an EIA is needed. This is done by the "**screening procedure**", which determines the effects of projects based on thresholds/criteria or a case by case examination. However, the national authorities must take into account the criteria laid down in Annex III. The projects listed in Annex II are in general those not included in Annex I, but also other types such as urban development projects, flood-relief works, changes of Annex I and II existing projects.

The EIA **procedure** can be summarized as follows: the developer may request the competent authority to say what should be covered by the EIA information to be provided by the developer (scoping stage); the developer must provide information on the environmental impact (EIA report – Annex IV); the environmental authorities and the public (and affected member states) must be informed and consulted; the competent authority decides, taken into consideration the results of consultations. The public is informed of the decision afterwards and can challenge the decision before the courts.

2.6.1 Contribution of the EIA directive requirements to the FAIRWAY objective

Label	*Requirements and objective of the EIA Directive*
Adopt effective measures	To adopt all measures necessary to ensure that, before development consent is given, projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment with regard to their effects on the environment (Art. 2 (a)(i))
Identify and assess impacts	The EIA shall identify, describe and assess in an appropriate manner, the direct and indirect significant effects of a project on the following factors:(a) population and human health;(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC; (c) land, soil, water, air and climate (d) material assets, cultural heritage and the landscape the interaction between the factors referred to in points (a) to (d) (Art. 3.1)

Table 2. 6 Requirements and objectives of the EIA Directive

Overall, the average scores from all participants for all EIA Directive requirements was very low, suggesting that respondents perceive the directive only **contributes slightly positively (M = 0.5)** to the protection of drinking water resources against pesticides and nitrates from agricultural practices. Figure 2.6 demonstrates that both requirements on average are scored as slightly enabling (between 0 and +1). However, scores were highly variable. For example, 80% of the respondents perceive the requirement to adopt effective measures (Art. 2 (a)(i)) to be neutral (0) or enabling (+1), 10% scored this requirement as counteracting (-2) the FAIRWAY objective, and 10% scored this requirement as indivisible (+3).

Similarly, scores for the contribution of the requirement to identifying and assessing impacts to achieving the objective of FAIRWAY were also variable; 70% of respondents scored this requirement as enabling (+1) and reinforcing (+2), however, 10 % scored the requirement as constraining (-1) and only 20% of the respondents considered this requirement to be indivisible (+3) to the protection of drinking water resources.

Responses to open-ended survey items give some **explanation** about the overall scores, and variability between scores for different requirements. Comments suggest that responses vary because the EIA Directive requirements are perceived to be less directly related to the FAIRWAY objectives compared to other directives. For example, some respondents suggested that the EIA Directive requirements do not specifically address nitrates and pesticides, and thus, that the interaction is neutral (0), or in some cases, negative.

Other responses to open-ended questions indicate that respondents believe the contribution of EIA Directive requirements to achieving the FAIRWAY objective is influenced by the fact that the directive provides a degree of discretion to member states. The list of projects that may need an EIA can vary from country to country, in their typology and dimension. In some cases, agriculture projects which are relevant to the FAIRWAY objective may therefore be subject to an EIA, and therefore may contribute positively. For example, carrying out an EIA for animal rearing projects may include a solution for residues affecting the size of land needed and possible run-off to water resources. In this way, EIA may be relevant for the control and reduction of the use of fertilizers and possible leaching to drinking water resources. Thus, where the EIA Directive influences agricultural practice, the interaction is positive.

Another example given by a respondent of positive interactions related to influencing agricultural practice was that EIAs can also offer an important backstop to ensure that the environment is protected, particularly for intensification practices which can impact water quality. EIA regulations could for example protect rural land that is uncultivated or semi-natural against changes in agricultural activities that might cause damage by increasing productivity and/or physically changing field boundaries through ploughing or activities that affect the soil surface' chemical status, such as adding fertilizer or soil improvers. Similarly, one respondent suggested that EIAs might have a positive contribution in the case of biogas production facilities and controlling the impact of digestate spreading on agricultural land that could impact drinking water. In that context, there would be a positive effect on the aim to protect drinking water resources.

The low average scores are partly due to some negative scorings, including -2 (counteracting) and -1 (constraining). The open-ended items in the survey did not provide any explanations for these negative scorings. However, it may be that, similar to scores for other directives, that these scores are related to the indirect nature of interactions between EIA requirements and the FAIRWAY objective.

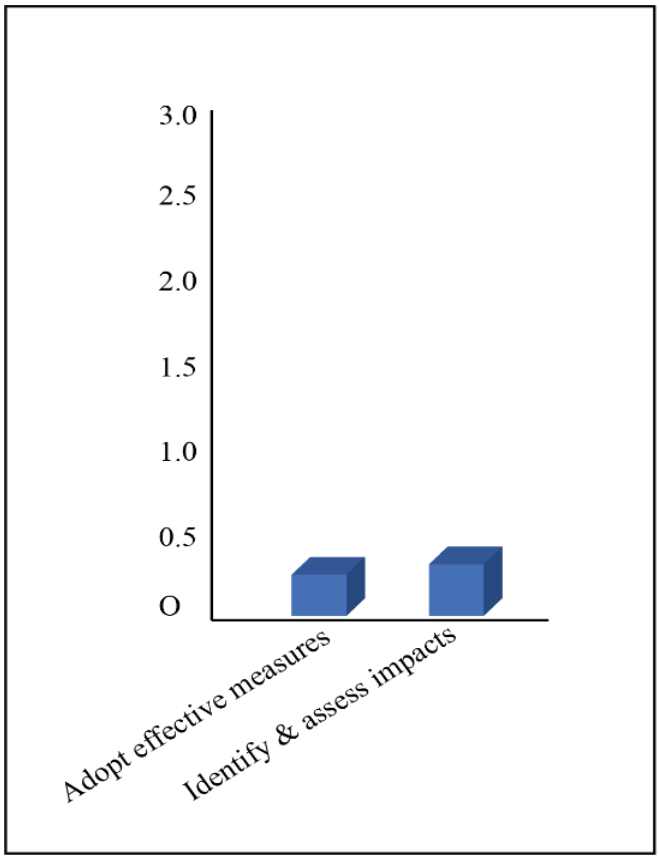


Figure 2. 6 Ten respondents scored the contribution of the various provisions of the EIA Directive to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.7 INDUSTRIAL EMISSIONS DIRECTIVE

The 2010 Industrial Emissions Directives aims to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of **Best Available Techniques** (BAT). Around 50,000 installations undertaking the industrial activities listed in Annex I of the IED are required to operate in accordance with a **permit** (granted by the authorities in the member states). This permit should contain conditions set in accordance with the principles and provisions of the IED.

The IED is based on several pillars, in particular (1) an integrated approach, (2) use of best available techniques, (3) flexibility, (4) inspections and (5) public participation. The **integrated approach** means that the permits must take into account the whole environmental performance of the plant, covering e.g. emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, and restoration of the site upon closure. The permit conditions including emission limit values must be based on the **Best Available Techniques (BAT).** In order to define BAT and the BAT-associated environmental performance at EU level, the Commission organises an exchange of information with experts from member states, industry and environmental organisations.

The IED allows competent authorities some **flexibility** to set less strict emission limit values. This is possible only in specific cases where an assessment shows that achieving the emission levels associated with BAT described in the BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to the geographical location or the local environmental conditions or the technical characteristics of the installation. The competent authority shall always document its justification for granting such **derogations**.

The IED contains mandatory requirements on **environmental inspections**. Member states shall set up a system of environmental inspections and draw up inspection plans accordingly. The IED requires a site visit to take place at least every 1 to 3 years, using risk-based criteria. The IED ensures that the **public has a right to participate** in the decision-making process, and to be informed of its consequences, by having access to permit applications, permits and the results of the monitoring of releases.

Overall, the IED can play an important role in controlling pollutant discharges to water and in enhancing the efficiency of water use in industrial activities. Though permits' emission limit values are to be based on the application of Best Available Techniques (BAT), stricter emission limit values are required if these are necessary to meet an environmental quality standard in EU law, such as good status under the Water Framework Directive.

The IED is therefore an important tool in controlling pressures on water bodies and contributing to achieving EU water policy objectives.[31]

2.7.1 Contribution of the IED requirements to the FAIRWAY objective

Label	*Requirements and objectives of the Industrial Emissions Directive*
Reduce emissions	To prevent or, where that is not practicable, to reduce emissions into air, water and land and to prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole (Art 1)
Prevent pollution	MS shall take the necessary measures that installations are operated as such that all appropriate preventive measures are taken against pollution, best available techniques are applied, no significant pollution is caused, generation of waste is prevented…. (Article 11)
Ensure rules are integrated	When adopting general binding rules, Member States shall ensure an integrated approach and a high level of environmental protection based on BATs (criteria for determining BATs is in Annex III) and make sure to update BATs as new techniques become available (art. 17)

Table 2. 7 Requirements and objectives of the IED

Overall, the average score from all participants for all requirements of the IED was close to 1. This suggests that respondents believe the requirements of the IED are considered to **enable (M = 0.7)** the protection of drinking water resources against pesticides and nitrates from agricultural practices. Figure 2.7 demonstrates that respondents perceive the requirements to prevent pollution (Art. 11 IED) and use integrated approaches and BATs (Art. 17 IED) are enabling the FAIRWAY objective. For both requirements together, 60% of the respondents scored these requirements as enabling (+1). However, scores are highly variable, indicating a range of perspectives. The remaining respondents scored the requirement to prevent pollution as +3 (10%), 0 (10%), -2 (10%), and 10% did not score the requirement due to uncertainty related to its contribution to the FAIRWAY objective. With regard to the requirement to use integrated approach and BATs, the remaining respondents (in addition to the 60% that perceived the requirement as enabling +1) scored this requirement as +3

[31] European Commission, 'The Fitness Check of EU Freshwater Policy' (Commission Staff Working Document) SWD (2012) 393 final, p.36.

(10%), 0 (10%), -3 (10%) and 10% did not score the requirement due to uncertainty related to its contribution to the FAIRWAY objective.

Scores suggest that participants believe the most positive interaction is between the requirement to prevent emissions and waste (Art. 1 IED) and FAIRWAY objective. For this requirement, 40% of the respondents perceive this requirement as enabling (+1) the protection of drinking water resources. The remaining respondents scored this requirement with large variability; +3 (10%) +2 (10%), 0 (20%), -1 (10%), and 10% did not score the requirement.

Responses to open-ended survey items give some **explanation** about the scores, and variability between scores for different articles. In general, the requirements are perceived as enabling and of some relevance. Participant responses emphasized the importance of the fact that large intensive livestock farms fall under the IED. At these farms, Best Available Techniques have to be applied to decrease ammonia pollution. Decreasing ammonia emission will decrease the N deposition to soils and by that may decrease nitrates leaching. The directive could also have a similar enabling effect in the context of pesticides emissions from chemical/pesticide industry. However, respondents suggest that the contribution of Best Available Techniques for achieving the FAIRWAY objective depends on how effectively the terms of the IED are implemented and enforced.

The low average scores are partly due to some negative scorings, including -3 (cancelling), -2 (counteracting), and -1 (constraining). The open-ended items in the survey did not provide any explanations for these negative scorings. Similar to other directives, it is likely that these scores reflect the indirect nature of interactions between FAIRWAY objective and the IED requirements. For example, it could be reasonably assumed though that the negative scorings are related to the fact that the IED is more directly related to regulating industry practices, rather than the practices of individual farmers. Thus, the IED might be most relevant for large scale farms.

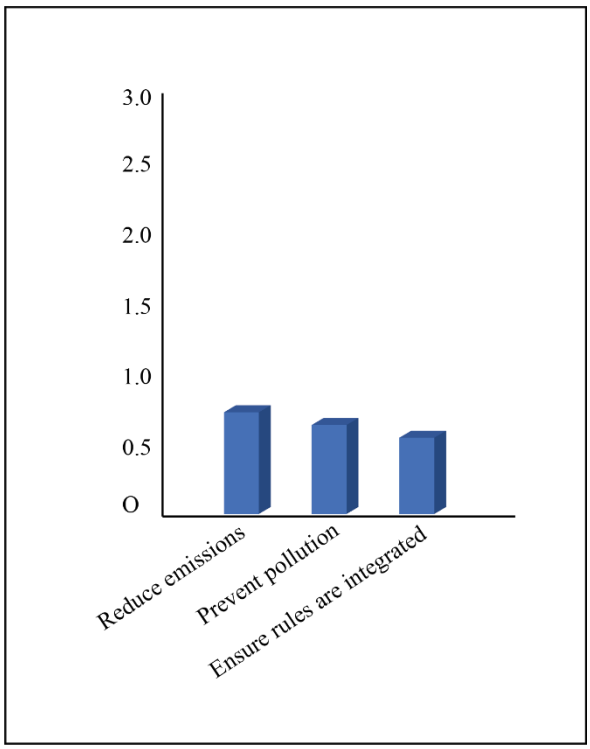


Figure 2. 7 Ten respondents scored the contribution of the various provisions of the IED to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.8 HABITATS DIRECTIVE

Member states have a clear responsibility under the Birds Directives and the 1992 Habitats Directives (HD) to ensure all habitats and species of Community interest are maintained or restored to **Favourable Conservation Status (FCS)**. **Natura 2000 sites** have a crucial role to play in achieving this overall objective since they harbour the most important core sites for these species and habitats. Each site must therefore be managed in a way that ensures it contributes as effectively as possible to helping the species and habitats for which it has been designated reach a favourable conservation status within the EU.

Once a site has been included in the Natura 2000 Network, member states are required to implement, on each site, the necessary **conservation measures** which correspond to the ecological requirements of the protected habitat types and species of Community interest present (Art. 6.1 HD). In accordance with the HD they must also prevent any damaging activities that could significantly disturb those species and habitats (Art. 6.2 HD) and protect the site from new potentially damaging plans and projects likely to have a significant effect on a Natura 2000 site (Art. 6.3 and 6.4 HD).

Member states are making significant efforts to ensure appropriate management of all designated sites, although the situation is quite variable depending on the countries, with some of them having approved management plans or established conservations measures for all Natura 2000 sites while some other have only covered a percentage of the sites.[32] To ensure that each Natura 2000 site contributes fully to reaching this overall target of FCS, it is important to set clear **conservation objectives** for each individual site. These should define the desired state, within that particular site, of each of the species and habitat types for which the site was designated. Once the conservation objectives have been set, the necessary conservation measures that are required in order to fulfil these objectives and targets should be identified and negotiated with all involved so that they are effectively implemented. These must correspond to the ecological requirements of the habitats and species for which the site is designated. A dialogue with all relevant **stakeholders** is needed to ensure that farmland management in Natura 2000 sites can contribute to the conservation of agricultural habitats and species.[33]

2.8.1 Contribution of the HD requirements to the FAIRWAY objective

Label	*Requirements and objectives of the Habitats Directive*
Ensure biodiversity	To contribute towards ensuring biodiversity through the conservation of natural habitats and wild fauna and flora in the European territory of the MS (art. 2.1)
Maintain/restore favourable status	To maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community interest (art. 2.2)
Establish network of special issues	A coherent European ecological network of special areas of conservations shall be set up under the title Natura 2000 (art. 3.1)

[32] European Commission, 'Farming for Natura 2000' (Guidance on how to support Natura 2000 farming systems to achieve conservation objectives, based on Member States good practice experiences) 2014, p. ii-iv.
[33] European Commission, 'Farming for Natura 2000' (Guidance on how to support Natura 2000 farming systems to achieve conservation objectives, based on Member States good practice experiences) 2014, p. v.

Designate special areas	MS shall designate sites as special areas of conservation (art 3.2). Each MS shall propose a list of sites (art.4)
Establish strict protection systems	MS shall take the requisite measures to establish a system of strict protection for the animal species listed in Annex IV (a) in their natural range prohibiting capture or killing, disturbance destruction, and deterioration of breeding sites (art. 12.1)
Establish strict protection of plants	MS shall take the requisite measures to establish a system of strict protection for the plant species listed in Annex IV (b) […] (art. 13.1)
Avoid habitat deterioration	MS shall take appropriate steps to avoid, in SAC's, the deterioration of natural habitats and the habitats of species as well as disturbances of species for which those sites have been designated, in so far as such a disturbance could be significant (art. 6.2). Projects or plans with a likely significant effect shall be subject to an appropriate assessment (art. 6.3). Compensatory measures can be required (art 6.4)
Manage important wildlife features	MS shall endeavor in their land-use planning and development policies to encourage the management of features of the landscape which are of major importance for wild fauna and flora (art.10)

Table 2. 8 Requirements and objectives of the HD

The average score from all participants for all requirements of the HD was low (**M=0.4**), suggesting that experts believe the directive contributes minimally to the FAIRWAY objective, including the protection of drinking water resources against pesticides and nitrates from agricultural practices. Figure 2.8 demonstrates that respondents perceive all requirements and objectives of the HD to be neutral (0) or enabling (+1) to the protection of drinking water resources. In addition, the respondent scores showed little variability. The requirements to ensure biodiversity (Art. 2.1 HD), to maintain favourable conservation status (Art. 2.2 HD), to establish a network of special areas (Art.3.1 HD), and to designate special areas (Art. 3.2 HD) have been scored 0 or +1 by 100% of the respondents.

The requirements to establish systems of strict protection (Art. 12.1 and 13.1 HD), avoid habitat deterioration (Art. 6 HD), and manage important wildlife features (Art. 10 HD) are also scored either 0 or +1 by 90% of the respondents. Interestingly, the remaining 10% of the respondents perceived these requirements as constraining (-1).

Responses to open-ended survey items give some **explanation** about the overall low scores, and variability between scores for different requirements. Comments suggest that the requirements and objectives of the HD are perceived to be of some relevance to the protection of drinking water resources because conservation areas are less prone to the use of fertilizers and pesticides. Thus, requirements to protect conservation areas should contribute to the prevention of damages to plant and habitat species, and ensure a low risk of pollution by nitrates and pesticides. Furthermore, groundwater protection areas for drinking water sometimes coincide with habitat conservation areas. The conservation areas could for instance impose a restriction on other activities or functions in the area, such as agriculture in general or the abstraction of groundwater. Several respondents highlighted the positive connection between nature, biodiversity and drinking water quality, suggesting that measures to improve biodiversity and habitats are likely to have positive effects on drinking water resources in these areas as well.

In contrast to these positive contributions, other respondents argued that the designation of areas as conservation sites may in practice result in little difference to drinking water quality if water resources are already polluted. This could suggest that there is some uncertainty with regard to the relationship between habitats and the protection of drinking water resources against nitrates and pesticides pollution. However, similar to the GWD, these comments may be related to knowledge about biophysical processes. For example, restoring habitats often involves revegetation, which can create a buffer for pollutants and prevent agricultural runoff from entering waterways and decreasing water quality. However, this interaction is much less direct and transparent than more positively scored requirements related to other directives. Similar to other directives, respondents also expressed concern about effective implementation. One respondent argued that the flexibility of the requirements may also potentially result in implementation that produces negative effects on drinking water resources. However, these potential negative interactions need to be investigated further.

Overall, respondent opinions suggest that, while the requirements of the HD could positively contribute to the FAIRWAY objective by influencing the use of pesticides and fertilizers/manures, the interaction depends very much on effective implementation.

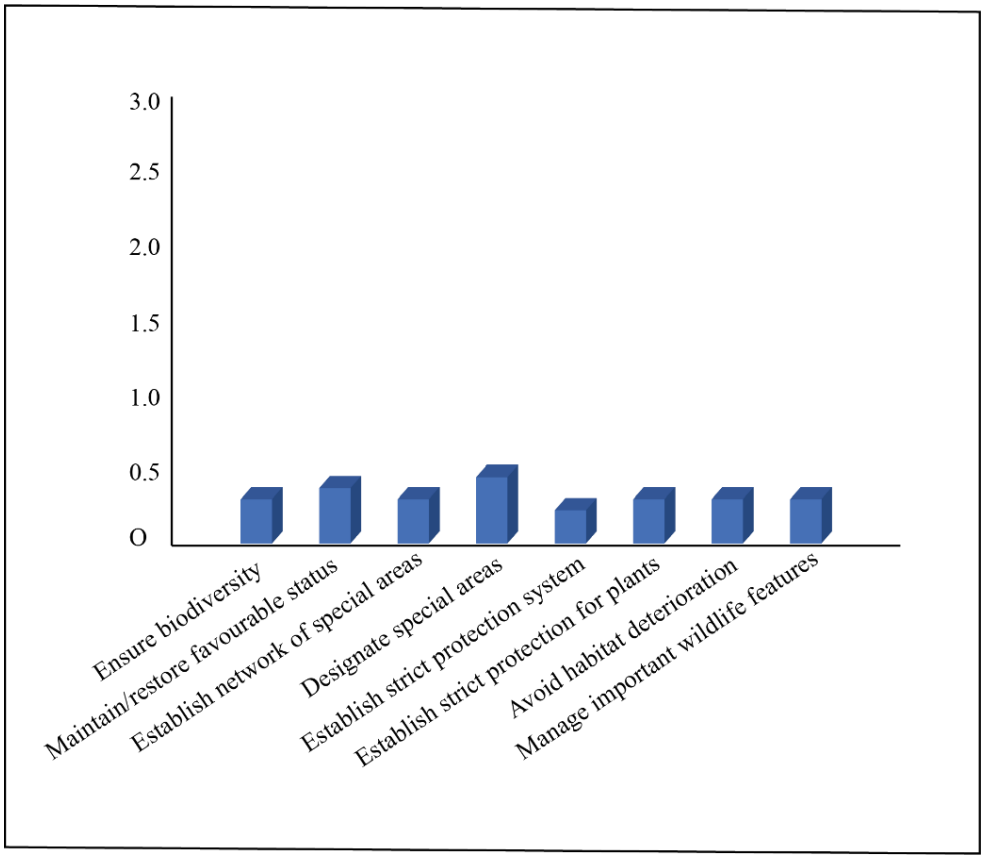


Figure 2. 8 Ten respondents scored the contribution of the various provisions of the HD to the protection of drinking water resources. The graph shows how the requirements and objectives are scored on average as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.9 Common Agricultural Policy

The Common Agricultural Policy (CAP) is the EU policy to provide financial support to farmers in member states. It is one of the founding policies of the original Common Market and brings together national intervention programmes into one scheme to allow farmers to compete on a level playing field while protecting against volatility in agricultural prices (and hence incomes) and to provide food security.

Following a major CAP reform in 2005, there are two big **pillars** to CAP payments: one for direct income support, cross-compliance (pillar 1) and the second for rural development (pillar 2). Direct income support is a much bigger programme than rural development.

Article 39 of the European Union Treaty sets out the specific **objectives** of the CAP. The CAP aims to increase agricultural productivity by promoting technical progress and ensuring the optimum use of the factors of production, in particular labour. Furthermore, CAP aims to ensure a fair standard of living for farmers; to stabilise markets; to ensure the availability of supplies; and to ensure reasonable prices for consumers.

Besides these specific objectives, the CAP more generally aims to support farmers and improve agricultural productivity, ensuring a stable supply of affordable food; to safeguard EU farmers to make a reasonable living; to help tackle climate change and the sustainable management of natural resources; to maintain rural areas and landscapes across the EU; and to keep the rural economy alive by promoting jobs in farming, agri-foods industries and associated sectors.

The CAP is a common policy for all the countries of the European Union. It is managed and funded at European level from the resources of the EU's budget.

Of interest is the recognition of the pressures on water sustainability as a result of some agricultural practices. The CAP establishes explicit links with water policies. To illustrate, it relies on the complementary effects of various instruments through cross-compliance, the green direct payment, and rural development support measures. CAP's Pillar I cross-compliance requirements represent the compulsory environmental obligations to be met by farmers to receive full funding. These obligations derive, among others, from the Nitrates Directive and Pesticides Directive.

2.9.1 Contribution of the CAP requirements to the FAIRWAY objective

Label	*Requirements and objective of the Common Agricultural Policy*
Farmer requirements	Farmers are required to diversify crops (crop rotations), maintain permanent grassland, and dedicate 5% of arable land to 'ecologically beneficial element ('ecological focus areas')
Farmer compliance	Farmers have to comply with environmental directives (including the WFD, ND GWD) and implement good agricultural and environmental conditions (including soil organic matter content, minimizing soil erosion, buffer strips, water extraction) (CAP)

Table 2. 9 Requirements and objectives of the CAP

The average score across all respondents and all requirements for the contribution of the CAP to achieving the objective of FAIRWAY suggests that participants believe the CAP requirements **enable/reinforce (M = 1.7)** the protection of drinking water resources against pesticides and nitrates from agricultural practices. Figure 2.9 demonstrates that respondents perceive all farmer requirements related to crop rotations and ecological focus areas, contribute slightly positively (M = 1,2) to the protection of drinking water resources. While most respondents scored the interaction positively, there was very high variability with regards to the strength of positivity though; 20% of the respondents considered these farmer requirements to be neutral (0), 20% enabling (+1), 30% reinforcing (+2), and 20% indivisible (+3), suggesting they believe these requirements contribute positively to the FAIRWAY objective. Only 10% of the respondents perceive these requirements as counteracting (-2) the protection of drinking water resources.

The requirement related to compliance is also scored generally positive, with less variability; 50% of the respondents suggested this requirement is indivisible (+3) from the FAIRWAY objective, while a further 30% suggested the requirement is reinforcing (+2). The remaining 20 % of the respondents perceived this requirement as enabling (+1) or neutral (0).

Responses to open-ended survey items give some **explanation** about the overall positive scores, and variability between scores for different requirements. Respondents clarified that certain practices related to the implementation of the CAP requirements are highly relevant, while others are less relevant. For example, the creation of buffer zones is a positive practice for reducing the concentrations of nitrates and pesticides (and perhaps also leaching). Crop rotation may also decrease the need for fertilizers and pesticides.

Similarly, respondents suggested that the requirement to comply with the other directives supports the FAIRWAY objective as those directives, such as the Nitrates Directive, are highly relevant for the protection of drinking water resources. As such, this requirement strengthens the need for practices already required by those directives to decrease nitrates and pesticide pollution. Respondents also emphasized that the compliance requirement is effective because it is supported by wider institutional factors, such as a funding scheme. Member states are required to comply with this CAP requirement in order to access funding; non-compliance will result in funding being withheld. Therefore, this mechanism may deter non-compliance with CAP requirements, and strengthen implementation of the environmental directives.

However, the funding mechanism could also entail some risks and challenges for the protection of drinking water resources. One respondent highlighted that the Basic Payment Scheme (BPS) linked with CAP and cross compliance means that farmers are keeping land in production just to receive this payment. In certain areas, farmers are spraying pesticide to remove rushes, so that the land is eligible under the BPS. This is resulting in an increase in pesticide run-off to the river. In addition, the areas declared for the BPS are also used to calculate the farm's organic N loading for the Nitrates Directive. For that reason, a farmer can legitimately increase his/her stocking density up to 170kg/ha organic N, even though the land may not be able to support this agricultural intensity. Similarly, in the Netherlands, for instance, farmers plough their grasslands within 5 years, to avoid that their grasslands will be considered as permanent grasslands in CAP, with more strict regulation. Ploughing of grasslands can strongly increase nitrate leaching. Thus, wider institutional factors may have positive effects on the FAIRWAY objective in some instances, and negative effects, such as an increase in nitrates and pesticides leaching to water resources, in other instances. These insights from respondents highlight the complexity of connections between EU environmental directives and achieving outcomes for water quality.

Overall, the CAP is perceived to contribute positively to the protection of drinking water resources against nitrates and pesticides pollution from agricultural resources. However, the funding mechanism and its implementation might also have some drawbacks that could affect drinking water quality adversely.

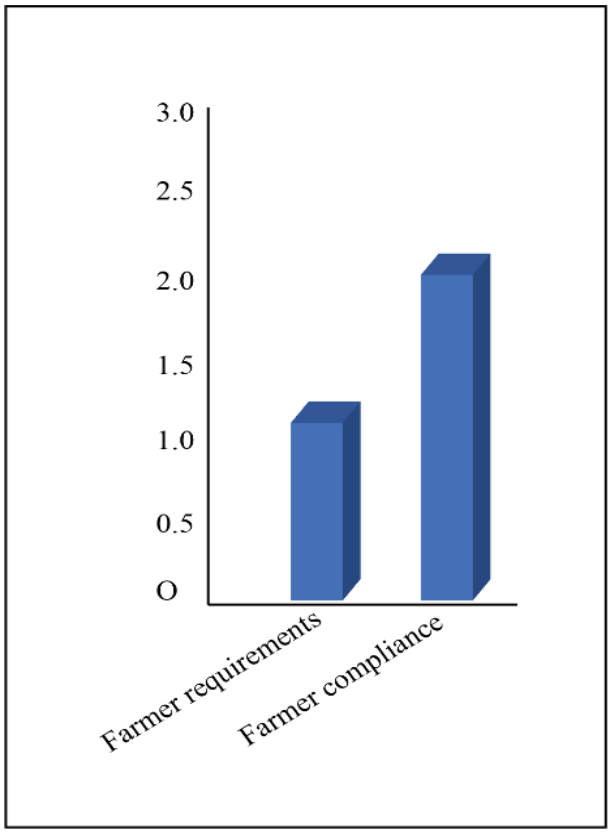


Figure 2. 9 Ten respondents scored the contribution of the various provisions of the CAP to the protection of drinking water resources. Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.10 Rural Development Regulation (CAP Pillar II)

Pillar II of CAP (Rural Development) promotes activities that aim at fostering the competitiveness of agriculture; ensure the sustainable management of natural resources, and climate change; and achieve a balanced territorial development of rural economies and communities including the creation and maintenance of employment.

In addition to these overall purposes, the RDR is drawn up with reference to six more specific priorities, which are further divided into more detailed **focus areas**: (1) knowledge transfer & innovation in agriculture, forestry & rural areas, (2) farm viability/competitiveness, sustainable management of forests, (3) food chain organisation, animal welfare, risk management in agriculture, (4) ecosystems related to agriculture and forestry, (5) resource efficiency, low-carbon / climate-resilient economy, and (6) social inclusion, poverty reduction, economic development.

A given **Rural Development Programme** (RDP) links the priorities of rural development policy to the situation on its territory via a SWOT analysis. The RDP then sets out a selection of measures drawn from the Rural Development Regulation to address the priorities in the appropriate way. A measure is essentially a set of one type of activity, project, or investment which may be funded within a RDP to achieve the priorities of rural development policy.

The RDR could be relevant for the protection of water resources, through its focus areas and the **priorities** that can be set. Priorities may include a focus on improving water management, by addressing the use of fertilizers and pesticides. In general, the member state or the region sets various targets for addressing the focus areas and priorities. The nature of the target varies according to the focus area. For example, for the focus area 'Increasing efficiency in water use by agriculture', the standard target indicator is the percentage of the irrigation area in the programme

area which is expected to switch to more efficient irrigation equipment as a result of rural development support.

2.10.1 Contribution of the RDR requirements to the FAIRWAY objective

Label	*Requirements and objectives of the Rural Development Regulation*
Fostering competitiveness of agriculture	Fostering the competitiveness of agriculture; ensuring the sustainable management of natural resources, and climate action; achieving a balanced territorial development of rural economies and communities including the creation and maintenance of employment (art. 4)
Implement measures	MS shall implement necessary measures to: foster knowledge transfer and innovation in agriculture, along with cooperation with other industries and life-long learning
Enhance farm viability	Enhance farm viability (economic performance) and competitiveness of agriculture and promote innovative farm technologies (adequately skilled farmers)
Food chain organization	Promote food chain organisation, including processing and marketing of agricultural products, animal welfare (introducing quality schemes) and risk management in agriculture
Restore agricultural ecosystems	Restore, preserve and enhance ecosystems related to agriculture (preserving biodiversity, Natura 2000, improve water management, including fertiliser and pesticide management; prevent soil erosion and improve soil management)
Promote efficiency	Promote resource efficiency (water, energy) and support the shift towards a low carbon and climate resilient agriculture sector (renewable resources, reducing emissions)
Introduce rural development programmes	MS shall bring into force national and/or regional programmes concerning 6 main priorities for rural development (art. 6)

Table 2. 10 Requirements and objectives of the RDR

Overall, the average score across all respondents and all requirements of the interaction between the RDR and FAIRWAY objective suggests that respondents believe the requirements **enable (M = 0.8)** the protection of drinking water resources against pesticides and nitrates from agricultural practices. Figure 2.10 demonstrates that respondents perceive the requirement to restore, preserve and enhance ecosystems related to agriculture to be most contributive to the FAIRWAY objective ('Restore agricultural ecosystems'). 60% of the respondents scored this requirement as reinforcing (+2) to the protection of drinking water resources. 20% scored this requirement as being indivisible (+3), and 20% of the respondents scored the requirement as +1 (enabling). The scores showed little variability.

Also the requirement to promote resource efficiency is perceived to enable (+1) the protection of drinking water resources by 60% of the respondents ('Promote resource efficiency'). Of the

remaining respondents, 10% scored the requirement as indivisible (+3), 10% as reinforcing (+2), and 20% as neutral (0).

The other requirements of the CAP are overall considered to contribute positively to the FAIRWAY objective, however respondent scores showed high variability. To illustrate, the requirements related to fostering the competitiveness of agriculture are scored as indivisible (+3) by 10%, reinforcing (+2) by 20%, +1 by 30%, 0 by 10%, and -1 by 30% of the respondents.

Similarly, the requirement related to implement measures is also scored positively, yet with a high degree of variability amongst respondent scores. 40% of the respondents perceived this requirement to enable (+1) the FAIRWAY objective, while the other respondents scored this requirement as (+2) reinforcing (20%), (0) neutral (20%), and (-1) constraining (20%).

The requirement to enhance farm viability is considered to be constraining (-1) to the FAIRWAY objective by 40% of the respondents. A further 20% of the respondents perceived this requirement as neutral (0), 20% as enabling (+1), and 20% as reinforcing (+2), suggesting a high degree of variability among the respondent scores.

Responses to open-ended survey items give some **explanation** about the overall positive scores, and high variability between scores for different provisions. In general, the requirements are considered to be positive because the RDR provides a framework for a development into clean and sustainable agricultural production today and in the future. Respondents argue that the RDR promotes both economically sustainable agriculture and sustainable resource management. It is suggested that the market can drive certain changes which are beneficial for the protection of drinking water resources. For example, the market is an important driver for improving good practices related to the use of pesticides. Products with a high level of pesticides or other harmful substances, will have more difficulty entering the market and being accepted by users. Incapacity to sell certain products has triggered innovation, rethinking and improvements in techniques and approaches to replace these products by more sustainable and less harmful ones. The focus on production and competitiveness could thus have positive side-effects to improved management of fertilizers and pesticides.

However, respondents also emphasized that, in some areas the objectives of sustainable agriculture are unlikely to be achieved, and that pressure to maintain and/or increase the competitiveness of agriculture will inevitably result in an increase in pressures on water resources. One respondent also highlighted this risk by arguing that measures designed to increase competitiveness could clearly raise concerns, particularly when increased competitiveness could be achieved through less stringent environmental protection.

Overall, the RDR is considered to have a positive enabling effect on the protection of drinking water resources since it could lead to a reduction in nitrates and pesticides use. However, it is emphasized that this effect is strongly dependent on how the requirements are implemented. Whether the requirement to enhance farm viability in practice will lead to better protection of drinking water resources, depends very much on what type of technology is used. Intensification might increase impacts on the environment, however some technology can lead to sustainable intensification. Moreover, the requirement related to food chain organisations could contribute positively to decreasing the impact of agriculture on the environment, but often concentrates more on biodiversity or animal welfare which is more tangible to the end consumer.

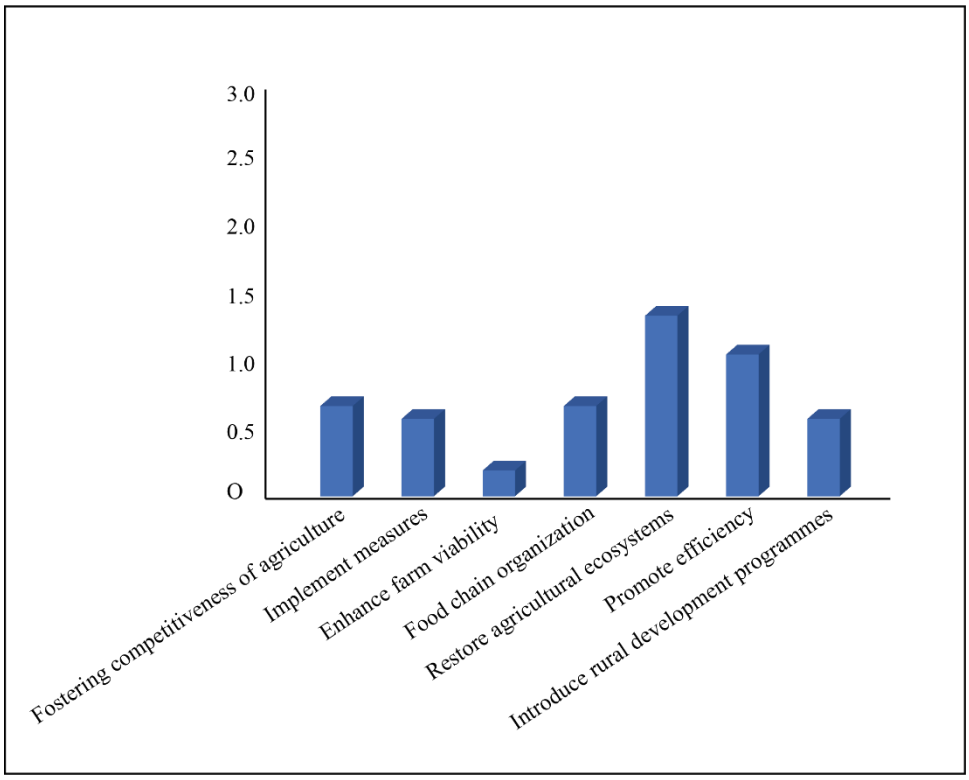


Figure 2. 10 Ten respondents scored the contribution of the various provisions of the RDR to the protection of drinking water resources. Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

2.11 CONCLUSION: IS THE OVERALL LEGAL FRAMEWORK FIT FOR PURPOSE?

The overarching FAIRWAY objective is to find solutions to the protection drinking water resources against pollution by pesticides and nitrates from agricultural practices. The legal framework is both very comprehensive and **fragmented**. Many directives apply directly and/or indirectly to the protection of drinking water resources against pollution and many of these impose different types of legal requirements upon EU member states to comply with. Attainment of the overarching purpose depends on the strength, coherence and effectiveness of the legal framework applicable to the FAIRWAY objective.

The chapter reviewed the **vertical coherence** of each directive with the purpose of protecting drinking water resources against pollution by pesticides and nitrates from agricultural practices. The assessment included the Water Framework Directive, the Groundwater Directive, the Drinking Water Directive, the Sustainable Use of Pesticides Directive, the Nitrates Directive, the Industrial Emissions Directive, the Environmental Impact Assessments Directive, the Habitats Directive, the Common Agricultural Policy, and the Rural Development Regulation. The vertical coherence was assessed through a methodology that consisted of the identification of the legal requirements of these directives, and the scoring of these interactions pursuant the **typology and seven-point scale** presented by Nilsson et al (2016).[34] Pursuant to the seven-point scale, interactions may be scored as either positive (indivisible', 'reinforcing' or 'enabling') or negative ('constraining', 'counteracting' or 'cancelling'); or the respective legal requirements may be entirely 'neutral' with each other, incurring no significant positive or negative interactions whatsoever, perhaps no interaction at all. See section 1.2.3 for a description of the methodology applied.

[34] Måns Nilsson, Dave Griggs and Martin Visbeck, 'Map the interactions between Sustainable Development Goals' (2016) 534 *Nature* 320-322.

The assessment in this chapter shed light on to extent to which the various legal requirements of the various directives contribute to the FAIRWAY objective. The focus of the assessment was on legal requirements to *protect/improve* natural resources that contribute to water quality, including general requirements to protect, enhance, or improve quality status or conditions, and specific requirements, (such as those setting specific limits for certain thresholds values) as well as legal requirements related to establishing the *institutional frameworks* for achieving improvements in water quality (such as requirements related to establishing criteria, frameworks, catchment management plans and so forth).

The assessments of the degree of coherence between the directives and FAIRWAY objective are based upon **respondents' perceptions and opinions**. As such, some bias in the scorings and explanations is unavoidable. The horizontal coherence assessment was carried out by ten WP6 partners.

Based on the scorings of the ten respondents, none of the directives is considered to have a negative average score. Five directives are perceived to be highly important and contributive very positively to the attainment of the overall purpose. These are the Water Framework Directive, the Groundwater Directive, the Drinking Water Directive, the Nitrates Directive, and the Sustainable Use of Pesticides Directive. As evident from figure 2.11, average scores for these directives varied from 2 to 2.6 suggesting that respondents considered these directives to be reinforcing (+2) or even indivisible (+3) to the protection of drinking water resources.

For all the remaining directives, all average scores are significantly lower yet still positive. Respondents consider the Habitats Directive, the EIA Directive, the IED, and the RDR to be neutral (0) to or enabling (+1) the FAIRWAY objective. Average scores varied from 0.4 to 0.8, suggesting these directives have a slightly positive effect on the protection of drinking water resources. The lowest average score is given to the Habitats Directive (0.4). The CAP is given an average score of 1.7 and is considered to enable or reinforce the overall objective.

In theory, it could be argued that the overall legal framework is fit for purpose. Yet to what extent this purpose will be realized depends to a large degree on **implementation**.[35] Concerns include how consistently requirements are implemented by member states, and the ambiguity of key terminology. These factors could have both positive and negative impacts on the vertical coherence of the directives with the FAIRWAY objective. As shown in the assessment above, several directives, including the Habitats Directive and the Environmental Impact Assessment Directive, were perceived to have contributive potential, probably more than indicated by the average scoring rate alone. If this potential is realised fully under implementation, the degree of vertical coherence increases.

To illustrate, conservation measures under the Habitat Directive can include both site-specific measures (i.e. management actions and/or management restrictions), and general measures that apply to many Natura 2000 sites over a larger area, for instance, measures to reduce nitrates pollution. The Habitats Directive could also require restoration measures to achieve favourable conservation status for key Natura 2000 habitats that have been damaged by pressures from intensive agriculture. Restoration actions may involve reversing soil enrichment and re-introducing vegetation, reseeding to restore plant species diversity, controlling scrub, controlling invasive weeds and alien species and restoring hydrological management (e.g. by reversing drainage, restoring groundwater levels and regimes, and flooding and river regulation).[36] This might contribute positively

[35] Implementation of the directives and governance arrangements throughout case study sites is subject to review in task 6.2 and deliverable D6.2.

[36] European Commission, 'Farming for Natura 2000' (Guidance on how to support Natura 2000 farming systems to achieve conservation objectives, based on Member States good practice experiences) 2014, p. v.

to the protection of drinking water resources, if these Natura 2000 sites and drinking water resources coincide.

The following figure demonstrates the average scores of vertical coherence per directive with the FAIRWAY objective.

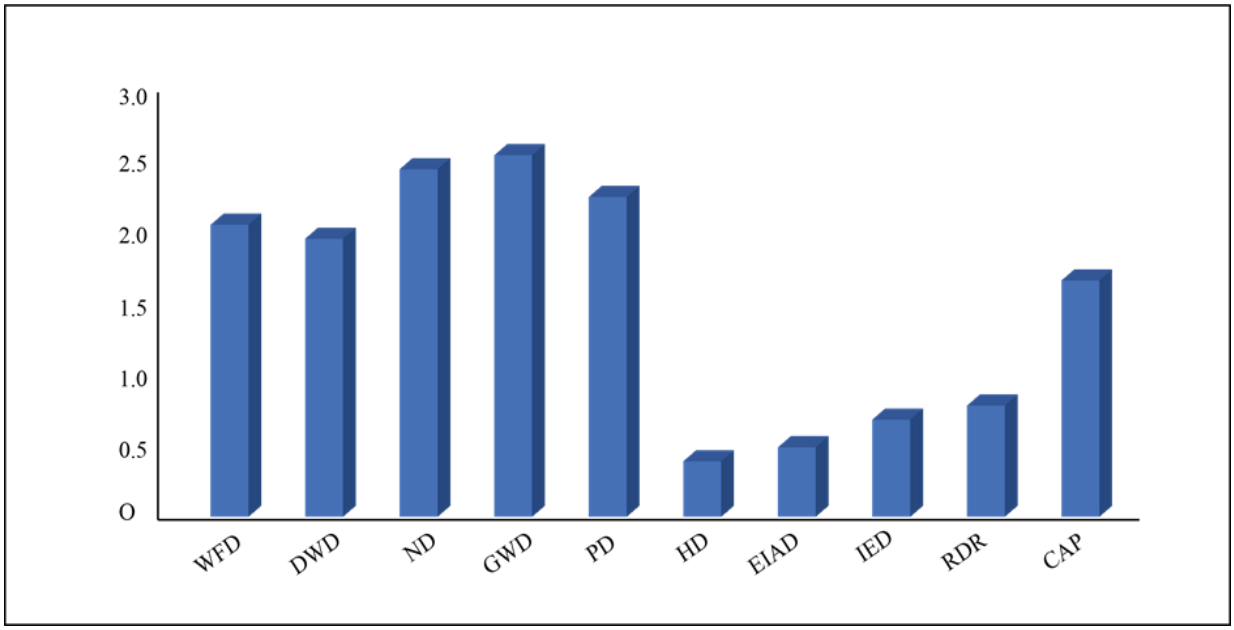


Figure 2. 11 Comparison of average contribution scores per directive. Requirements and objectives of each directive are scored by ten respondents as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

Summary of the contribution of each instrument to the Fairway objective	
WFD	Numeric responses indicate that participants feel that all articles of the WFD are enabling, reinforcing, or indivisible from the FAIRWAY objectives. Qualitative data suggests that the requirements of the WFD are reinforced by institutional frameworks at the state level, although the plans, programs and measures in place are not necessarily sufficient. Respondents identified important cross-over or interdependencies between the WFD and other directives, such as the Nitrates Directive; while this interdependency is intuitive (the ND must be upheld to achieve the objectives of the WFD), the interaction is informal. **A potential action could be to formalise the interaction institutionally by requiring cross-referencing with regards to monitoring and enforcement.**
GWD	Numeric responses indicate that participants feel that articles of the GWD related to threshold values and preventative measures are enabling, reinforcing, or indivisible from the FAIRWAY objectives. Qualitative data indicates some division between respondent perspectives. Most suggested the GWD positively reinforces the FAIRWAY objectives, while some suggested threshold requirements are not necessarily sufficient.

	There are clear interdependencies between the WFD and the GWD; **formalising interactions between surface and ground water with cross-referencing may reinforce institutional frameworks to support these interdependencies.**
DWD	Numeric responses indicate that participants feel that the articles of the DWD related to protection and controlling harmful substances are mostly indivisible with the FAIRWAY objectives. Articles related to new infrastructure were viewed neutrally. Qualitative data emphasizes interdependencies between the DWD and other Directives, such as the ND. Respondents expressed some uncertainty about how requirements related to pollutants under the DWD and requirements under the ND interact. **This suggests that cross-referencing is required to ensure that the requirements of each Directive support each other**.
ND	Numeric responses indicate that participants feel the articles of the ND are mostly indivisible, reinforcing or enabling of FAIRWAY objectives. One exception relates to livestock manure limits for land application for which opinions were divided. Most participants agreed limits contribute positively to FAIRWAY objectives while one suggested that limits are constraining. Reasons for this variation are suggested in the qualitative data. Respondents felt that catchment scale limits and targets may be more appropriate than farm scale limits; the cumulative effect may be more important than the individual application of manure. Similarly, the impact on water quality varies geographically. Interactions between the ND and other Directives may be influenced by these geographical dynamics, **highlighting the need for cross-referencing**.
PD	Overall, respondents considered that all requirements of the PD interact positively with the FAIRWAY objectives. Articles related to protection and requirements to establish a framework and national action plans were mostly viewed to be indivisible or reinforcing. Articles related to infrastructure were viewed to be indivisible, reinforcing, enabling, or neutral. Qualitative responses again emphasized the geographical dynamics of limits and targets, **suggesting that set requirements may be more or less sufficient depending on wider context.**
EIA	Quantitative scores reflecting perceptions of interactions between the requirements of the EIA and FARIWAY objectives varied considerably. Most considered requirements related to adopting effective measures and identifying and assessing impacts to be neutral or enabling, however, others considered these requirements to be constraining, counteracting or indivisible. Qualitative data indicated that some respondents felt that the requirements of the EIA lack the necessary specificity to support other related Directives, such as the ND. **These issues could be addressed by formalising some interactions between requirements across Directives.**
IED	Most respondents indicated that the requirements of the IED are enabling, however, there was some variation, with minority views including that requirements are cancelling, constraining, neutral or indivisible.

	Respondents highlighted the interdependence of the IED and the ND in relation to large intensive livestock farms. Some comments indicated that respondents feel the IED is most relevant to industry practices rather than the full range of practices that contribute to the FAIRWAY objectives, which may explain the variance in scores and views.
HD	Scores suggest that respondents generally believe that the HD contributes only minimally to the FAIRWAY objectives. All responses suggest the requirements of the HD are either enabling or neutral. Some comments suggest that conservation areas are of relevance to the DWD and GWD because these spaces are less likely to involve use of fertilizers and pesticides. **These positive interactions are not formalised and could equally benefit from cross-referencing as would more negative interactions. Comments also indicated the importance of effective implementation.**
CAP	Most respondents suggested that the requirements of the CAP enable or reinforce the FAIRWAY objectives, however there was some variability regarding views of farm requirements and compliance, with some suggesting these requirements are indivisible, enabling or reinforcing and a minority suggesting they are counteracting. Qualitative data indicated that some CAP requirements interact with requirements of the ND, including those related to buffer zones for reducing concentrations of pollutants. Further, there are strong institutional incentives for compliance; funding is contingent on compliance. One issue of cross compliance identified was that farmers are incentivised to use pesticides to maintain certain vegetation to be eligible for the BPS, thus increasing pesticide run-off and impacting water quality. Another example of cross compliance identified was that farmers in the Netherlands may plough their land after 5 years to avoid being considered permanent grasslands in CAP, thus increasing nitrate leaching. Overall, while the funding mechanism offers incentives for compliance in some regards, there are multiple cross compliance issues related to the interdependence of other Directives. **There are opportunities with the CAP to formalize interactions with the ND and establish cross-referencing.**
RDR (CAP Pillar II)	Overall, respondents suggested that the requirements of the RDR enable the FAIRWAY objectives. Most respondents agreed that requirements to protect and enhance ecosystems are reinforcing or indivisible while the requirement to promote resource efficiency is enabling. Views on requirements to implement measurements and to enhance farm varied considerably, from reinforcing and enabling to neutral and constraining. Qualitative data indicates that on the one hand, market engagement has driven innovation and sustainability. On the other hand, increasing competition is likely to increase pressures on water resources which may have negative outcomes. Market competition may incentivise less sustainable environmental practices, which may counter the benefits of innovation. Thus, there are competing incentives within the RDR framework.

Table 2.11 Summary of the contribution of each instrument to the Fairway objective

Based on the scorings and comments provided by project partners, we identified **four reoccurring themes** emerge from respondents' scores and comments about the coherence of the directives with the objectives of FAIRWAY. These are:

- Divided opinions between respondents about the effectiveness of fixed threshold values. Some respondents suggested fixed thresholds are effective, while others raised the concern that effectiveness may vary depending on scale and geographic location;
- Some directives are more supported by wider institutional frameworks compared to others, Respondent scores may be dependent on knowledge and understanding of biophysical processes, and the impact of EU policies on biophysical processes, and;
- Respondent scores may be dependent on knowledge and understanding of biophysical processes, and the impact of EU policies on biophysical processes, and;
- In many cases, participants assigned more positive scores to interactions between requirements with more direct links to the FAIRWAY objectives, and less positive (and occasionally negative) scores to interactions with indirect links to FAIRWAY objectives.

These themes are expounded below.

The effectiveness of fixed thresholds for achieving the FAIRWAY objectives

There appear to be divided opinions between respondents about the effectiveness of fixed threshold values. Some respondents suggested fixed thresholds are effective, while others raised the concern that effectiveness may vary depending on scale and geographic location. To, illustrate, it has been argued that threshold levels of nitrates (50 mg/L) and pesticides (0.1 µg/L) are not necessarily sufficient for controlling pollution. In the case of pesticides, fixed thresholds could limit the leakage of less harmful pesticides to the environment, while not being stringent enough for other more harmful types of pesticides. Despite overall positive scores, respondents were also divided about the effectiveness of the explicit limit to the amount of livestock manures applied on land (170kg/ha each year). Thus, it was suggested that differentiated threshold levels could be more appropriate, providing a leeway to take into consideration scale and geographic variation when setting threshold levels. The respondents' comments underscored the limitations of 'blanket' approaches to setting limits, thresholds, regulations across diverse geographical landscapes.

Some directives are more supported by wider institutional frameworks compared to others

Legal requirements that are supported by wider institutional frameworks are often scored more positively than those that are not. To illustrate, respondents emphasized the difficulty of ensuring the non-deterioration of large groundwater bodies with variations in quality. And respondents believed there may be disconnect between the large time scales between impacts and effects on groundwater quality, and the timescales over which measures are taken to assess groundwater quality. Thus, in practice it may be difficult to prevent deterioration if measures do not reflect ongoing causes and rates of deterioration. These concerns warrant further investigation into the effectiveness of institutional requirements of environmental directives, such as requirements to establish frameworks (Art. 1 WFD) and national action plans (Art. 4.1 PD)

In many cases, participants assigned more positive scores to interactions between requirements with more direct links to the FAIRWAY objective and less positive (and occasionally negative) scores to interactions with indirect links to the objective to protect drinking water resources.

Scores suggest that project partners view direct interactions between the requirements of directives and the protection of drinking water resources more positively than indirect interactions. To illustrate, the requirement related to remedial action (Art. 8 DWD) targets a different temporal scale of

management compared to the FAIRWAY objective. Remedial action includes restoration of degraded resources, while the FAIRWAY objective is perhaps more focused on long term prevention of pollution. Thus, respondents may perceive a less direct relationship between the long-term goals of FAIRWAY, and the more immediate reactive purpose of restoration. Moreover, the requirement to ensure that water used for human consumption should be free from any micro-organisms, parasites and substances which, in numbers or concentrations, constitute a potential danger to human health (Art.2, annex 1 DWD) might be unclear in terms of their relevance for pollution by pesticides and nitrates. Several respondents were uncertain about the applicability of this requirement to the protection of drinking water resources against agricultural pollution. Also requirements from apparently less relevant directives, such as the Habitats Directive, scored generally lower. This could suggest that there is some uncertainty with regard to the relationship between habitats and the protection of drinking water resources against nitrates and pesticides pollution. However, these scorings and comments may also be related to knowledge about biophysical processes. For example, restoring habitats often involves revegetation, which can create a buffer for pollutants and prevent agricultural runoff from entering waterways and decreasing water quality. However, this interaction is much less direct and transparent than more positively scored requirements related to other directives. The distinction between direct and indirect interactions between requirements of EU Directives and the objectives of FAIRWAY is an important finding that may speak to more institutional barriers between conceptualization of water quality policy, and on ground practice. These findings should be addressed further in successive tasks in WP6.

3. HORIZONTAL COHERENCE WITHIN EU WATER AND AGRICULTURE LAW

The previous chapter assessed the coherence of EU environmental directives with the FAIRWAY objective to protect drinking water resources against pollution by pesticides and nitrates from agricultural practices ('vertical coherence'). The main conclusion of the assessment was that, while the overall legal framework has the potential to contribute positively to this objective, the actual contribution will depend on the effectiveness of implementation. Chapter Two further identified several reoccurring themes that emerged from respondents' scores and comments about the coherence of the directives with the FAIRWAY objective. These are 1) divided opinions between respondents about the effectiveness of fixed threshold values; 2) differences in scoring between requirements to achieve environmental outcomes and requirements related to institutional frameworks; and 3) differences in scoring between direct and indirect interactions between requirements and the FAIRWAY objective. Respondent scores may be dependent on knowledge and understanding of biophysical processes and the impact of EU policies on biophysical processes though. Importantly, scorings reflect the perspectives of WP6 partners.

On average, the scores detailed in Chapter Two suggest good coherence between directives and the FAIRWAY objective. However, there is also a need to assess the degree of coherence between the requirements of each directive, referred to here as 'horizontal coherence'. A low degree of horizontal coherence could jeopardize the attainment of the overall purpose of protecting drinking water resources and carry the potential to undermine the effectiveness of the overall legal framework. Therefore, this chapter examines how well the requirements of individual directives support each other and identifies instances where the achievement of a requirement or objective would constrain, counteract or even make it impossible to achieve another requirement. Inconsistencies of this nature may affect the capacity of directives to contribute positively to the FAIRWAY objective to protect drinking water resources against agricultural pollution.

In this chapter, the focus will be on the most directly relevant directives. Based on the results from the vertical coherence assessment, five directives were identified as highly relevant for the attainment of the Fairway objective. For that reason, the horizontal coherence assessment analyses these five directives thoroughly. The delimitation to these five directives, enabled a more thorough and in-depth horizontal coherence assessment than what would be possible if all directives had been included in this final analysis. The directives analysed in this chapter are the WFD, GWD, DWD, ND and PD. The methodology used to assess the horizontal coherence amongst the five core directives is similar to the methodology used for the first overall assessment. The assessment is based on a **survey** carried out by the project's experts. Five surveys have been designed to score the degree of coherence between the legal requirements of one directive against the requirements of the other four directives. The purpose of this assessment is to identify possible regulatory overlaps, gaps, inconsistencies that might affect the effectiveness of the overall legal framework for the protection of drinking water resources.

Experts have **scored** the various interactions as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling') or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling'); or the respective requirements may be entirely '0 neutral' with each other, incurring no significant positive or negative interactions whatsoever, perhaps no interaction at all.[37] The surveys also contained open-ended

[37] Nilsson et al 2016; McCollum 2018.

items where respondents could explain their scorings or provide examples. For a further explanation of the scoring, see section 1.2.3 in chapter 1.

In the sections below only the **highlights** of the survey results will be presented, these are either interactions scored as indivisible (+3) or any negative interactions (-1, -2 or -3). Full scorings are provided in Appendix III - Complete horizontal coherence scorings per directive.

3.1 Coherence of the Water Framework Directive with other directives

The WFD contains several requirements and objectives. For the purpose of this assessment, we asked respondents to score four key requirements, those related to preventing deterioration, measures and artificial water bodies, reducing pollution, and the establishment of frameworks. The first three are considered substantive requirements, whereas the final one is more of a procedural nature. These four requirements have been assessed and scored in terms of their coherence with key requirements of the GWD, DWD, ND and PD.

Label	*WFD Article*
Preventing deterioration	Protect surface waters and groundwater to, inter alia, prevent their further deterioration and enhance their status, and to promote sustainable water use (art 1.1)
Measures and artificial water bodies	Implement the necessary measures to prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (art. 4.1(a)(ii)). MS shall also protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (art. 4.1(a)(iii))
Reducing pollution	Implement the necessary measures with the aim of progressively *reducing pollution from priority substances* and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD art. 4.1(a)(iv)).
Establishing frameworks	Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD. art. 1). Identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures.

Table 3. 1 Four key requirements of the WFD

3.1.1 Preventing deterioration

Art. 1.1 of the WFD requires member states to protect surface waters and groundwater to, inter alia, prevent their further deterioration and enhance their status, and to promote sustainable water use. One WP6 partner scored the extent to which requirements of the GWD, DWD, PD and ND are coherent with the WFD requirement to prevent deterioration, using the same 7-point Likert-scale as was used to assess coherence in Chapter 2. This approach was used to determine whether there are any requirements that may impede the attainment of the requirement to prevent deterioration.

Scores were given to assess the cohesion between each requirement of the four other directives, and the requirement to prevent deterioration stipulated under the WFD. The average score for cohesion between other directives and preventing deterioration indicates that the respondents perceive that other directives **(M = 1,9)** contribute positively to the aim to prevent deterioration. On average, the requirements of the **GWD** are perceived to be most contributive to the WFD (**M = 3**). The scores to the four requirements of the GWD contained no variability. All four requirements are scored as indivisible (+3). Since the GWD is a daughter directive to the WFD and as such directly related, this is an expected result.

The requirements of the **ND** are also considered to contribute positively to preventing deterioration **(M = 2.2**). The ND forms an integral part of the WFD. In particular, the requirement to apply common criteria for water pollution, that groundwater should not contain more than 50 mg/l nitrates, and that surface waters should not be eutrophic (ND, Annex I) is perceived to be indivisible (+3) and, thus, highly contributive. The requirement of the ND to identify vulnerable zones which drain into waters which are, or could be, affected by pollution within a 2-year period (Art. 3.2) is considered to be equally indivisible (+3). Respondents emphasized that although there may be challenges for implementation that may reduce the contribution of the ND to preventing deterioration, the framework outlined in the ND has high contributive potential.

The requirements of the **DWD** were also identified by the WP partner as important contributions to preventing deterioration under the WFD. However, it was noted that the DWD primarily focuses on the water quality at the tap, rather than within wider catchments. The revision of the DWD introduces a risk-based safety assessment to the monitoring of water at the tap, enabling authorities to concentrate resources on potential risks, to avoid analyses of non-occurring parameters and identify possible risks to water sources at distribution level. Respondents identified a possible **mismatch** between this risk-based approach at the tap and the WFD. The respondents suggested that the risk-based approach at the tap should be better linked to protecting drinking water resources within wider catchments, and Article 7 of the WFD. Due to this gap, there is some uncertainty about how to realise the contributive potential of the DWD.

For the aim of preventing deterioration, **no negative interactions** have been identified between the WFD and the requirements and objectives of the GWD, DWD, PD, and ND. Of note, the requirements associated with the PD were scored much lower than for other directives. However, no explanation was offered regarding this scoring. Similarly, given that the ND forms an integral part of the WFD, it was anticipated that all requirements of the ND would be indivisible (+3) from requirements of the WFD. In contrast, the respondents gave variable scores, and scored some requirements much lower than expected. This suggests the relationships may be more complex than originally anticipated, and that there may be some uncertainty around the coherence of these directives. Exploring these uncertainties in greater detail is an important direction for future tasks in WP6.

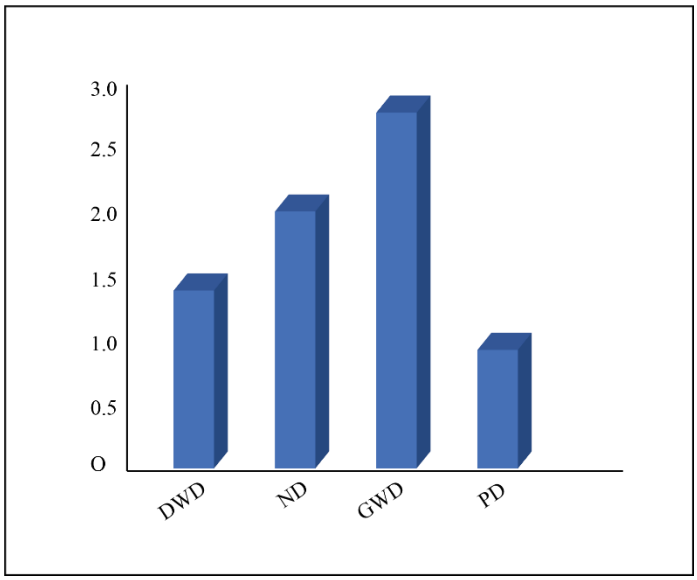


Figure 3. 1 Average scores of coherence of DWD, ND, GWD and PD with the aim to prevent deterioration (WFD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.1.2 Measures and artificial water bodies

Art. 4.1 (a)(i)-(iii)) of the WFD requires member states to implement the necessary measures to prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (art. 4.1(a)(ii)). Member states shall also protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (art. 4.1(a)(iii)). It has been assessed to what extent the requirements of the GWD, DWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of these requirements related to measures and artificial water bodies.

The scores for the contribution of the other directives to the WFD requirement related to measures and artificial water bodies were **highly variable**. While the requirements of the GWD and the PD are perceived to contribute positively to the aim to implement the necessary measures and to protect artificial water bodies **(M = 1 and M = 1.1 respectively)**, the scores assigned to the requirements of the DWD and ND were only marginally positive, and in some instances were negative. The requirements that are perceived to contribute negatively are those stipulating that the amount of livestock manures applied on land shall not exceed 170 kg/ha each year (ND, Annex III), and the requirement to apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I). Both these requirements are considered to be **cancelling (-3)** the WFD requirements pursuant to the respondent.

Responses to open-ended survey items give some explanation to the negative scorings for the requirements of the ND. The respondent clarified that, in some countries, such as the Netherlands, the assignment of waterbodies as artificial or heavily modified pursuant to the WFD implies that the specific ecological objectives are being set at a provincial level, for instance, at the level of nutrients. The application rules for manure are set at national level for 5 soil types and related to a human-health based standard of nitrates in groundwater. The objectives of the ND are primarily related to drinking water quality and only to ecology in the context of eutrophication. For nutrients, objectives are stricter for ecology than for drinking water quality purposes. On this basis, the respondents argue that existing general rules on the use of manure and pesticides are not comprehensive enough to

support WFD ambitions.[38] Importantly, these views represent the subjective assessment of one project partner. As such, further research is needed in successive tasks in WP6 to consider the potential gap highlighted here. It needs to be emphasized also that the limits to the amount of livestock manures and nitrates threshold values, are only one on a long list of obligatory measures to decrease leaching of nitrogen.

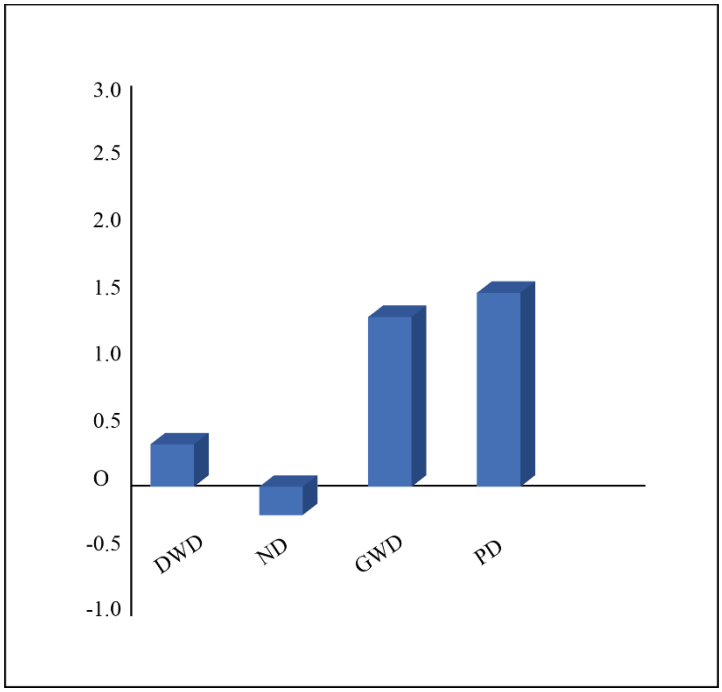


Figure 3. 2 Average scores of coherence with the requirement to take measures (WFD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.1.3 Reducing pollution

Art. 4.1 (a)(iv) of the WFD requires member states to implement the necessary measures with the aim of progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances. It has been assessed to what extent the requirements of the GWD, DWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to reduce pollution.

Overall, the scores assigned by the project contributor indicate that all requirements of the directives are perceived to be neutral (0) or enabling (+1) the requirement to implement **measures to reduce pollution (M = 0.2).** For the purpose of reducing pollution, **no negative interactions** have been identified.

Many of these scores are unexpected. While the perspectives reflected in the scoring are subjective, it could be assumed that many of the interactions, in particular those associated with the ND, should be clearly contributive to the WFD requirements. All measures in the ND aim to reduce nitrates pollution of waters. Thus, further investigation is required in WP6 to unravel the basis for these scores and partly diverging views.

[38] Susanne Wuijts et al, 'An Ecological Perspective on a River's Rights: a Recipe for More Effective Water Quality Governance?', (2019) *Water International* (in press).

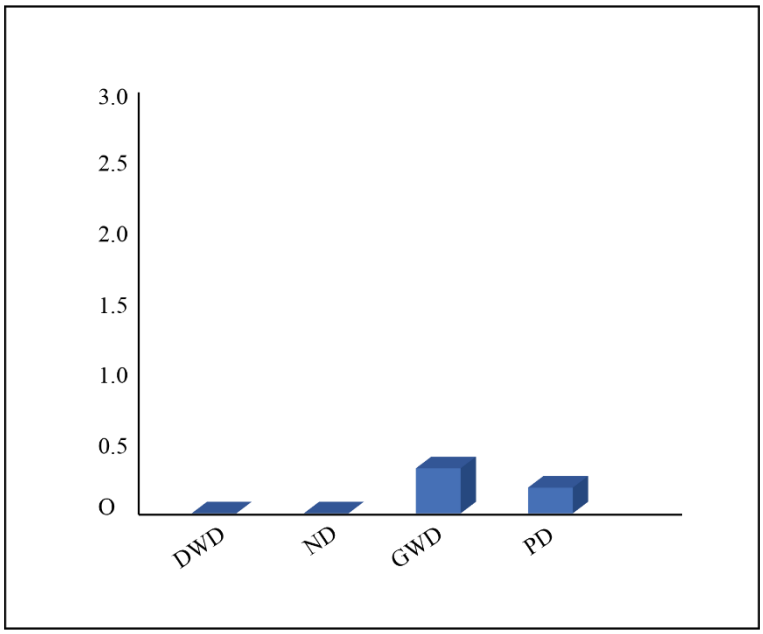


Figure 3. 3 Average scores of coherence with the aim to reduce pollution (WFD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.1.4 Establishing frameworks

Art. 1 of the WFD requires member states to establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (Art. 1). Member states are further required to identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures. It has been assessed to what extent the requirements of the GWD, DWD, PD and ND are coherent with these requirements, and whether there are any requirements that may impede their attainment.

The scores assigned by the WP partner suggests that, on average, all the directives were perceived to contribute positively to the above requirements (**M = 1.6).** On average, the requirements related to the GWD have been scored most positively (M = 2). In particular the requirement to prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1), has been identified as the most contributive (+3) to the WFD for the purpose of establishing frameworks and related procedural requirements.

No negative interactions were identified between the WFD requirement to establish frameworks, and other directives.

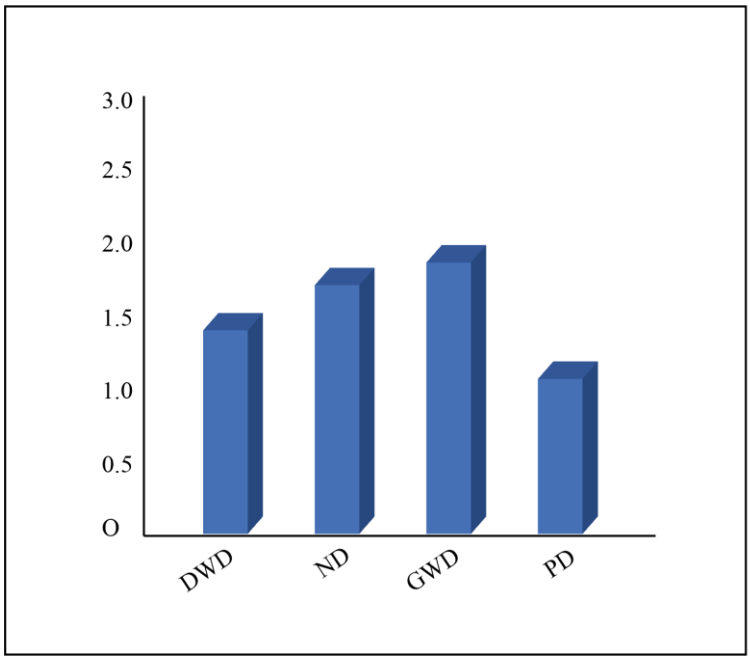


Figure 3. 4 Average scores of coherence with establishing frameworks (WFD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.1.5 Conclusion

Overall, several strong interactions have been identified between the requirements of the WFD, and the requirements stipulated under other key directives. In particular, the requirements of the GWD was judged to contribute very highly to the WFD, something which is an expected result given the nature of the GWD as a daughter directive. Also the **ND**, which forms an integral part of the WFD, contributes positively to the aim of *preventing deterioration*. In particular the requirement to apply common criteria for water pollution and the requirement that groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic (ND, Annex I) is considered to be positive. The ND's requirement to identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (Art. 3.2) is considered to be equally important.

However, the scores given by the project partner suggests that some requirements of the **ND** might challenge the objectives and requirements of the WFD. In particular, the respondents suggest that there is a potential disconnect between drinking water requirements and requirements that affect water quality in wider catchments. For example, in theory, the requirements of the ND related to the amount of livestock manures applied on land, to apply common criteria for water pollution, and to limit values of 50 mg/l nitrates should target both drinking water quality and wider ecological conditions that impact water quality in catchments. In practice, these linkages are seldom realised due to various complexities (see further WP3 FAIRWAY). Importantly, these perspectives may reflect the knowledge of the project partner about the intricacies of the ND. Therefore, these suggestions warrant further investigation.

3.2 COHERENCE OF THE GROUNDWATER DIRECTIVE WITH OTHER DIRECTIVES

The GWD contains several requirements and objectives. For the purpose of this assessment, we asked respondents to score four key requirements related to criteria for assessment, chemical threshold values, establishing strict thresholds, and programme of measures. These four requirements have been assessed and scored in terms of their coherence with key requirements of the WFD, DWD, ND and PD.

Label	*GWD Article*
Criteria for assessment	To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (art. 1).
Chemical threshold value	Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (art. 3.1).
Establish strict thresholds	Where threshold values from Annex II (50 mg/L for nitrates and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (Annex I).
Programme of measures	To ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment (art.6)

Table 3. 2 Four key requirements of the GWD

3.2.1 Criteria for assessment

Art. 1 GWD requires member states to prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals. It has been assessed to what extent the requirements of the WFD, DWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to form criteria.

Overall, the requirements of the other directives are perceived to be neutral (0) or enabling (+1) for establishing criteria for assessment (**M = 1.2).** Of all requirements, the project partner judged that the most contributive were: the requirement to adopt National Action Plans and to encourage integrated pest management (Art. 4.1 PD), the aim to reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (Art. 1, ND), as well as certain requirements of the WFD (Art. 1 and 4.1 (a)(ii) WFD). These requirements were deemed to be reinforcing (+2). The partner emphasized that in the context of groundwater protection, there is a high focus on the effects of pollution by nitrates and pesticides.

For the purpose of forming criteria, **no negative interactions** have been identified.

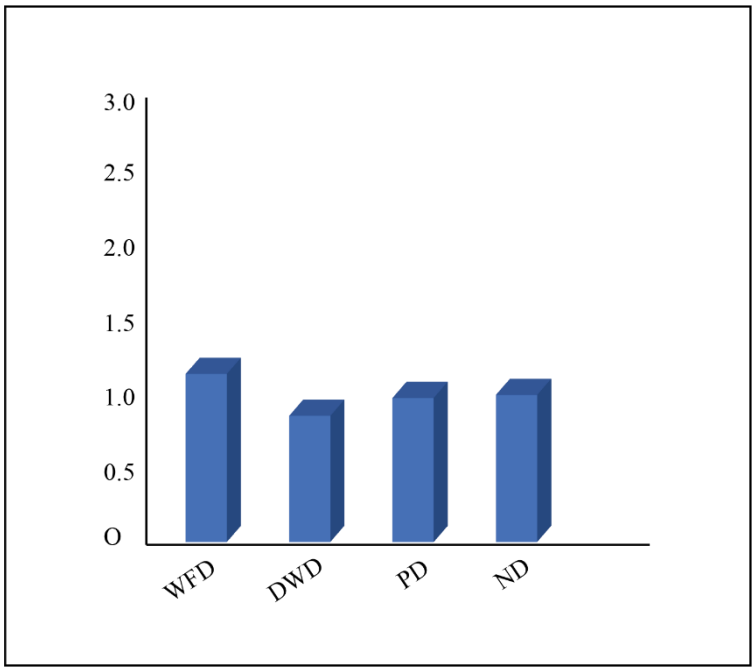


Figure 3. 5 Average scores of coherence with forming criteria (GWD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.2.2 Chemical threshold value

Art. 3.1 GWD stipulates that threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (art. 3.1). It has been assessed to what extent the requirements of the WFD, DWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement related to chemical threshold values.

Overall, the scores given by the assessor suggest that the directives are perceived to contribute positively to the requirement (**M = 1.4**). The scorings showed little variation; the average scores of the directives vary between 1.2 and 1.7. The requirements of the ND are considered to be most important.

In the context of chemical threshold values, **no negative interactions** have been identified.

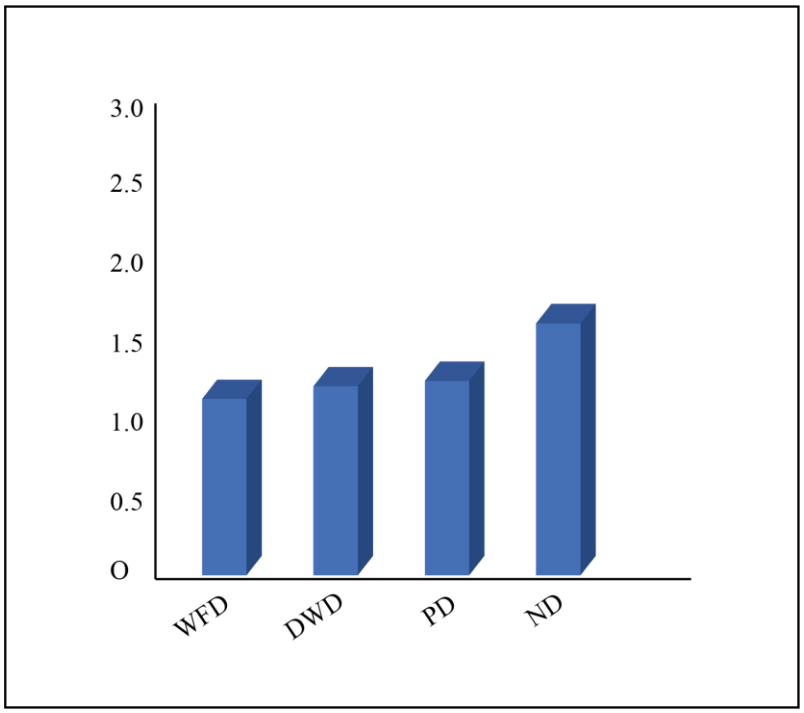


Figure 3. 6 Average scores of coherence with chemical threshold values (GWD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.2.3 Establish strict thresholds

Where threshold values from Annex II (50 mg/L for nitrates and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans, more strict values shall be established (GWD, Annex I). A project partner scored the extent to which the requirements of the WFD, DWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to establish strict thresholds.

Overall, the scores allocated by the respondent suggests that the directives are neutral for the purpose of establishing strict thresholds (**M = 0.1**). However, there is some variability between the scores given for specific directives and requirements. While the WFD, DWD, and PD are considered to be neutral (0), the ND is perceived to be slightly constraining (M=-0.5). Particularly the limits to the amount of livestock manures applied on land (170 kg/ha each year) (ND, Annex III), the requirement to apply common criteria for water pollution (not more than 50 mg/l nitrates) (ND, Annex I), and the requirement to identify vulnerable zones (ND, Annex I) are all considered to be **constraining (-1).** Respondents suggested that one explanation for this interaction is related to the fact that a fixed threshold of 170 kg N can vary in its pollution risk. Under certain circumstances, these amounts can adversely affect groundwater quality. It needs to be stressed though that these threshold values are only one of the measures of a long list of measures prescribed by the ND.

Of all requirements, the aim to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1) is perceived to be most contributive (reinforcing, +2).

These results suggest similar distinctions to those highlighted in Chapter Two. Project contributors perceive more general requirements related to protecting water quality and preventing pollution more positively than requirements associated with fixed thresholds. This seems to be due to the risk that a fixed threshold may be appropriate in some contexts, and insufficient in others. Thus, one potential area for improving coherence may be including terms in requirements to necessitate more strict

thresholds under certain environmental conditions. For example, it may be possible to identify biophysical conditions that pose a greater risk to groundwater quality than others, and thus, determine that stricter thresholds should be adopted.

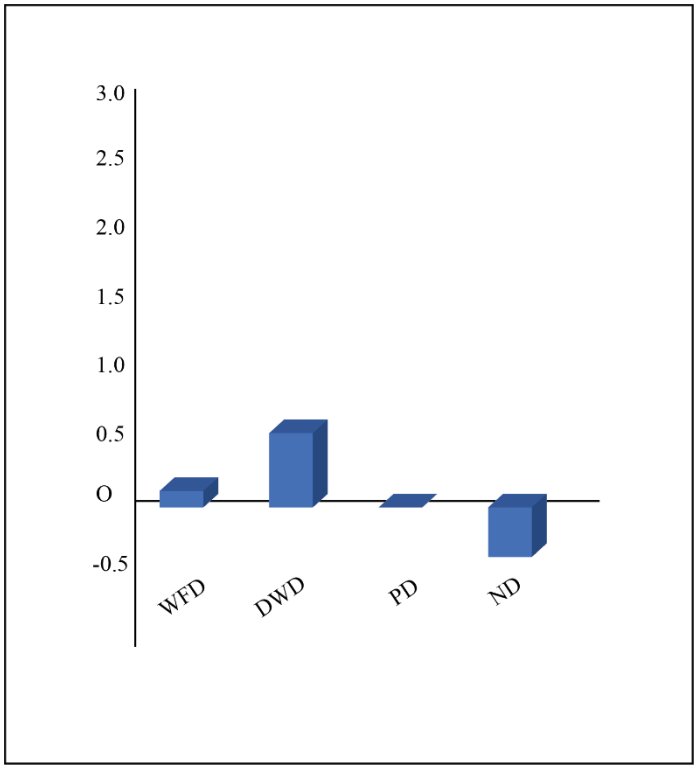


Figure 3. 7 Average scores of coherence with more strict threshold values (GWD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.2.4 Programme of measures

Art. 6 GWD stipulates that member states ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by member states to be dangerous for the environment. It has been assessed to what extent the requirements of the WFD, DWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to prevent deterioration

Overall, the scores assigned by the project partner suggest that the directives are perceived to be neutral or slightly constraining for the attainment of this requirement (**M = -0,1).** While requirements related to the PD and the ND are considered to be neutral (0), both the WFD and the DWD are scored slightly negatively with average scores of -0,2. The requirements considered to be most negative, and constraining (-1) are the overall protection aim of the WFD (Art.1 WFD), and the requirement related to micro-organisms and parasites (Art.2 and Annex I DWD). The respondents considered that these requirements contribute the least to achieving a programme of measures related to nitrates and pesticides pollution.

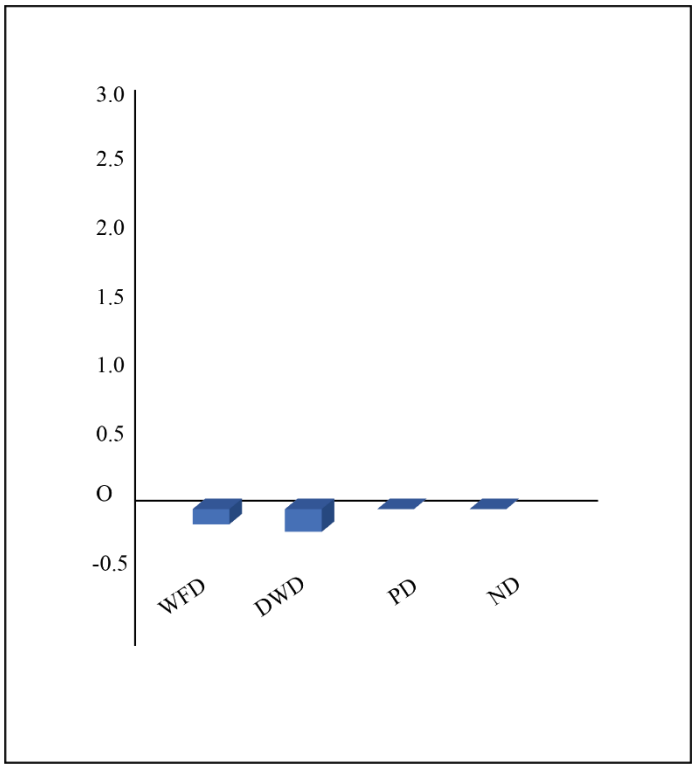


Figure 3. 8 Average scores of coherence with establishing programmes of measures (GWD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.2.5 Conclusion

Overall, the requirements and objectives of the WFD, DWD, ND and PD are considered to be coherent with the GWD, yet some negative interactions have been identified. For example, project contributors suggest that several requirements of the ND are considered to be moderately inconsistent with the requirements of the GWD. These include: the limits to the amount of livestock manures applied on land (170 kg/ha each year) (ND, Annex III), the requirement to apply common criteria for water pollution (not more than 50 mg/l nitrates) (ND, Annex I), and the requirement to identify vulnerable zones (ND, Annex I). Comments by project contributors about these interactions suggest that one reason that these requirements do not support the GWD is the risks associated with setting fixed threshold values in diverse biophysical environments.

Of note, no positive interactions were identified between the requirement to establish a programme of measures and other directives. This may reflect disconnect between the environmental objectives of the directives, and the institutional processes required to ensure those objectives are achieved.

3.3 COHERENCE OF THE DRINKING WATER DIRECTIVE WITH OTHER DIRECTIVES

The DWD contains several requirements and objectives. For the purpose of this assessment, we asked respondents to score four key requirements related to contamination, micro-organisms and parasites, deterioration and pollution, and remedial action. These four requirements have been assessed and scored in terms of their coherence with key requirements of the WFD, GWD, ND and PD.

Label	*DWD Article*
Contamination	To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).
Micro-organisms and parasites	To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)
Deterioration and pollution	To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).
Remedial action	If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).

Table 3. 3 Four key requirements of the DWD

3.3.1 Contamination

Art. 1 of the DWD requires member states to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean. It has been assessed to what extent the requirements of the WFD, GWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement related to contamination.

Overall, the scores assigned by the project partner suggest that the directives positively influence the requirement related to protecting human health from contaminants (**M = 1,8**). On average, both the WFD and the GWD are considered to reinforce (+2) the requirement of the DWD. Scoring suggests that the contributor believes that the most positive interaction is from two requirements. The first is the requirement to prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1), which has been scored as indivisible (+3). The second is the duty to prohibit aerial spraying, except under strict regulations (PD, art. 9) is scored as indivisible (+3).

In the context of contamination, **one negative interaction** was identified. The contributors suggested that the requirement to establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1) constrains (-1) the objective

of the DWD. Respondents suggested that the integrated pest management approach may result in increased s use of a lesser variety of active ingredients, and that those ingredients may as a consequence of greater use be at risk of exceeding the 0.1µg/l, which is the threshold level set for pesticides pursuant to GWD, Annex II. This critique reflects the subjective views of the project contributors. Thus, it would be worthwhile further investigating the potential risks associated with limiting the number of pesticide projects available in successive tasks of WP6.

A further observation that was made by respondents was that the definition of a Groundwater Body in WFD may result in a single body being large and heterogenous. The quality of drinking water resource from that groundwater body may vary spatially and temporally. It might help to investigate if more emphasis should be placed on those parts used for drinking water.

Respondents further suggested that national action plans may be ineffective as these are often not targeted at a specific source, but a whole aquifer. Thus, it may be necessary to introduce stricter measures in targeted areas. These comments are consistent with those made by project contributors outlined in the above section about the GWD; requirements related to institutional processes are viewed less favourably than requirements related to protecting natural resources and preventing pollution.

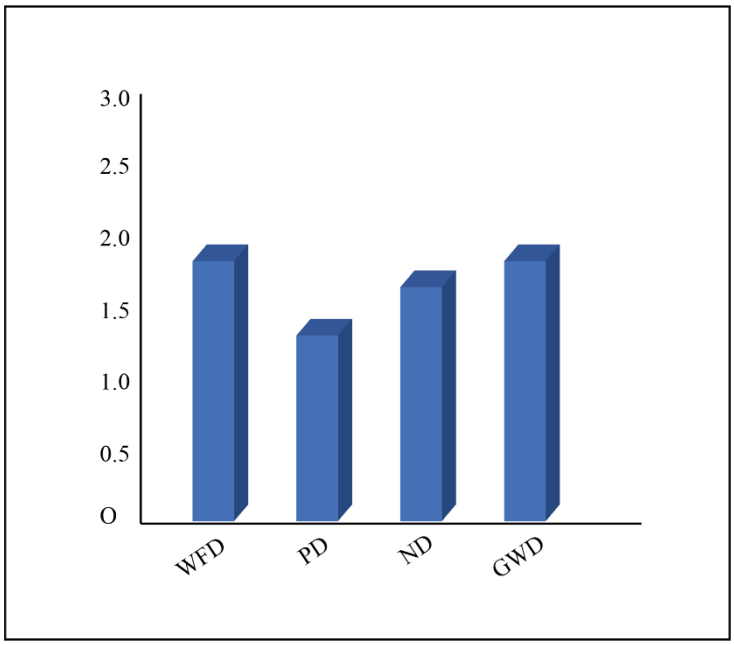


Figure 3. 9 Average scores of coherence with protection against contamination (DWD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.3.2 Micro-organisms and parasites

Art. 2 DWD (and Annex 1) require member states to ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1). It has been assessed to what extent the requirements of the WFD, GWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement.

Overall, the scores allocated by the project partner suggests that the interaction between the directives and the DWD requirement is perceived to be neutral (M = 0.2). However, there is variability between scores for individual directives. Specifically, the ND is considered to be generally enabling (+1) the attainment of the requirement. In contrast, respondents however identified a number of negative interactions between the requirements of the WFD and the DWD.

Requirements related to the protection and prevention of deterioration (WFD, Art.1), establishing a framework (Art. 1 WFD), and to identify river basins, produce plans and establish programmes of measures (Art. 3.1, 7, 13.1, 11.1 WFD) were all scored negatively, indicating that those requirements may be constraining (-1). Respondents commented that there may be a mismatch between actual protection and reported protection. For example, they suggested that ambiguity around how the use of groundwater bodies is reported may result in inaccurate reports about usage. They rationalize that the *number* of groundwater bodies used for drinking water purposes is often reported, without taking into account the *size or volume* of these bodies. Thus, a member state might be using a very small groundwater body with 'good status', and a very large groundwater body with 'poor status'. If reporting only captures the number of bodies in use, a member state could achieve a 50% compliance rate. However, in this scenario, the actual quality status of total water volume may be considerably less than 50%.

Respondents were uncertain about the interactions between the requirements of the GWD in relation to micro-organisms and parasites and left these interactions unscored. However, they did suggest that there could be potentially negative impacts associated with better environmental conditions, such as an increase in microorganisms from an increase in wild fowl. However, these suggestions are highly subjective. Further investigation into the biophysical implications of wildlife on water quality are required to determine whether it is likely that the requirements of the GWD may interact negatively with the DWD requirement about micro-organisms.

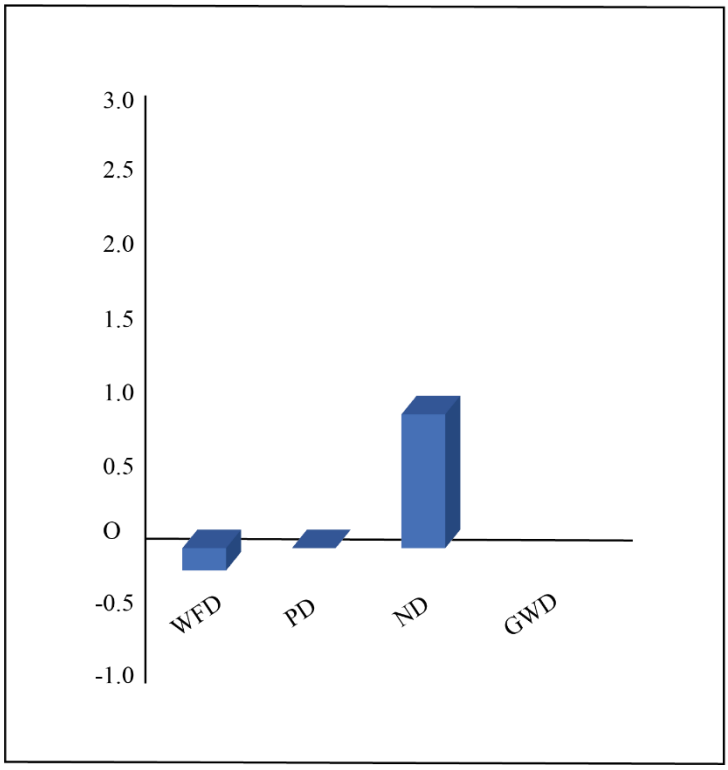


Figure 3.10 Average scores of coherence with preventing micro- organisms and parasites (DWD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.3.3 Deterioration

Art. 4 of the DWD requires member states to ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water. It has been assessed to what extent the requirements of the WFD, GWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to avoid deterioration

Overall, the scores allocated by project partner suggests that the directives are perceived to contribute highly positively to the aim to avoid deterioration **(M = 2,3).** The average score of all requirements for each directive was either enabling (+2) or indivisible (+3). Specifically, some requirements of the WFD and the PD have been scored as indivisible (+3). Among others, these include requirements related to protection (Art.1 WFD), prevention of pollution (Art. 4.1(a)(iv)), establishing frameworks (Art. 1 WFD), integrated pest management (Art. 1 PD), and national action plans (Art. 4.1 PD). For a complete overview of the scorings, see Appendix III – 'Complete horizontal coherence scorings per directive'

For the aim of preventing deterioration, **no negative interactions** have been identified between the DWD and the requirements and objectives of WFD, GWD, PD, and ND. This is consistent with scores reported above related to the GWD; respondents perceive a strong positive relationship between other directives and requirements about protecting natural resources and preventing pollution.

Respondents emphasized the difficulty of ensuring the non-deterioration of large groundwater bodies with variations in quality. Comments also suggested that respondents believe there may be disconnect between the large time scales between impacts and effects on groundwater quality, and the timescales over which measures are taken to assess groundwater quality. Thus, in practice it may be difficult to prevent deterioration if measures do not reflect ongoing causes and rates of deterioration. These concerns warrant further investigation into the effectiveness of institutional requirements of environmental directives, such as requirements to establish frameworks (Art. 1 WFD) and national action plans (Art. 4.1 PD)

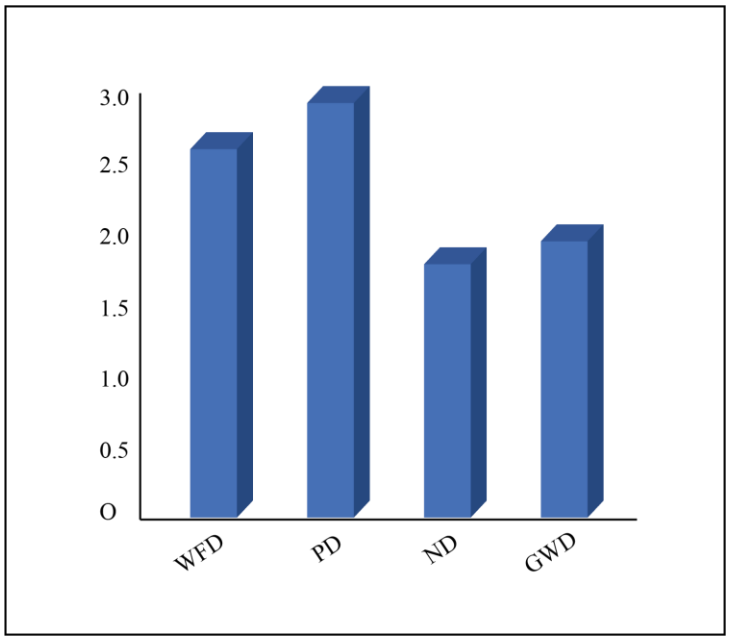


Figure 3. 11 Average scores of coherence with avoiding deterioration (DWD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.3.4 Remedial action

If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8). It has been assessed to what extent the requirements of the WFD, GWD, PD and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to take remedial action.

The average score given to the contribution of directives to the requirement to take remedial action suggests that the project partner perceives that the directives contribute positively to the requirement (**M = 1.3).** However, there is large variability between scores given to individual directives. While the average score given to requirements of the ND suggests that the project partner views the interactions as neutral (0), the average score given to requirements of the WFD suggests the partner perceives these interactions as having a strong enabling or indivisible effect (2.5).

The requirements that have been identified as indivisible (+3) are those related to protection (Art.1 WFD), preventing deterioration (art. 4.1(a)(i) and 4.1(a)(ii)) WFD), and establishing frameworks (Art. 1 WFD). Also, the requirement to establish stricter threshold values, where threshold values from Annex II (50 mg/L for nitrates and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans, of the GWD (Annex I), is scored as indivisible (+3).

For the purpose of remedial action, **no negative interactions** have been identified between the DWD and the requirements and objectives of WFD, GWD, PD, and ND. This is consistent with scoring of interactions between other requirements of the DWD and GWD related to taking action to protect condition and prevent pollution.

Despite the absence of any negative interactions, respondents highlighted that timescales are highly important in the context of taking remedial action. Changes in groundwater condition can occur very slowly, and time lags are common. Respondents suggest that drinking water companies may need to begin remedial action before a threshold for groundwater contamination is reached because changes in groundwater condition occur very slowly, and time lags are common. They further commented that how deterioration is defined, and thus how the quality of groundwater is assessed and reported, depends on the measures included in monitoring, and how well those measures allow trends in quality change to be identified. Further, some contaminants result from single ‘events’ rather than ongoing causes, and therefore are difficult to identify through regular scheduled monitoring. Thus, while water companies may use risk assessments, these assessments may not be sufficient to identify contaminants in groundwater bodies related to Source Protection Zones.

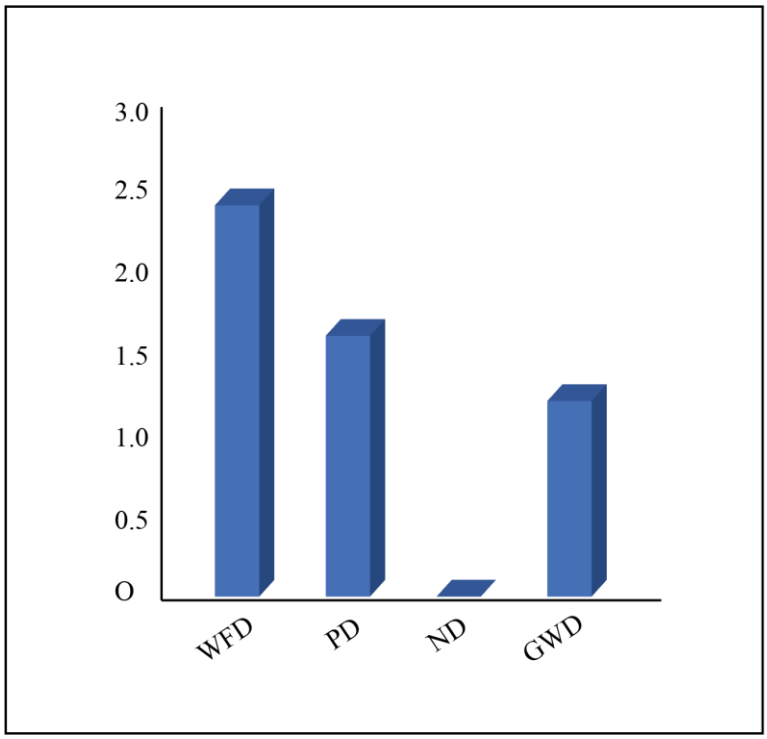


Figure 3. 12 Average scores of coherence with taking remedial action (DWD). Requirements and objectives are scored as positive (‘+3 indivisible’, ‘+2 reinforcing’ or ‘+1 enabling’), neutral (0), or negative (‘-1 constraining’, ‘-2 counteracting’ or ‘-3 cancelling’)

3.3.5 Conclusion

Overall, the requirements and objectives of the WFD, GWD, ND and PD are considered to be coherent with the DWD. However, some negative interactions have been identified that reinforce the importance of having strong institutional processes for achieving the objectives of directives to protect natural resources, prevent pollution, and improve degraded condition. For example, respondents suggested that the requirements of the PD to establish national action plans could be ineffective as these are often not targeted at a specific source, but a whole aquifer. Measures could also be stricter in targeted areas to facilitate attainment of the DWD objectives. Furthermore, respondents highlighted a possible gap between the WFD and the DWD. More specifically, they argue that, in the context of the WFD, the *number* of groundwater bodies used for drinking water purposes is decisive, without taking into account the water volume *size* of these bodies. Thus, a member state could use a very small groundwater body with 'good status', and a very large groundwater body with 'poor status'. By a mere focus on number, this would equal to 50% compliance while the actual quality status of all sources would be poorer.

Two reoccurring themes emerged from the analysis of respondent scores and comments for the DWD. Firstly, as mentioned earlier, respondents emphasized disconnect between requirements to protect condition and prevent pollution, and requirements related to institutional processes. This is consistent with themes emerging from the analysis of other directives. Secondly, respondents highlight the potential problems associated with time lags between groundwater contamination and taking measures of groundwater condition. These observations suggest avenues for further investigation.

3.4 COHERENCE OF THE PESTICIDES DIRECTIVE WITH OTHER DIRECTIVES

The PD contains several requirements and objectives related to aquatic environments and improving water quality. For the purpose of this assessment, we asked respondents to score four key requirements related to establishing a framework, national action plans, measures, and regulations. These four requirements have been assessed and scored in terms of their coherence with key requirements of the WFD, GWD, DWD, and ND.

Label	*PD Article*
Establishing frameworks	To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).
National Action Plans	To adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. To encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1)
Measures	To establish specific measures to protect the aquatic environment and drinking water from the impact of pesticides (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)
Regulations	To establish regulations about use of application equipment (PD, art. 8). Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).

Table 3. 4 Four key requirements of the PD

3.4.1 Establishing frameworks

Art.1 PD requires member states to establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques. It has been assessed to what extent the requirements of the WFD, GWD, DWD, and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to establish frameworks.

Overall, the scores given by project partner suggests that they believe that the directives contribute very positively to establishing frameworks under the PD **(M = 2**). However, the average of all scores for requirements related to each directive vary. On average, the DWD is considered to be most contributive and indivisible (+3). Similarly, the WFD was considered to be enabling (+2), and the GWD was considered to be indivisible (+3) to the requirement to establish frameworks.

The requirements considered to be of particular importance are: those related to the progressive reduction of pollution (WFD, art. 4.1(a)(iv)), institutional requirements (WFD, Art. 3.1, 7, 11.1, and 13.1), protection against contamination of water (Art.1 DWD), micro-organisms and parasites (Art.2, annex 1 DWD), prevention of deterioration (Art.4 DWD), threshold levels for nitrates and pesticides and need for stricter values (GWD, Annex I), the requirement to establish programmes of measures (GWD, art.6), and the need for remedial action (Art. 8 DWD). All these have been scored as indivisible (+3) from establishing frameworks under the PD.

For the purpose of the requirement to establish a framework to achieve a sustainable use of pesticides, **no negative interactions** have been identified. These results vary from earlier analyses which suggest that project partners view interactions with institutional requirements, such as establishing frameworks, more negatively compared to requirements related to protection and prevention of pollution. This may reflect genuine differences in coherence between institutional and protection/prevention requirements within each directive. However, the views expressed by project contributors are subjective and may also reflect variable perspectives about biophysical processes and how environmental policy is implemented in practice. The varying cohesion of institutional arrangements related to achieving the objectives of protection and prevention requirements should be investigated further in successive tasks in WP6. In particular, it would be helpful to identify elements of more coherent directives, compared to those with greater disconnect between objectives to protect resources and prevent pollution, and institutional arrangements.

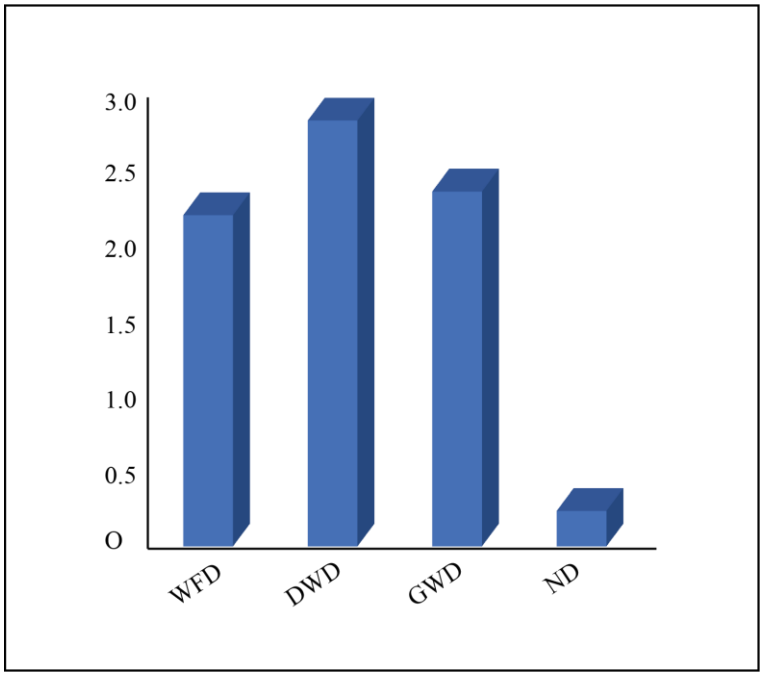


Figure 3. 13 Average scores of coherence with establishing frameworks (PD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.4.2 National Action Plans

Art. 4 PD requires member states to adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use, and to encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1). It has been assessed to what extent the requirements of the WFD, GWD, DWD, and ND are coherent with this, and whether there are any requirements that impede the adoption of National Action Plans and to introduce integrated pest management.

Overall, the scores given by project partners indicates that the directives are perceived to contribute positively to adopting National Action Pans under the PD (**M= 1.3**). While the WFD, DWD, and the GWD are considered to be generally enabling the requirement (+1), the ND is on average scored as neutral (0).

Amongst the respondent scores, several requirements stood out as being indivisible (+3). Of particular importance are the requirements to progressively reduce pollution (WFD, art. 4.1(a)(iv)),

to establish a framework under the WFD (Art. 1 WFD), to establish stricter threshold values (Annex 1 WGD), and to establish a programme of measures under the GWD (Art.6 GWD).

For the purpose of adopting National Action Plans and introducing integrated pest management, **no negative interactions** have been identified. Similar to the requirement to establish frameworks, these results contrast from scores related to institutional arrangements under other directives, such as the DWD.

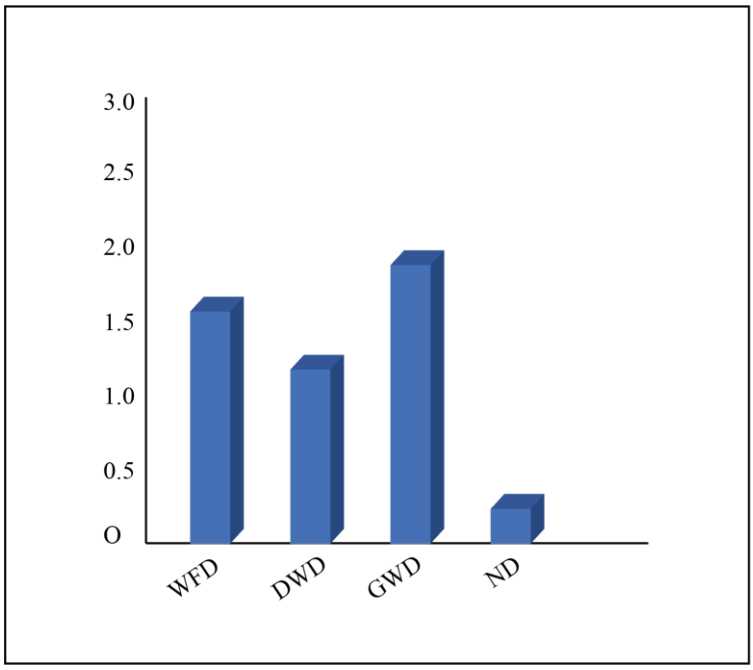


Figure 3. 14 Average scores of coherence with adopting National Action Plans (PD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.4.3 Measures

Art. 11.1 PD requires member states to establish specific measures to protect the aquatic environment and drinking water from the impact of pesticides. Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD). It has been assessed to what extent the requirements of the WFD, GWD, DWD, and ND are coherent with this, and whether there are any requirements that impede the attainment of the requirement to establish specific measures.

Overall, the scores assigned by the project partner suggests that the directives are perceived to contribute highly positive to the requirement to establish specific measures (**M = 2.1**). Both the WFD and the DWD are considered to be indivisible (+3), and the respondent scores contained no variability. All requirements of these directives were scored as +3. The GWD was perceived to be less contributive, though still reinforcing (+2). Among the GWD requirements and objectives, the requirements to establish more strict values where threshold values from Annex II (0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans (Annex 1 GWD), and to establish programmes of measures (Art. 6 GWD), are considered to be most contributive and indivisible (+3).

The ND is perceived to be least contributive, yet still positive, with an average score of M=0,75. Most requirements of the ND are considered to be neutral (0), except for the duty to identify vulnerable zones (Art.3.2 ND) and establish action programmes for those (Art.5.1-5.4 ND). While the scores

given by project partners are subjective, this may also indicate some challenges associated with translating certain requirements from policy to on ground practice, and possible complex governance arrangements where interactions between PD and ND may appear (See further report D6.2 reviewing governance arrangements in case study areas). Thus, these observations require further investigation.

For the purpose of establishing specific measures, **no negative interactions** have been identified between the PD and the WFD, GWD, DWD and ND.

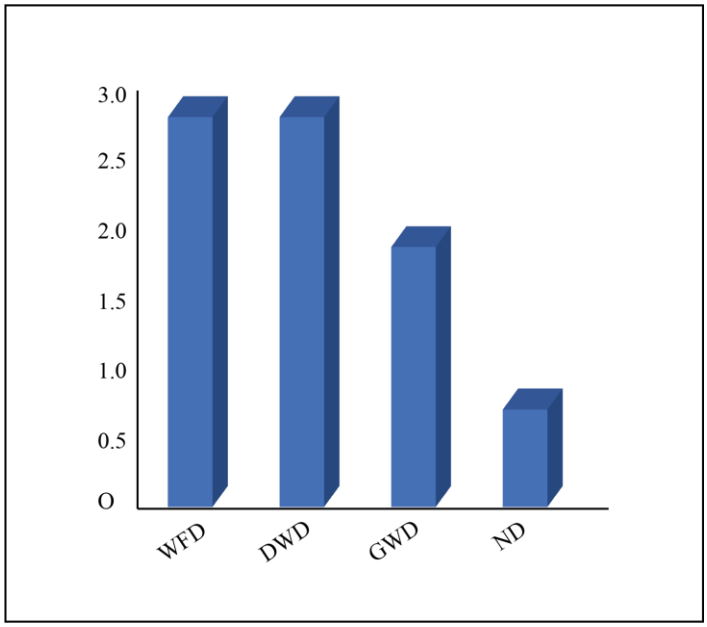


Figure 3. 15 Average scores of coherence with establishing measures (PD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.4.4 Regulations

Art. 8 PD requires to establish regulations about use of application equipment (PD, art. 8). Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9). It has been assessed to what extent the requirements of the WFD, GWD, DWD, and ND are coherent with this, and whether there are any requirements that impede the attainment of these requirements.

Overall, scores assigned by project partner indicate that the directives are perceived to be less coherent with the requirement, compared to other requirements under the PD (M=0,7). Average scores for requirements under each directive varied between 0,2, such as for ND, and 1,2, such as for DWD. The scores for individual requirements were also variable. While most requirements were scored either as neutral (0) or enabling (1), a few requirements are considered to be indivisible (+3) to the attainment of Art. 8 and 9 PD.

The requirement to progressively reduce pollution (WFD, art. 4.1(a)(iv)), and to ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4) are considered to be most contributive and scored as indivisible (+3).

For the purpose of establishing regulations and prohibit aerial spraying, **no negative interactions** have been identified between the PD and the WFD, GWD, DWD and ND. However, it is noteworthy that the scores given by project partner about establishing regulations are much lower than the scores pertaining to other requirements. These low scores related to establishing regulations are more consistent with the assessments of institutional requirements under other directives, such as

the DWD. Further, these scores are also much lower than scores given for other institutional requirements under the PD, such as establishing frameworks. Further investigation may be worthwhile to identify factors that explain these perceptions, particularly with regards to lower cohesion between establishing regulations and requirements related to protecting resources and preventing pollution.

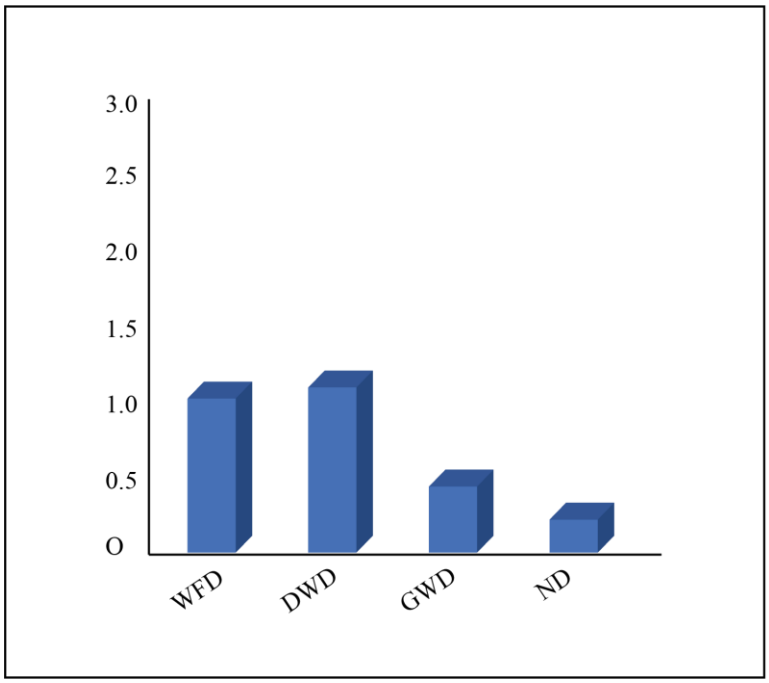


Figure 3. 16 Average scores of coherence with establishing regulations (PD). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.4.5 Conclusion

Overall, many positive interactions have been identified. The WFD, DWD and GWD are generally considered to contribute positively to the achievement of the PD directive. The ND is least relevant, as in general the ND does not apply to pesticides. No negative interactions have been detected.

Unlike other directives (such as the DWD), the project partner indicates that they believe there is much greater coherence between most institutional arrangements and the objectives of requirements related to protecting resources, preventing pollution, and establishing thresholds. There may be several explanations for this variability. Firstly, the scores assigned to interactions reflect the subjective judgements of project partners. Thus, variability may be due to opposing perspectives. In this instance, it would be worthwhile to further investigate the rationale underpinning these opposing perspectives. Secondly, the variability may reflect genuine differences in cohesion between institutional and environmental requirements under different directives. In this instance it would be worthwhile to identify factors that facilitate greater cohesion in some instances and impede cohesion in others.

3.5 COHERENCE OF THE NITRATES DIRECTIVE WITH OTHER DIRECTIVES

The ND contains several requirements and objectives. For the purpose of this assessment, we asked respondents to score four key requirements related to establishing a framework, national action plans, measures, and regulations. These four requirements have been assessed and scored in terms of their coherence with key requirements of the WFD, GWD, DWD, and PD.

Label	*ND Article*
Reduce pollution	To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (art. 1)
Livestock manure limits	The amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (Annex III)
Groundwater limits	Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (Annex I)
Vulnerable zones	Identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). MS shall establish action programmes in respect of the designated vulnerable zones or part of it (art. 5.1 to 5.4).

Table 3. 5 Four key requirements of the ND

3.5.1 Reduce pollution

Art. 1 ND requires member states to reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution. It has been assessed to what extent the requirements of the WFD, GWD, DWD, and PD are coherent with this, and whether there are any requirements that impede the attainment of the aim to reduce pollution.

Overall, the scores assigned by project partners suggest that the directives are perceived to contribute positively to the aim to reduce pollution (**M = 1.5**). However, the average scores for the four directives varied considerably. All requirements under the PD are scored as neutral (0). It is likely that this is because the PD does not apply to nitrates. The respondent scores did not identify any negative interactions between the aim to reduce pollution by nitrates and the PD.

Both the WFD and the GWD are perceived as highly contributive, with average scores around 2.7. Many WFD and GWD requirements are considered to be indivisible (+3). These include: requirements related to the protection of surface waters (Art. 1 WFD), the prevention of deterioration (art. 4.1(a)(i) WFD), institutional requirements of the WFD (Art. 3.1, 7, 11.1, and 13.1 WFD), the prevention and control of groundwater pollution (Art.1 GWD), threshold values (Art. 3.1 GWD), and the possible need for more strict threshold values (Annex 1, GWD). For a full overview, see Appendix III - Complete horizontal coherence scorings per directive'.

For the purpose of reducing pollution by nitrates, **no negative interactions** have been identified between the ND and the WFD, GWD, DWD and PD. These results are consistent with scores indicating the cohesion between requirements to protect resources and reduce pollution, and the requirements of other directives, outlined in earlier sections of Chapter Three.

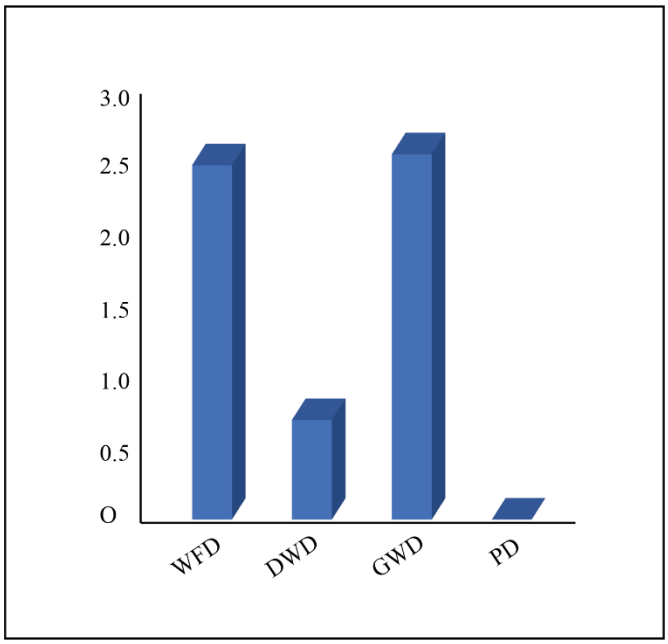


Figure 3. 17 Average scores of coherence with reducing pollution (ND). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.5.2 Livestock manure limits

Annex III of the ND stipulates that the amount of livestock manures applied on land shall not exceed 170 kg/ha each year. It has been assessed to what extent the requirements of the WFD, GWD, DWD, and PD are coherent with this, and whether there are any requirements that impede the attainment of this objective.

Scores for all directives and all individual requirements suggest that project partners believe that all interactions with the requirement about manure application are neutral (0). The respondent scores contained no variability, suggesting that for the purpose of complying with these livestock manure limits, the WDF, GWD, DWD and PD incur no significant positive or negative interactions whatsoever. According to the respondents, only a restriction of breeding intensity or a restriction on the number of animals per hectare could support the 170kg/ha limit positively. It should be stressed here that there appear to be diverging interpretations of the requirement related to livestock manure limits; is this requirement about the amount of manure contribute from cattle or about the amount of manure that farmers can use on crops and apply themselves like a fertilizer. As there are diverging views on the scope of this requirement, this is worthy of further investigation later in WP6.

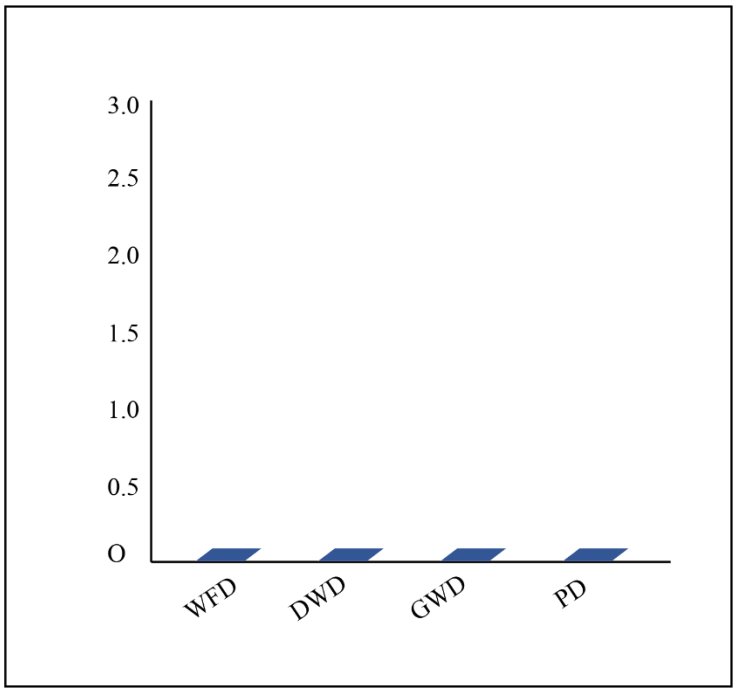


Figure 3. 18 Average scores of coherence with livestock manure limits (ND). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.5.3 Groundwater limits

Annex I ND stipulates that groundwater should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. It has been assessed to what extent the requirements of the WFD, GWD, DWD, and PD are coherent with this, and whether there are any requirements that impede the attainment of this objective.

Overall, the scores assigned by the project partner suggest that the directives are perceived to only contribute minimally to the attainment of groundwater limits (**M = 0.5).** The DWD and the GWD are considered to be most contributive, with average scores of 0,5 and 1,5 respectively. The WFD and the PD are scored as being neutral (0), with no variability in scores among the requirements.

The requirements that contribute the most to groundwater limits were judged to be the requirements of the GWD setting threshold levels applicable to good chemical status (Art. 3.1 GWD), and the possible need for more strict values where threshold values from Annex II (50 mg/L for nitrates) are not sufficient to prevent damage to environment (Annex I, GWD). Both of these requirements are considered to be reinforcing (+2) the groundwater limits for nitrates. The respondents commented that long retention periods for groundwater, low rainfall levels, and denitrification may also influence nitrate concentrations in drinking water.

In the context of groundwater limits, **no negative interactions** have been identified between the ND and the WFD, GWD, DWD and PD. These results contrast with scores given to other requirements related to specific threshold values; in other instances, project partners presented conflicting perspectives suggesting that there are negative risks associated with adopting fixed thresholds. Overall, the scoring for groundwater limits suggests that project partners feel the fixed thresholds related to nitrates may be more appropriate than other fixed thresholds, such as limits to contaminants in groundwater.

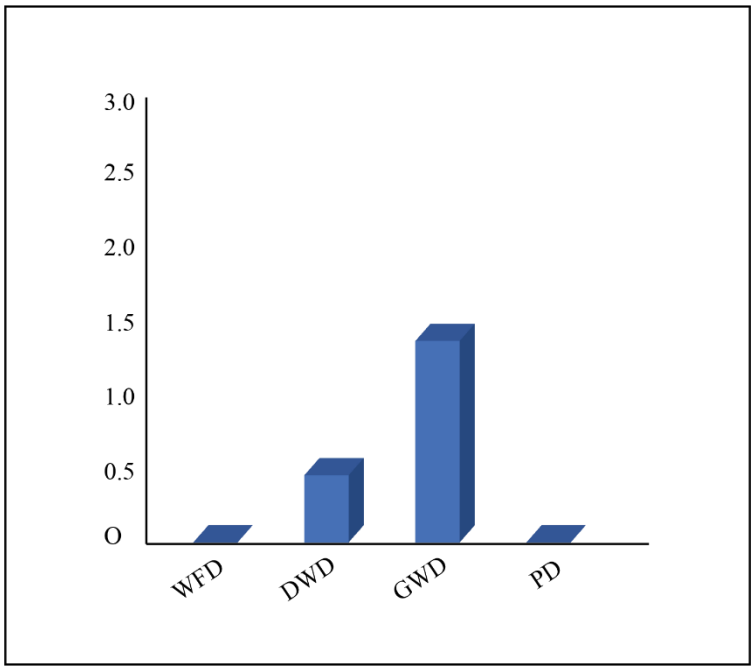


Figure 3. 19 Average scores of coherence with groundwater limits (ND). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.5.4 Vulnerable zones

Art 3.2 ND requires member states to identify vulnerable zones which drain into water bodies which are or could be affected by pollution within a 2-year period, and to establish action programmes in respect of the designated vulnerable zones or part of it (art. 5.1 to 5.4 ND). It has been assessed to what extent the requirements of the WFD, GWD, DWD, and PD are coherent with this, and whether there are any requirements that impede the attainment this requirement.

Overall, the scores assigned by the project partner for the cohesion between the vulnerable zones requirement and other directives suggests that the directives are perceived to be only slightly contributive (**M = 0.6).** However, the average scores showed great variability. The requirements of the DWD and the PD are considered to be neutral (0). This suggests that identifying vulnerable zones and establishing action programmes for those zones are unrelated to the DWD and the PD.

The requirements of the WFD were scored as neutral (0) or enabling (+1). In contrast, the interaction between requirements under the GWD and the requirement to establish vulnerable zones are considered to be highly positive (M=2.3). Several GWD requirements were scored as being indivisible (+3). These include the requirements to prevent and control groundwater pollution (Art.1 GWD), requirements related to threshold values (Art.3.1 GWD), and the need for more strict threshold values (Annex I, GWD).

Thus, while the DWD and PD were viewed as unrelated to vulnerable zones, requirements related to groundwater and the WFD were considered to be highly related. These perspectives warrant further investigation. Scoring was conducted subjectively. Therefore, it is of interest to identify why some factors are considered to be more important for vulnerable zones than others. For example, it may be useful to determine why requirements related to drinking water were considered 'neutral', while requirements related to groundwater were considered highly important for identifying vulnerable zones. It is possible that, as suggested in the section above addressing the DWD, drinking water requirements are perceived to be separate from requirements that pertain to wider catchment processes, such as vulnerable zones.

For the purposes of identifying vulnerable zones and establishing action programmes, **no negative interactions** have been identified between the ND and the WFD, GWD, DWD and PD. Respondents emphasized that regulations on water protection do not necessarily help with the establishment of nitrates vulnerable zones, which might be a quite practical task.

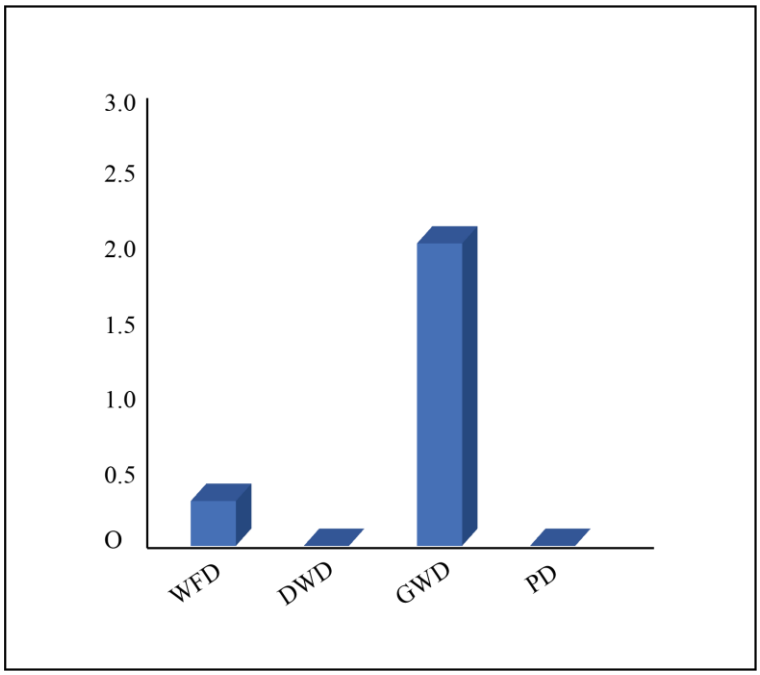


Figure 3. 20 Average scores of coherence with identifying vulnerable zones (ND). Requirements and objectives are scored as positive ('+3 indivisible', '+2 reinforcing' or '+1 enabling'), neutral (0), or negative ('-1 constraining', '-2 counteracting' or '-3 cancelling')

3.5.5 Conclusion

Overall, various positive interactions between the requirements of the ND and other directives were identified. No negative interactions were detected.

Of note, compared to other directives, numerous interactions were viewed to be 'neutral'. There are several explanations for this. In some instances, it is likely that these perspectives reflect a genuine lack of connectivity between ND objectives and other directives, particularly with regards to requirements under the PD. However, in some cases, these perspectives may reflect the more complex nature of interactions between nitrate levels and other environmental concerns. This is consistent with the conclusions of Chapter Two which suggested that *less direct* interactions may be more difficult to identify and score accurately.

Also, of interest is the fact that fixed thresholds related to the ND were viewed positively, compared to other fixed thresholds examined in relation to other directives. This may reflect the varying opinions of multiple project partners. Alternatively, the fixed thresholds related to nitrate concentrations may not produce the same risks as those identified in relation to other directives, such as concentrations of contaminants in groundwater.

3.6 THE DEGREE OF HORIZONTAL COHERENCE IN THE EU LEGAL FRAMEWORK

Overall, project partners scored the interaction between the directives positively. However, the scoring for individual requirements indicate that some negative interactions were identified. While these assessments are subjective, and likely to reflect varying degrees of knowledge, the negative scorings may indicate interactions that impede the effectiveness of some components of EU legal frameworks. While some fragmentation between legal frameworks is likely to be inevitable, and in many cases unproblematic, in some instances fragmentation may become problematic, such as cases of significant inconsistencies between directives. Further, in some cases, it is possible to identify gaps where two directives could support the objectives of each more cohesively. Inconsistencies, and gaps that point to unfulfilled opportunities for greater coherence, could jeopardize the overall aim to protect drinking water resources, and potentially undermine the effectiveness of the wider legal framework. Thus, chapter 3 assessed the degree of coherence between each of the core directives and their individual requirements, referred to here as horizontal coherence.

Chapter 3 scored the coherence between the legal requirements of the Water Framework Directive, Groundwater Directive, Drinking Water Directive, Nitrates Directive and Pesticides Directive. The purpose was to identify interactions between legal requirements and objectives that could hinder the attainment of the overall goal related to safe drinking water quality or reduce the contributive effect of any one directive or requirement towards achieving the overall goal. This analysis was undertaken by partners to work package 6.1 who gave a score to the interaction between legal requirements and provided explanations for these scores where appropriate. The scoring of interactions between individual requirements from each directive followed the methodology presented by Nilsson et al (2016). This methodology involved using a seven-point Likert-scale whereby interactions may be given a score between +3 and -3. Positive scores are assigned to interactions that are indivisible (+3), reinforcing (+2), or enabling (+1). Negative scores are assigned to interactions that are cancelling (-3), counteracting (-2) or constraining (-1). A score of 0 can be assigned to interactions that are perceived to be neutral, thus incurring no significant positive or negative implications. See section 1.2.3 for a more detailed description of the methodology applied.

The assessments of the degree of coherence between individual directives are based upon **respondents' perceptions and opinions**. As such, some bias in the scorings and explanations is unavoidable. Each partner to task 6.1 conducted one survey, and thus one assessment of coherence between a single directive and the requirements of other directives. For budgetary reasons it was not possible to ask each partner to conduct all surveys and assessments. By comparison, the survey reported in Chapter Two was conducted by ten project partners. Given that each survey (for the WFD, GWD, DWD, ND and PD) was carried out by only one partner, there may be more bias in the results of Chapter Three, compared to the results of Chapter Two. However, to minimise error, the surveys reported in Chapter Three were distributed in accordance with the partners' main fields of expertise.

The following figure presents a synthesis of the horizontal coherence assessment between the five directives.

		WFD	DWD	GWD	ND	PD
WFD	*Summary*					
	Highlights		All interactions positive or neutral	All interactions positive or neutral	Possible disconnect/insufficient rules for support	All interactions positive or neutral
GWD	*Summary*					
	Highlights	Most interactions positive or neutral; Programme of Measures least interaction	Most interactions positive or neutral; Programme of Measures least interaction		Most interactions positive or neutral; applying blanket manure thresholds constraining	Some positive interactions; thresholds for manure, groundwater & requirements for vulnerable zones constraining
DWD	*Summary*					
	Highlights	Most interactions positive or neutral; Concern about effective implementation of programmes & reporting		All interactions positive. Possible issue of timescale for remedial action emphasized.	All interactions positive or neutral.	Most interactions positive or neutral. Concern regarding perverse incentives of compliance resulting in overuse of alternative products
ND	*Summary*					
	Highlights	All interactions positive or neutral	All interactions positive or neutral	All interactions positive or neutral		All interactions neutral
PD	*Summary*					
	Highlights	All interactions positive or neutral	All interactions positive	All interactions are positive	All interactions are positive or neutral	

Figure 3. 21 A synthesis of findings from analysis of horizontal coherence between the WFD, GWD, DWD, ND and PD, including a visual summary of interactions between each Directive and highlights. Visual summaries (pie charts) demonstrate the proportion of interactions between the requirements of each Directive that respondents judged to be positive (green), neutral (orange) and negative (blue)

Emphasized highlights	
WFD	Potential disconnect between ND and WFD; in practice drinking water requirements rarely extend to the wider catchment, spatial disconnect. Nitrate requirements should target drinking water quality directly, as well as water quality in the wider catchment because the two are clearly connected. These ideas warrant further investigation in successive tasks of WP6.
GWD	Article 4.1 of the ND related to reducing pollution could offer an opportunity to formalise cross-referencing between the GWD and the ND. While the interaction is viewed to be positive, there is currently no requirement for cross-referencing.
DWD	There may be unintentional negative outcomes of setting restrictions on pesticides without considering the alternative products used by farmers. National action plans may not be sufficient for addressing the spatial dynamics of the entire aquifer. These concerns could be followed up in successive tasks of WP6. Perceptions of interactions between the DWD and other Directives appear to reflect a range of beliefs, including those about cohesion between requirements, as well as wider confidence, or lack of confidence in process and implementation. How these concerns might be addressed, and the appropriate scale of governance to address these concerns could be considered in successive tasks of WP6.

ND	Overall, the requirements of the ND are viewed to interact positively neutrally with other directives' requirements. However, there is room for improvement. According to the respondents, only a restriction of breeding intensity or a restriction on the number of animals per hectare could support the 170kg/ha limit positively. It should be stressed here that there appear to be diverging interpretations of the requirement related to livestock manure limits; is this requirement about the amount of manure contribute from cattle or about the amount of manure that farmers can use on crops and apply themselves like a fertilizer. As there are diverging views on the scope of this requirement, this is worthy of further investigation later in WP6. There appears to be a need for increased specificity in the directives to avoid unclarities.
PD	Overall, many positive interactions have been identified. The WFD, DWD and GWD are generally considered to contribute positively to the achievement of the PD directive.

Table 3. 6 Emphasised highlights of the horizontal coherence analysis

Key emerging themes:

Three important themes emerge from the analysis of scores and comments about interactions between the requirements of the WFD, DWD, GWD, PD and ND. Some of these themes reinforce the findings outlined in Chapter 2, while some are unique to the analysis presented in Chapter 3. The key themes are:

- Emphasis on the fact that the effectiveness of fixed threshold values compared to more general terms about protecting resources, reducing pollution, and performing restoration are scored generally low;
- The tendency for project partners to score direct interactions more positively, and indirect interactions less positively, or occasionally negatively, and the possibility that varying degrees of knowledge about biophysical processes may have influenced these judgements;
- That, with minor exceptions, the scores for requirements related to environmental outcomes, including protecting resources, reducing pollution, and remediation, tended to be more positive than scores for requirements related to the institutional arrangements for achieving environmental outcomes, such as requirements to establish frameworks.

These key narratives are expounded in the following.

The effectiveness of fixed threshold values

Chapter Two emphasized the perceived limitations of fixed thresholds for achieving the FAIRWAY objectives. The scores and comments given by project partners in Chapter Three reinforce these perceptions. This is not surprizing given that the same work package partners were involved in both stages of the research. However, the results of the five surveys conducted about interactions between the directives suggest that fixed threshold values may also impede EU laws from supporting each other.

Project contributors perceive more general requirements related to protecting water quality and preventing pollution more positively than requirements associated with fixed thresholds. This seems to be due to the risk that a fixed threshold may be appropriate in some contexts, and insufficient in others. Thus, one potential area for improving coherence may be including terms in requirements to necessitate more strict thresholds under certain environmental conditions. For example, it may be possible to identify biophysical conditions that pose a greater risk to groundwater quality than others, and thus, determine that stricter thresholds should be adopted.

There were two exceptions to the tendency for contributors to score general requirements about achieving environment outcomes more positively than requirements about specific fixed thresholds. Firstly, in the context of groundwater limits, project partners did not consider any negative interactions between fixed limits and the requirements of the WFD, GWD, DWD and PD. These results contrast with scores given to other requirements related to specific threshold values; in other instances, project partners presented conflicting perspectives suggesting that there are negative risks associated with adopting fixed thresholds. Overall, the scoring for groundwater limits suggests that project partners feel the fixed thresholds related to nitrates may be more appropriate than other fixed thresholds, such as limits to contaminants in groundwater. Secondly, fixed thresholds related to the ND were viewed positively, compared to other fixed thresholds examined in relation to other directives. This may reflect the varying opinions of multiple project partners. Alternatively, the fixed thresholds related to nitrate concentrations may not produce the same risks as those identified in relation to other directives, such as concentrations of contaminants in groundwater.

Another issue raised in relation to fixed thresholds was the potential disconnect between drinking water requirements and requirements that affect water quality in wider catchments. For example, in theory, the requirements of the ND related to the amount of livestock manures applied on land, to apply common criteria for water pollution, and to limit values of 50 mg/l nitrates should target both drinking water quality and wider ecological conditions that impact water quality in catchments. In practice, these linkages are seldom realised due to various complexities (see further WP3 FAIRWAY). Importantly, these perspectives are subjective and warrant further investigation.

Direct versus indirect interactions & the influence of knowledge

Scores suggest that project partners view direct interactions between the requirements of directives more positively than indirect interactions. However, these judgements may also reflect the varying knowledge of project partners about biophysical processes, and how specific management practices may influence those processes. Thus, the findings presented in this report should be considered in the context of scientific literature about the relevant processes. We recommend a robust literature review to complement these findings.

For example, in the context of the Nitrates Directive, numerous interactions were viewed to be ‘neutral’. There are several explanations for this. In some instances, it is likely that these perspectives reflect a genuine lack of connectivity between ND objectives and other directives, particularly with regards to requirements under the PD. However, in some cases, these perspectives may reflect the more complex nature of interactions between nitrate levels and other environmental concerns. This is consistent with the conclusions of Chapter Two which suggested that *less direct* interactions may be more difficult to identify and score accurately.

Differences between requirements to achieve environmental outcomes & requirements related to institutional frameworks

Overall, the scoring suggests that requirements related to achieving environmental outcomes are viewed more positively than requirements related to the institutional frameworks that are used to implement environmental policy on the ground. For example, most requirements to protect resource, prevent pollution, and implement remediation are scored highly positively, such as those requirements under the DWD and GWD. By comparison requirements to establish a programme of measures, establish frameworks, and establish national action plans were viewed less favourably. For example, no positive interactions were identified between the requirement to establish a programme of measures and other directives. This may reflect disconnect between the environmental objectives of the directives, and the institutional processes required to ensure those objectives are achieved. Similarly, respondents suggested that national action plans may be

ineffective as these are often not targeted at a specific source, but a whole aquifer. Thus, it may be necessary to introduce stricter measures in targeted areas.

Several respondents suggested that the disconnect between environmental objectives and the institutional frameworks employed to achieve those outcomes stems from time-lag between the causes of degradation, observable degradation, and the timescales over which condition monitoring and assessment is performed. One example given was related to groundwater contamination and the time required before measures of condition are likely to correctly identify concentrations of contaminants. However, there was also some variation in scores. For example, institutional requirements of the PD were viewed more favourably than the institutional requirements of other directives. This may reflect genuine differences in cohesion between legal requirements related to environmental outcomes and requirements related to institutional arrangements under the PD compared to other directives. However, these judgements are subjective and may also reflect bias.

CHAPTER 4: SYNTHESIS

This final chapter highlights the key findings from Chapter 2 about coherence between the Directives and the FAIRWAY objectives (vertical coherence), and Chapter 3 about the interactions between individual Directives (horizontal coherence). The synthesis includes:

- A comparison of key themes emerging from the analysis of vertical and horizontal coherence
- Some recommendations for further investigation
- Specific suggestions for cross referencing and formalising interactions in the EU legal framework

4.1 A COMPARISON OF KEY THEMES RELATED TO VERTICAL AND HORIZONTAL COHERENCE

Overall, five key themes emerged from the analysis presented in both Chapter 2 and Chapter 3. The four themes emphasized in bold are common to assessment of vertical and horizontal coherence, while the fifth theme pertains only to horizontal coherence, as follows:

- **Divided opinions between respondents about the effectiveness of fixed threshold values. Some respondents suggested fixed thresholds are effective, while others raised the concern that effectiveness may vary depending on scale and geographic location;**
- **Some directives are more supported by wider institutional frameworks compared to others;**
- **Respondent scores may be dependent on knowledge and understanding of biophysical processes, and the impact of EU policies on biophysical processes, and;**
- **In many cases, participants assigned more positive scores to interactions between requirements with more direct links to target objectives (whether FAIRWAY with regards to vertical coherence, or links between requirements of two directives with regards to horizontal coherence), and less positive (and occasionally negative) scores to interactions with indirect links to target objectives.**
- The scores for requirements related to environmental outcomes, including protecting resources, reducing pollution, and remediation, tended to be more positive than scores for requirements related to the institutional arrangements for achieving environmental outcomes, such as requirements to establish frameworks.

These themes are highly interrelated. Project contributors scored requirements that stipulate more general terms related to protection and pollution prevention more positively than either requirements related to fixed thresholds, or requirements related to institutional arrangements. Further, some directives appear to be more supported by institutional frameworks than others. These perspectives suggest that, while the environmental objectives of EU directives support the FAIRWAY objective to protect drinking water resources against pollution by pesticides and nitrates from agricultural practices *and* support the underlying purpose of each individual directive, there are challenges associated with the practical implementation of legal frameworks. In some cases, legal requirements may be too inflexible and do not account for varying environmental and geographic landscapes. In other cases, the programmes, monitoring schedules, and planning involved in implementation may not be sufficient to deliver the desired environmental outcomes.

Other themes highlight the challenges associated with the research methods undertaken in this research. The subjective nature of scoring, and the varying levels of knowledge of each respondent are likely to have biased the data. However, significant efforts were made to reduce error, such as distributing Survey One to ten different work package contributors, and selecting contributors with the greatest knowledge about each individual directive to complete Survey's Two-Six.

4.2 RECOMMENDATIONS FOR FURTHER INVESTIGATION

This report (D6.1), together with the report produced in task 6.2 on governance arrangements in case study areas (D6.2), forms the basis for research to be carried out in successive tasks of WP6.

In general, we recommend further investigating the reoccurring themes that have been described above. In particular, the effectiveness of the legal framework to attain the objective of protecting drinking water resources against agricultural pollution, might be adversely affected by fixed threshold values and 'blanket' approaches to setting limits, thresholds, and regulations across diverse geographical landscapes. Furthermore, the distinction between direct and indirect interactions between requirements of EU Directives, and the objectives of FAIRWAY is an important finding that may speak to more institutional barriers between the goals and aims conceptualization of water quality policy, and on ground practice. These findings should be addressed further in successive tasks in WP6. For example, the goal to reduce agricultural pollutants is very clearly linked to FAIRWAY objectives. The fact that institutional requirements, such as establishing frameworks, are perceived as contributing less may indicate a disconnect between frameworks, implementation, and environmental outcomes.

In addition to further investigate the reoccurring themes, we recommend investigating a number of potential inconsistencies or gaps more thoroughly. The three challenges that we consider most worthy of further investigation are the following:

- **The relationship between the Drinking Water Directive and the Water Framework Directive**

Respondents emphasised that there appears to be a potential gap between the risk-based approach to improve drinking water quality at the tap as adopted in the DWD and the wider goal to protect protection of drinking water resources under the WFD. One suggested reason for this disconnect may be related to the physical distance between urban areas and river catchments. Respondents may be concerned about the fact that there are many sources of pollutants in river catchments that are not addressed at the tap. However, it is unclear whether these subjective perspectives reflect genuine risks to water quality. This gap also came forward in the evaluation of the Drinking Water Directive (98/83/EC) as an area for improvement.

Another example of this disconnect is related to groundwater bodies. Respondents highlighted that, the WFD only takes into consideration, the number of groundwater bodies used for drinking water purposes, without taking into account the water volume size of these bodies. Thus, a member state could use the size of a groundwater body to get a more favourable outcome. The member state could have a very small groundwater body with 'good status', while also having a very large groundwater body with 'poor status' requiring additional measures. By a mere focus on number, this would equal to 50% compliance while the actual quality status of all sources would be poorer.

The recent revision of the DWD (EU/2020/2184) introduces a risk-based approach from source to tap, including risk identification, risk assessment and risk management, following the methodology of 'Water Safety Plans' as was introduced by the WHO (WHO 2009). This risk-based approach aims to strengthen the links between de DWD and the WFD and the GWD and connects to WFD-methodologies regarding characterization of water bodies and pressures, risk-based monitoring, and

the objectives of Article 7 (2000/60/EC). This enables authorities to concentrate on potential risks to water quality at the source and its catchment (Article 8, DWD) onto distribution, but also requires adequate programmes of measures to prevent and mitigate risks and monitoring programmes to identify effects of these measures. Timelines are being aligned to the WFD. Furthermore, monitoring should be risk based including possible emerging contaminants. The WFD is not yet so explicit in the monitoring of emerging contaminants. The revised DWD should transposed by MS within 2 years from the introduction. As it seems, the gap identified seems to be resolved by the revision of the DWD. However, the first set of data for the DWD needs to be delivered at the formal end date of the WFD (2027). So, it remains somewhat open how these linkages will develop in practice.

- **The relationship of the Water Framework Directive and the Nitrates Directive**

Respondents suggest that there is a potential disconnect between drinking water requirements under the Nitrates Directive and requirements that affect water quality in wider catchments pursuant to the Water Framework directive. For example, in theory, the requirements of the ND related to the amount of livestock manures applied on land, to apply common criteria for water pollution, and to limit values of 50 mg/l nitrates should target both drinking water quality and wider ecological conditions that impact water quality in catchments. However, the objectives of the ND are primarily related to drinking water quality and only to ecology in the context of eutrophication. Some respondents therefore argue that existing requirements related to the use of fertilizers and manures are not comprehensive enough to support WFD ambitions. Respondents had different views on the nature of the relationship between the WFD and the ND though, and therefore we recommend this issue to be examined further later in WP6.

- **Potential negative effects of the funding mechanism under the Common Agricultural Policy**

Some respondents identified potential negative consequences of the CAPs funding mechanisms on the protection of drinking water resources. To illustrate, the Basic Payment Scheme (BPS) linked with CAP and cross compliance could means that farmers are keeping land in production just to receive this payment. In certain areas, farmers are spraying pesticide to remove rushes, so that the land is eligible under the BPS. This is resulting in an increase in pesticide run-off to the river. In addition, the areas declared for the BPS are also used to calculate the farm's organic N loading for the Nitrates Directive. For that reason, a farmer can legitimately increase his/her stocking density up to 170kg/ha organic N, even though the land may not be able to support this agricultural intensity. Furthermore, farmers may also plough their grasslands within 5 years, to avoid that their grasslands will be considered as permanent grasslands in CAP, with more strict regulation. Ploughing of grasslands can strongly increase nitrate leaching. Overall, the CAP is perceived to contribute positively to the protection of drinking water resources against nitrates and pesticides pollution from agricultural resources. However, the funding mechanism and its implementation might also have some drawbacks that could affect drinking water quality adversely. This needs to be explored further.

4.3 SPECIFIC SUGGESTIONS FOR CROSS REFERENCING AND FORMALISING INTERACTIONS IN THE EU LEGAL FRAMEWORK

1. WFD, DWD, GWD were viewed to be interdependent on one another, however, the connectedness is not formalised in any way. There are opportunities here **for cross referencing**. One option would be to include these requirements as an additional component to existing requirements related to institutional frameworks, such as WFD Article 1, 'To establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters

and groundwater, *with reference to, and in collaboration with parallel frameworks put in place with the DWD and GWD'*. Another example might be the WFD Article 13.1, 'To ensure that a river basin management plan is produced for each basin district lying entirely within their territory, *including actions and objectives for ensuring compliance with the thresholds and *requirements* of the DWD and the GWD'.* Similar adjustments could be made to articles referring to programmes of measures (e.g., WFD Article 11.1) to reflect the interdependence of Directives, such as ensuring that programmes of measures consider the thresholds and relevant requirements in the DWD and GWD.

2. There is also interdependence between the EIA, IED and ND suggesting that the implementation of these Directives would benefit from cross referencing. There are opportunities to improve the outcomes of the ND by ensuring consistent specificity between the ND, EIA and IED towards achieving the FAIRWAY objectives.

3. Views expressed on the CAP and RDR raise concerns about competing incentives for farming communities to simultaneously innovate towards sustainability and sacrifice sustainable practices to engage competitively in markets. Issues of cross-compliance, such as increasing pollutants to remain eligible for funding, suggest a need for cross referencing between the requirements of the CAP and RDR and other directives, such as the ND and the DWD. More specifically, market-based instruments work most effectively when implemented within a framework that mitigates potential side-effects, such as 'perverse incentives' associated with increasing pesticide use to remain eligible for financial support. This, and other such 'perverse incentives' should be revisited and the introduction of guidelines or additional peripheral requirements for the CAP and RDR to uphold the underlying principles of other Directives, including the ND, such as Article 4.1 related to a code of conduct.

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APPENDIX I - COMPLETE REVIEWS OF EU DIRECTIVES AND POLICIES

WATER FRAMEWORK DIRECTIVE (2000/60/EC)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	Protection of inland surface waters, transitional waters, coastal waters and groundwater to, *inter alia*, prevent their further deterioration and enhance their status, and to promote sustainable water use (art. 1). Main environmental objectives clarifying the main goals of art. 1: Member states shall implement the necessary measures to *prevent deterioration* of the status of all bodies of surface water (art. 4.1(a)(i)); and *protect, enhance and restore* all bodies of surface water to achieve good water status (art. 4.1(a)(ii)). Member states shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (art. 4.1(a)(iii)). Member states shall implement the necessary measures with the aim of progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (art. 4.1(a)(iv)).	The competent authority has the power to introduce measures to enforce change if ecological goals and standards are not met.
Clarity of the goals	Overall goals ambiguous (art. 1), but clarified by a set of environmental objectives set in art. 4.1 (good status of waters) and Annexes II, III, IV and V. Art. 4.1(a)(i–iv) and 4.1(b)(i–iii) include two general obligations: improvement of surface waters in less than good status; and an obligation of non-deterioration of current water status.	MS shall implement necessary measures to prevent or limit input of pollutants, enhance and restore good status, reverse upward trends, related to specific community legislation for protected areas (e.g. on nitrates, pesticides, drinking water) Nutrient concentrations do not exceed the levels established so as to ensure the functioning of the ecosystem (Annex V).

		MS shall ensure establishment of a register of protected areas, including areas for human consumption, nutrient sensitive areas and areas for the protection of habitats (Annex IV)
Exemptions from the substantive goals	Yes, on several grounds: extending the deadlines in which the goals are to be met (art. 4.4); by aiming for less stringent goals than established in art. 4.1 (art. 4.5); by claiming a temporary failure to achieve the goals due to *force majeure* (art. 4.6); or justifying new development activities based on an overriding public interest (art. 4.7).	Possible reasoning for extensions of timeframe (disproportionately expensive, technical feasibility)
Procedural goals	Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (art. 1).	
Preciseness of the goals	Procedural goals in art. 1 are vague but they are clarified throughout the directive. The WFD sets obligations to the member states to identify river basins in their area (art. 3.1); to ensure appropriate administrative arrangements, including the identification of competent authorities responsible for implementing the WFD (art. 3.2); to ensure an analysis of each river basin's characteristics, to review the impact of human activity on the status of surface waters, and to conduct an economic analysis of water use according to the technical specifications set out in Annexes II and III (art. 5.1).	
	In addition, MSs shall establish a register(s) of all areas lying within each river basin district which have been designated as requiring special protection under specific Community legislation (art. 6.1); ensure the establishment of *programmes for the monitoring* of water status (art. 8.1); ensure the establishment for each river basin district, of a *programme of measures*, in order to achieve the objectives established under article 4 (art. 11.1).	Specific requirements in groundwater protection areas are assigned by MS on national level e.g. criteria for application of pesticides by farmers in groundwater protection areas.
	Where monitoring or other data indicate that the objectives set under article 4 for the body of water are unlikely to be achieved, the member state shall ensure that the causes of the possible failure are investigated; relevant permits and authorisations are examined and reviewed as appropriate; the monitoring programmes are reviewed and adjusted as appropriate (art. 11.5).	When objectives are unlikely to be met: MS investigate causes of failure, examine relevant permits, adjust monitoring programmes, establish additional measures including stricter environmental quality standards
	Member States shall ensure that a *river basin management plan* is produced for each river basin district lying entirely within their territory (art. 13.1).	

Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	Yes. Obligation to set up a monitoring programme (art. 8.1). For surface waters such programmes shall cover: (i) the volume and level or rate of flow to the extent relevant for ecological and chemical status and ecological potential, and (ii) the ecological and chemical status and ecological potential; for protected areas the above programmes shall be supplemented by those specifications contained in Community legislation under which the individual protected areas have been established (art. 8.1). In addition, member states shall monitor, in accordance with Annex V, those bodies of water which according to Annex V, provide more than 100 m^3 a day as an average (art. 7.1). Under art. 5.1, the member states must study the human impacts affecting the water status in each river basin.	Applies to water bodies with abstractions of 10m3/day or serves 50 persons Avoid deterioration of resources and improve quality in term When monitoring shows deteriorating results this can result in penalties to farmers in some member states
Type of scientific information to be included in planning	Technical specifications and standardized methods for analysis and monitoring of water status shall be laid down in accordance with the procedure laid down in article 21 (art. 8.3). Natural sciences dominate the identification of water bodies (Annex II) and setting of criteria for the good status of waters (Annex V). Economic analysis is required to implement the principle of recovery of costs established in art. 9 (Annex III).	
Coordination with national and EU authorities		
Who runs the planning process?	Single authority or multiple authorities (art. 3.2; 3.3; Annex I).	
Inclusion of other domestic sectoral authorities in the planning process	Yes, member states shall encourage the active involvement of all interested parties in the implementation of this Directive, in particular in the production, review and updating of the river basin management plans (art. 14.1).	
Inclusion of industries and the public in the planning process	Yes, member states shall encourage the active involvement of all interested parties in the implementation of this Directive, in particular in the	This is very relevant for the farming sector.

	production, review and updating of the river basin management plans (art. 14.1).	Some member states require farmer representation in river basin advisory panels.
Inclusion of authorities from other countries in the planning process	Yes, for international river basin districts the member states concerned shall together ensure coordination and may, for this purpose, use existing structures stemming from international agreements (art. 3.4). Where a river basin district extends beyond the territory of the Community, the member state(s) concerned shall endeavour to establish appropriate coordination with the relevant non-member states, with the aim of achieving the objectives of WFD throughout the river basin district (art. 3.5). In the case of an international river basin district falling entirely within the Community, member states shall ensure coordination with the aim of producing a single international river basin management plan (art. 13.2).	
Inclusion of EU institutions in the planning process	Yes, on several accounts. At the request of the member states involved, the Commission shall act to facilitate the assigning to such international river basin districts (art. 3.3). At the request of the member states involved, the Commission shall also act to facilitate the establishment of the programmes of measures in river basins crossing national boundaries (art. 3.4). In addition, member states have many reporting obligations. Member states shall provide the Commission with a list of their competent authorities and of the competent authorities of all the international bodies in which they participate (art. 3.8). Member states shall inform the Commission of any changes to the information provided (art. 3.9). Where a member state identifies an issue which has an impact on the management of its waters but cannot be resolved by that member state, it may report the issue to the Commission and any other member state concerned and may make recommendations for the resolution of it (art. 12.1). Member States shall send copies of the river basin management plans and all subsequent updates to the Commission (art. 15).	

	Member states must inform the Commission of laws, regulations and administrative provisions implementing WFD (art. 24.1).	
Public participation		
Access to information	Yes, in all stages of river basin management planning. Member States shall ensure that, for each river basin district, they publish and make available for comments to the public, including (a) a timetable and work programme for the production of the plan, including a statement of the consultation measures to be taken, at least three years before the beginning of the period to which the plan refers; (b) an interim overview of the significant water management issues identified in the river basin, at least two years before the beginning of the period to which the plan refers; (c) draft copies of the river basin management plan, at least one year before the beginning of the period to which the plan refers (art. 14.1). On request, access shall be given to background documents and information used for the development of the draft river basin management plan (art. 14.1).	The agricultural industry has the opportunity to contribute to consultation on river basin planning
Access to justice	On procedural and substantive grounds.	
Instrument choice		
Direct regulation as the main policy instrument?	Yes.	
Does direct regulation embrace complementary policy instruments?	Yes. Member states must conduct an economic analysis of water uses in river basin districts falling within their jurisdiction (art. 5.1). Member states shall take account of the principle of recovery of the costs of water services, and in accordance in particular with the polluter pays principle. Member states shall ensure that water-pricing policies provide adequate incentives for users to use water resources efficiently. Member states shall also ensure an adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services (art. 9.1). Annex VI, part B Non-exclusive list of supplementary measures which Member States within each river basin district may choose to adopt as part of the programme of measures required under Article 11(4)	Information on water use and environmental emissions of nitrate and pesticides. Taxes for water services. Possibility for economic and fiscal instruments which can demand specific management measures for farmers. Includes legislative instruments; administrative instruments; economic or fiscal instruments; negotiated

		environmental agreements; emission controls; codes of good practice, educational projects; research, development and demonstration projects.
Enforcement		
Legal bindingness of goals		
Procedural	Legally binding. Member states shall establish river basin districts (art. 3), make an initial assessment of inland surface waters, coastal waters, transitional waters and groundwater (art. 5), set up a register of protected areas (art. 6), identify all bodies of water used for significant abstraction for human consumption (art. 7), set up monitoring programmes (art. 8), set up programmes of measures (art. 11) and produce a river basin management plan (art. 13).	Implementation and enforcement of existing environmental legislation for the protection of waters should be ensured.
Substantive	Legally binding, sets obligations of result.	
Specific obligations to meet the goals		
Procedural	Specific criteria for establishing river basin districts (art. 3), making an initial assessment of inland surface waters, coastal waters, transitional waters and groundwater (art. 5), setting up a register of protected areas (art. 6), identifying all bodies of water used for significant abstraction for human consumption (art. 7), setting up monitoring programmes (art. 8), setting up programmes of measures (art. 11) and producing a river basin management plan (art. 13).	
Substantive	Member states must reach good status of waters if exemptions are not used (art. 1; 4).	
Time frames		
Procedural	Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with WFD at the latest 22 December 2003 (art. 24.1). Analysis of characteristics of river basins; review of human activity impacting the waters and economic analysis of water use by 22 December 2004 (art. 5.1). Monitoring programmes shall be operational by 22 December 2006 (art. 8.2).	

	Programmes of measures shall be established by 22 December 2009, and be made operational by 22 December 2021 (art. 11.7). Member states shall ensure by 2010 the implementation of the principle of recovery of the costs of water services (art. 9.1).	
Substantive	By 2015 (art. 4.1(ii)) If deadline is extended, alternatively by 2021, or 2027 the latest (art. 4.4, 4.5, 4.7, 4.8).	
Review	The analysis of characteristics of waters; review of human impacts and economic analysis of water use shall be reviewed, and if necessary updated at the latest 22 December 2013 and every six years thereafter (art. 5.2). Designation as artificial or heavily modified water must be reviewed every six years (art. 4.3(b)). Reasons for granting an exemption from the goals of the WFD under art. 4.7 must be reviewed every six years (art. 4.7(b)). The programmes of measures shall be reviewed, and if necessary updated at the latest 22 December 2015 and every six years thereafter (art. 11.8). River basin management plans shall be reviewed and updated at the latest 22 December 2015 and every six years thereafter (art. 13.7). The Commission shall publish a report on the implementation of WFD at the latest 22 December 2012 and every six years thereafter (art. 18.1).	Reporting every 6 years.
Sanctioning of non-compliance	Yes (art .258 TFEU).	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	EC shall develop a groundwater directive (2005/118/EC) holding specific objectives to nitrates and pesticides (art.17.1))	
Combined approach for point and diffuse sources.	Discharges into surface waters should be controlled by a combined approach, by established best practices practices set out in various EU Directives, including the practices set out in Nitrates Directive (91/676/EC) (art.10.2(2))	

Coordination with other directives	Annex VI: List of measures to be included within the programmes of measures: (i) The Bathing Water Directive (76/160/EEC); (ii) The Birds Directive (79/409/EEC)(1); (iii) **The Drinking Water Directive** (80/778/EEC) as amended by Directive (98/83/EC); (iv) The Major Accidents (Seveso) Directive (96/82/EC)(2); (v) The **Environmental Impact Assessment Directive** (85/337/EEC)(3); (vi) The Sewage Sludge Directive (86/278/EEC)(4); (vii) The Urban Waste-water Treatment Directive (91/271/EEC); (viii) The Plant Protection Products Directive (91/414/EEC); (ix) **The Nitrates Directive** (91/676/EEC); (x) **The Habitats Directive** (92/43/EEC)(5); (xi) The Integrated Pollution Prevention Control Directive (96/61/EC).	

DRINKING WATER DIRECTIVE (98/83/EC)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	Protection of human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (art. 1).	Goals for MS and drinking water companies. Farmers may affect water quality of resources
Clarity of the goals	Clear in general, but more exact objectives are given throughout the document (art. 4, 5, Ann I and II).	Farmers not directly affected by DWD
Exemptions from the substantive goals	Never applicable for: natural mineral waters recognised as such by the competent national authorities; or waters which are medicinal products (art. 3.1). Left to judgement by MSs for: water of which quality has no influence on the health of the consumers concerned; or water intended for human consumption from an individual supply providing less than 10 m^3 a day as an average or serving fewer than 50 persons (art.3.2), but in the latter case MSs shall ensure that population is informed about possible consequences and solutions (art. 3.3). If water intended for human consumption does not meet parametric values even if prescribed measures are being used, and if it can be established that non-compliance is due to domestic distribution system (only for non-public premises as schools, hospitals…), them MSs must still try to eliminate risks, advise property owners of possible remedial actions, use appropriate treatment measures to reduce risk and ensure consumers are warned and advised on possible actions they should take (art. 6.2 and 6.3).	Possible exemptions for specific water sources, not applicable for mineral water springs etc.
Procedural goals	Member States should establish a set of regulations regarding safety of water intended for human consumption in accordance with prescribed parametrical values (art. 1 and 7) and execute adequate monitoring to ensure that monitored values comply with standards (art. 7.2 and 7.3).	
Preciseness of the goals	Goals set in art. 1 are clarified by art. 2: water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health.	Limitations for chemical parameters are stated to ensure safety of water (Annex I).

	While ensuring these goals MSs must also ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (art. 4). If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded). Consumption of water that does not comply with standards should be prohibited and consumers informed on said matter (art. 8). Materials used in new infrastructure should not deteriorate in any way the quality of water for human consumption (art. 10).	When objectives are not met: MSs should investigate causes of failure and establish additional measures. Goal is to avoid deterioration of resources and improve quality over time.
Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	Yes. Monitoring programmes (collection and analysis of water samples, recording measurements) shall be established by the competent authorities, carried out regularly and meet the minimum requirements set out in Ann. II. (art. 7.2, 7.3). Samples should be taken so that they are representative of the quality of water throughout the year (Annex II, part B (3)). Member States may derogate from the parameters and sampling frequencies provided that a risk assessment is performed as described in Annex II part C. If disinfection is used, disinfection by-products must be monitored and their values kept as low as possible without comprising the disinfection (art. 7.1). For water supplied from a distribution network monitoring must be executed where water emerges from the taps, for water supplied from a tanker at the point where it emerges from tanker, and in case of bottled water or water used in food-production where it is put into bottles or used in production (art. 6.1). Limitation values must be at least as strict as those written in Ann. I, but MSs can tighten them or include additional parameters if there are other regional hazards (art. 5.3). Member States shall ensure occasional monitoring of substances and micro-organisms, for which no parametric value has been set, if there is reason to suspect that they may be present in potentially dangerous amounts (art. 7.6).	Applies to water bodies with abstractions of more than 10m^3/day or serves 50 persons (art.3.2). Other parameters may be defined by MSs when there is risk of some other pollutant being present in drinking water. No monitoring requirements for farmers
Type of scientific information to be included in planning	Technical specifications (microbiological and chemical parameters) for control of contamination (Ann I). Natural sciences are included in monitoring (throughout the water supply chain).	

	ISO standards (*inter alia* EN ISO 19458) must be complied with when sampling is undertaken (Annex II, part D).	
Coordination with national and EU authorities		
Who runs the planning process?	Member States (art. 7.2).	
Inclusion of other domestic sectoral authorities in the planning process	Competent authorities, accredited by Member States (art. 7.2).	Depending on which MS organisation/department is assigned responsibility for implementing the directive, this could change the impact on the farming sector.
Inclusion of industries and the public in the planning process	No.	
Inclusion of authorities from other countries in the planning process	No, except as already available under Directive 2003/35/EC	
Inclusion of EU institutions in the planning process	The Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field covered by this Directive (art. 17.2).	
Public participation		
Access to information	Member States shall provide consumers with adequate and up-to-date information on the quality of water at least every 3 years (art. 13) and notify consumers every time monitored values exceed parametric prescriptions (art. 6.3(b)) or any changes to the request of this directive are made (art. 15.4).	Consumers should be notified when values exceed parametric prescriptions. Consumers may have concerns due to pesticides. Farmers not directly affected/involved
Access to justice	Not stated.	
Instrument choice		
Direct regulation as the main policy instrument?	Yes.	
Does direct regulation embrace complementary policy instruments?	Measures should be carefully coordinated with the implementation of Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market (1) and Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market.	Regulation of biocidal products affects the plant protection part of farming

	For risk assessment Article 8 of Directive 2000/60/EC shall be applied (Annex II, Part C).	
Enforcement		
Legal bindingness of goals		
Procedural	Legally binding. MSs shall establish a set of regulations in accordance with prescribed parametrical values (art. 1, art. 7), execute adequate monitoring to ensure representative results and use measures to ensure that monitored values comply with standards (art. 7.2, 7.3).	
Substantive	Legally binding.	
Specific obligations to meet the goals		
Procedural	MSs may establish a set of regulations in accordance with prescribed parametrical values (art. 1, art. 7) and execute adequate monitoring to ensure that monitored values comply with standards (art. 7.2, 7.3).	
Substantive	Member states must ensure clean and safe water for use in human consumption (art. 1), with certain allowed exemptions (art. 3).	
Time frames		
Procedural	State laws, regulations and administrative provisions necessary to comply with this Directive should be brought into force by 2000 (art. 17).	Legislation concerning goals shall be brought into force by 2000
Substantive	Clean and safe water must be ensured by 2003 (art. 14). If there is no other way of ensuring clean water supply derogations can be accepted for 3 years, with possible extension to 6 years under special conditions (art. 9, 15).	Clean and safe water must be ensured by 2003
Review	Annexes I, II and III need to be reviewed by the Commission every 5 years in the light of scientific and technical progress and adapted when necessary (art. 11). Every three years condition of water used for human consumption must be assessed and presented to public (art. 6.3(b), 13) and every five years monitoring programmes should be reviewed and updated if necessary (Annex II (A)).	Adaptations to the annexes every 5 years. Condition of water every 3 years.
Sanctioning of non-compliance	If prescribed values are not met, MSs should ensure further remedial measures (art. 6.3(a)) Yes. If the Commission considers that a Member State has failed to fulfil an obligation under the Treaties, it shall deliver a reasoned opinion on the matter after giving the State concerned the opportunity to submit its observations. If the State concerned does not comply	Remediation shall be performed until state of drinking water is considered safe.

	with the opinion within the period laid down by the Commission, the latter may bring the matter before the Court of Justice of the European Union (art. 258 TFEU).	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	Former Directive 80/778/EEC, concerning water safety, is repealed by 2003 or as soon as MS has brought into force the laws, regulations and administrative provisions necessary to comply with this Directive (art. 16).	
Combined approach for point and diffuse sources.	Not stated.	
……		

NITRATES DIRECTIVE (91/676/EEC)

	Provisions and requirements	Relevance to the farming sector
Ecological goals		
Substantive goals	– reducing pollution of ground-, surface and estuarial water by nitrates from agricultural sources – preventing further such pollution (art. 1)	very high, as – nitrogen as the most important fertilizer component is affected, and thus yield level and farmer's income – the utilisation of animal manure as organic fertilizer is affected: amount of manure applied and time of application, thus cost-efficiency of animal breeding as a production branch of a farms is affected
Clarity of the goals	Overall goal is well defined (art. 1) Subgoals are defined in Annex III: – amount of livestock manures applied on land shall not exceed **170 kg/ha each year** – member states may fix different amounts, also on the basis of animal numbers; they have to inform the commission on this alteration **(derogation)**	very high, as – the number of animals per farm is limited and/or a transport of surplus nutrients may be necessary
Exemptions from the substantive goals ----procedural goals	…..procedual goals: no identification of vulnerable zones necessary for MS who establish or apply **action programmes** as described in art. 5 in accordance with the ND **throughout their national territory** (art. 3.5)	
Procedural goals	– **definition of vulnerable zones**: MS shall identify zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2) – **concertation** in case of transnational vulnerable zones (art. 3.3) – **review/revision of list** of vulnerable zones at least every 4 years (art. 3.4) – **establish codes of good agricultural practice:** MS shall submit details (art 4.1a and 4.2)	very high, as – the good agricultural practice has to be followed by the individual farmers, especially if the farmland is situated in one of the vulnerable zones

	– **set up a programme for the promotion of codes of good agricultural practice** (art 4.1.b) – MS shall establish **action programmes** in respect of the designated vulnerable zones or part of it (art. 5.1 to 5.4). – MS shall take **additional measures or reinforced actions** as it becomes apparent that goals may not be reached – action programmes shall be **implemented within 4 years** of their establishment (art. 5.4)	
Preciseness of the goals	There is a description of goals in the text and a clear definition for each item in the Annex of ND: – **criteria for water pollution** (groundwater > 50 mg/l nitrates; eutrofication of surface waters) (Annex I) – **guidelines for setting up codes of good agricultural practice** (items covered by the MS) (Annex II) – **guidelines for measures to be included in action programmes** (periods, where fertilizer application is prohibited, limitation of land application of fertilisers according to soil, climate, land use, nitrogen requirement of crop, nitrogen supply to crop)(Annex III)	very high, especially **measures** influence directly agricultural practice on the field
Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	– MS shall draw up and implement **suitable monitoring programmes** to assess effectiveness of action programmes – MS who establish or apply action programmes throughout their national territory shall **monitor nitrates content of ground- and surface waters** at selected measuring points (art. 5.6) – MS shall review and if necessary revise their action programmes at least **every four years** (art. 5.7) – MS shall monitor **nitrates concentration in surface water** sampling stations at least monthly (art 6.1) – MS shall monitor **nitrates concentration** at sampling stations which are representative of the **groundwater aquifers** at regular intervals – MS shall **submit a report** to the Commission ever 4th year, containing the content of Annex V (art.10)	Monitoring refers to the quality of ground- and surface waters: there is no direct connection to the farming sector; nevertheless, a polluted groundwater measuring point may influence attitude towards farming. **In the long run**, the region might be transformed into a vulnerable zone with further restriction on the fertilizing intensity (WFD, ND).

Type of scientific information to be included in planning	reference methods of measurement (Annex IV) – chemical fertilizers – freshwater, coastal and marine waters	
Coordination with national and EU authorities	**SEA Directive 2001/42/EC** on the assessment of the effects and certain plans and programmes has to be applied on the adoption and the implementation of plans and programmes Recent studies commissioned by **DG Environment** to support implementation of the Directive: http://ec.europa.eu/environment/water/water-nitrates/studies.html	Coherence of WFD and ND on the case study level?
Who runs the planning process? (planning process is here understood as establishment and adjustment of EU-legislation, transformation into national legislation and monitoring)	Commission (DG AGRI) – design and update of the ND – evaluation of reports – adoption of measures – **ADJUSTMENT OF ANNEXES OF 91/676/EEC on the basis of 1137/2008:** **As regards Directive 91/676/EEC, the Commission should be empowered to adapt or supplement the Annexes** **thereto to technical and scientific progress. Since those measures are of general scope and are designed to amend** **non-essential elements of Directive 91/676/EEC, inter alia, by supplementing it with new non-essential elements,** **they must be adopted in accordance with the regulatory procedure with scrutiny provided for in Article 5a of** **Decision 1999/468/EC.** *Accordingly, Directive 91/676/EEC is hereby amended as follows:* *1. Articles 7 and 8 shall be replaced by the following:* *'Article 7* *The Commission may draw up guidelines for the monitoring referred to in Articles 5 and 6 in accordance with the regulatory procedure referred to in Article 9(2).* *Article 8* *The Commission may adapt the Annexes to this Directive to scientific and technical progress.* *Those measures, designed to amend non-essential elements of this Directive, shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 9(3).';* *2. Article 9(3) shall be replaced by the following:*	Farmers are not directly involved in the planning process

	'3. Where reference is made to this paragraph, Article 5a(1) to (4) and Article 7 of Decision 1999/468/EC *shall apply, having regard to the provisions of Article 8 thereof.';* *3. the third subparagraph of point 2 of Annex III shall be replaced by the following:* *'If a Member State allows a different amount under point (b) of the second subparagraph, it shall inform the Commission, which shall examine the justification in accordance with the regulatory procedure referred to in* *Article 9(2).'* Yet, there has not been an amendment, although there is a huge scientific progress since 1991. Futhermore, scientific studies have been accomplished (**DG Environment** to support implementation of the Directive: http://ec.europa.eu/environment/water/water-nitrates/studies.html)	
Inclusion of other domestic sectoral authorities in the planning process	Yes, for the **transformation in national legislation (fertilising ordinance),** a strategic environmental assessment (SEA) has to be executed	Farmers not directly involved
Inclusion of industries and the public in the planning process	Yes, for the **transformation in national legislation (fertilising ordinance),** a strategic environmental assessment (SEA) has to be executed	Farmers not directly involved
Inclusion of authorities from other countries in the planning process	Original definition of good agricultural practice and measures: in cooperation with a **Committee**, which is composed of members of the member states and chaired by the representative of the Commission (art. 9). Yes, for the **transformation in national legislation (fertilising ordinance),** a strategic environmental assessment (SEA) has to be executed	
Inclusion of EU institutions in the planning process	– regular report (4 years period) from the MS to the Commission – review and revision of the MS action programmes at least every four years (art. 5.7) has to be approved by the Commission	New programs will affect farmers
Public participation		
Access to information	Website: The Nitrates Directive: http://ec.europa.eu/environment/water/water-nitrates/index_en.html	Farmers have access through their own information channels (local advisors, focused news letters)
Access to justice	National – EU level: European lal	
Instrument choice		
Direct regulation as the main policy instrument?	direct regulation (170kg/ha and year) as one element of EU-legislation. Most has to be implemented on **national level** or even on **federal state level** (Control and sanctions)	Directly relevant to farmers, also 50mg/l standard in water

Does direct regulation embrace complementary policy instruments?	Yes, i.e. **CAP** with the **CC** sanctioning possibilities on **national level**	Depends
Enforcement		
Legal bindingness of goals	Yes; otherwise infringement proceedings	Very relevant, direct effect
Procedural	– implementation of nitrates directive is nationally binding; also the process of regular (all 4 years) reports and evaluation – CC-linkage of good agricultural practices (and national transformation)	Sometimes implemented through other regulations, eg. CAP, so no enforcement through ND
Substantive	Legally binding, bit hard to achieve (i.e. concentration below 50 mg/l)	
Specific obligations to meet the goals		
Procedural	See above	
Substantive	See above	
Time frames		
Procedural	implementation of nitrates directive is nationally binding; also the process of regular (all 4 years) reports and evaluation	
Substantive	**no**	
Review	implementation of nitrates directive is nationally binding; also the process of regular (all 4 years) reports and evaluation	
Sanctioning of non-compliance	Yes; otherwise infringement proceedings	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	WFD ->ND, GWD, …	
Combined approach for point and diffuse sources.	WFD->ND, GWD, ….	

GROUNDWATER DIRECTIVE (2006/118/EC)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	The Groundwater Directive contains an elaboration of the goals for Groundwater specified in the Water Framework Directive. The Groundwater Directive establishes specific measures to prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (art. 1). Another goal of the Groundwater Directive is the establishment of measures to prevent and limit groundwater pollution (art. 6).	Depending on the characteristics of the designated groundwater bodies (and related wfd monitoring), the threshold values / quality standards can put extra restrictions / measures to limit the input of nitrates and pesticide, especially in capture zones of drinking water (and other human consumption) wells. Extra above the Nitrates directive and plant protection products directive.
Clarity of the goals	Clear. Directive sets clear criteria regarding groundwater chemical status and identification of trends connected to pollution.	MS shall implement necessary measures to prevent or limit input of pollutants, enhance and restore good status, reverse upward trends. Even though clear criteria is given, MS have a certain freedom concerning the criteria for chemical status and trends.
Exemptions from the substantive goals	The WFD states in article 4.4, 4.5, 4.6 and 4.7 the preconditions that may be used to extend the deadline (art 4.4 WFD), achieve less stringent environmental objectives (art 4.5 WFD), allow temporary deterioration of a groundwater body (art 4.6 WFD) and new modifications to the groundwater body (art 4.7 WFD). Measures required by Article 6 (prevent and limit) are not necessary when sufficient monitoring is established, and *inter alia:* pollutant quantity or concentration is too small to present harm; pollution is a consequence of a natural disaster or event that could not be foreseen; measures used would be disproportionately expensive or present bigger harm for environment than existing pollution… (art. 6.3)	Non dangerous exceeded values can be interpreted as safe if the body of water does not serve humans or it is not being significantly damaged.

Procedural goals	For the purposes of the assessment of the chemical status of a body or a group of bodies of groundwater pursuant to Section 2.3 of Annex V to Directive 2000/60/EC, Member States shall use the criteria in Annex I and procedure set out in Part A of Annex II (art. 3). Guidance document no 18 explains in more detail the procedure.	
Preciseness of the goals	The threshold values applicable to good chemical status shall be based on the protection of the body of groundwater in accordance with Part A, points 1, 2 and 3 of Annex II, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands and shall inter alia take into account human toxicology and ecotoxicology knowledge (art. 3.1). Amendment of threshold values shall be made when new information on pollutants, groups of pollutants, or indicators of pollution is obtained and demands improvements to safety (art. 3.6) A body or a group of bodies of groundwater is considered to be of good chemical status 1) when monitoring demonstrates that the conditions in Table 2.3.2 of Annex V to Directive 2000/60/EC are met 2) or water quality meets quality standards listed in Annex I or doesn't exceed threshold values set in Annex II 3) one of the groundwater quality standards or the threshold values is exceeded but an appropriate investigation has shown that there is no significant risk (art. 4.2). In order to achieve the objective of preventing or limiting inputs of pollutants into groundwater, MSs shall ensure that the programme of measures established in accordance with Article 11 of Directive 2000/60/EC includes *inter alia* all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment. MSs shall also identify circumstances under which different pollutants are considered hazardous (art. 6).	Threshold values can be established at the national level, at the level of the river basin district or the part of the international river basin district falling within the territory of a Member State, or at the level of a body or a group of bodies of groundwater (art. 3.2). TVs can be amended, removed or introduced as necessary. Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (Annex I). Other pollutants from the list are, *inter alia* arsenic, cadmium, lead, ammonium, sulphate, man-made synthetic substances… If an appropriate investigation in accordance with Annex III confirms that, *inter alia*, concentrations of pollutants do not exceed threshold values, other conditions for good groundwater quality are met or the ability of the body of water to support human uses has not been significantly impaired, such groundwater is still considered to be of good chemical status (art. 4.2c). **Member states can derive threshold values for nitrates and phosphate that are more restrictive for fertilizer use then the Nitrates Directive. The same accounts for pesticide.**

	The prescribed method to derive threshold values in the Groundwater Directive 2006 created quit a degree of freedom. Annexes I and II of the Groundwater Directive 2006/118/EC were reviewed in 2013 in order to obtain more clear describition of future harmonisation of methodologies for establishing groundwater threshold values	
Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	Yes, member states shall ensure the establishment of monitoring programmes for groundwater (art 8.1 WFD) The choice of the groundwater monitoring sites has to satisfy the requirements of Section 2.4 of annex V of WFD on being designed so as to provide a coherent and comprehensive overview of groundwater chemical status and to provide representative monitoring data (art. 4.3). Also, it must be conducted in a way to show any upward trends in pollution and to distinguish that from natural fluctuation and take into account the physical and chemical temporal characteristics of the groundwater body (Annex IV).	Monitoring is mandatory to provide coherent overview of state and trends in quality of water. Member states have to monitor and quantify pressures from agriculture of phosphorous / phosphate and ammonia (Annex II to Directive 2006/118/EC and amendments 2013)
Type of scientific information to be included in planning	Annex V section 2.4 of the WFD specifies the type of information that should be included in the monitoring programmes. Identification of trends in monitoring results is mandatory (art. 5). Presence of chemicals (nitrate, pesticides) in certain area, their ecological issues… (Annex I) Use of conceptual models for bodies of water is encouraged when investigating conditions of groundwater (Annex III). See also table WFD.	Maps shall be made to indicate the status of bodies of water (Annex III).
Coordination with national and EU authorities		
Who runs the planning process?	Member States, with proposals from the Commission (art. 3.1, 4.1, 12).	
Inclusion of other domestic sectoral	No. See table WFD	

authorities in the planning process		
Inclusion of industries and the public in the planning process	No. See table WFD	
Inclusion of authorities from other countries in the planning process	For bodies of water that are affected by more than one MS the establishment of threshold values is subject to coordination between the MSs concerned, in accordance with Article 3.4 of Directive 2000/60/EC (art. 3.3). Even if MS borders on a non-member state coordination about threshold values is encouraged (art. 3.4).	This is important for the farming sector in order to give them some input into the development of the plans
Inclusion of EU institutions in the planning process	Yes, for publishing reports by MSs (art. 3.7) and also for reviewing legislative proposals by the Commission (Scientific Committee, EU Business and environmental organizations…) (art. 10).	
Public participation		
Access to information	Not stated. See table WFD	Public participation is required under Directive 2003/35/EC while preparing programmes of measures.
Access to justice	No, except as already available under Directive 2003/35/EC See table WFD	
Instrument choice		
Direct regulation as the main policy instrument?	Yes.	
Does direct regulation embrace complementary policy instruments?	Yes. Accordance with Directive 2000/60/EC (WFD) must be ensured. Legislative and administrative instruments (part B of annex VI of WFD)	
Enforcement		
Legal bindingness of goals		
Procedural	Legally binding. MSs need to establish specific measures to prevent and control groundwater pollution (art 1) by forming certain criteria for threshold values (art. 3), criteria for the identification and reversal of significant and upward trends (art 5), establish monitoring programmes (art. 4.3), and measures to prevent or limit inputs (art 6)	
Substantive	Legally binding. Sets obligation of results.	
Specific obligations to meet the goals		

Procedural	MSs need to establish specific measures to prevent and control groundwater pollution by forming certain criteria for threshold values (art. 1) For the assessment of the chemical status (art 4) member states shall use (1) the groundwater quality standards as stated in annex I (specific limiting values for nitrate (50 mg/L) and pesticides (0.1 μg/L)) and (2) threshold values established by the member states. The threshold values shall be based on the protection of the body of groundwater and the interaction with associated surface waters, directly dependent terrestrial ecosystems and human uses of groundwater (art 3.1). The list of threshold values shall be amended whenever new information on pollutants, groups of pollutants, or indicators of pollution indicates that this is necessary (art 3.6). The monitoring needs to be established to show whether threshold values are violated and what kind of trend can be seen (art 4.3, art. 5.1). Identification of significant and upward trends (art 5.1). Definition of the starting point for trend reversal (art 5.3). Member States may identify the circumstances under which the pollutants listed in Annex VIII to Directive 2000/60/EC are to be considered hazardous or non-hazardous (art 6.1). When member states exempt from the measures required by art 6.1 then efficient monitoring of the bodies of groundwater must have been carried out (point 2.4.2 of Annex V to Directive 2000/60/EC) (art 6.3) and an inventory of the exemptions must be collected (art 6.4).	Limiting values are 50 mg/L for nitrate and 0.1 μg/L for pesticides.
Substantive	MSs need to establish specific measures to prevent and control groundwater pollution by forming certain criteria for threshold values (art. 1).	
Time frames		
Procedural	In the period between 16 January 2009 and 22 December 2013, any new authorisation procedure pursuant to Articles 4 and 5 of Directive 80/68/EEC shall take into account the	MSs shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 16 January 2009

	requirements set out in Articles 3, 4 and 5 of this Directive (art. 7). MSs shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 16 January 2009 (art. 12). See also table WFD	
Substantive	Threshold values are to be established by MSs for the first time by 22 December 2008 (art. 3.5) and published by the Commission as a report on 22 December 2009.	Threshold values are to be established by MSs for the first time by 22 December 2008
Review	Annexes I and II should be reviewed by 16 January 2013 and after that every six years (art. 10).	Review every 6 years.
Sanctioning of non-compliance	Yes. If the Commission considers that a Member State has failed to fulfil an obligation under the Treaties, it shall deliver a reasoned opinion on the matter after giving the State concerned the opportunity to submit its observations. If the State concerned does not comply with the opinion within the period laid down by the Commission, the latter may bring the matter before the Court of Justice of the European Union. (art. 258 TFEU).	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	This Directive establishes specific measures as provided for in Article 17.1 and 17.2 of Directive 2000/60/EC.	
Combined approach for point and diffuse sources.	Yes, plumes resulting in point sources shall be monitored for trends in pollution and whenever possible diffuse source pollution shall be taken into account (art. 5.5, art. 6.2).	Whenever possible diffuse source pollution shall be taken into account.
Other Directives/Regulations	The Groundwater Directive is not a stand-alone directive and needs to be considered in the context of multiple other directives/regulations including Water Framework Directive 2000/60/EC; Public Participation Directive (2003/35/EC); Conservation of Wild birds Directive (79/409/EEC); Conservation of Natural Habitats Directive (92/43/EEC);	All of the Directives/regulations listed have relevance to the farming sector.

Reporting obligations	Assessment of chemical status: Member states shall report a summary in the RBMP (art 4.4). Point 5 of annex III gives the information that Member States have to provide concerning the assessment of groundwater chemical status. Trend assessment Member states shall summarize (1) the way in which the trend assessment form individual monitoring points has contributed to identifying significant and sustained upward trends and (2) the reasons for the starting points for trend reversal (Art 5.4). Member states shall summarize in the RBMP the results of the trend assessments for identified pollutants in order to verify that plumes from contaminated sites do not expand, do not deteriorate the chemical status of the body or group of bodies of groundwater, and do not present a risk for human health and the environment (art 5.5). Threshold values: Part C of annex II gives the information that Member States have to provide concerning threshold values.	

PESTICIDES DIRECTIVE (2009/128/EC)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (art. 1).	High relevance to farming, as they are likely to be the main sector impacted on by the regulations on the handling, storage, mixing and disposal of pesticides used in agriculture. Use of IPM and other alternative plant protection techniques is encouraged to reduce risks associated with use of pesticides.
Clarity of the goals	Ambiguous.	The use of the word 'sustainable' in art.1 is misleading as it only covers human and environmental health. Sustainable use of pesticides has a wider application in the context of food supply and livelihoods.
Exemptions from the substantive goals	No.	
Procedural goals	Adoption of National Action Plans for setting objectives about reducing risks and impacts of pesticides (art. 4.1). All professional users, distributors and advisors have access to appropriate training by bodies designated by the competent authorities (Art 5.1) Raising awareness about use, protective equipment, storage… of pesticides (Chapter II). Establishing regulations about use of application equipment (art. 8). Establishing harmonised risk indicators (art. 15). Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1).	Farmers must have training prior to purchasing pesticides. Equipment being used by farmers is subject to inspection. Farmers are required to store, handle and dispose of pesticides and packaging as per the guidelines detailed in the directive. New regulations about use of pesticides, *inter alia* stricter rules about protective equipment, storage, use of pesticides… Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (art. 11.2).

Preciseness of the goals	The procedural goals lack precision, only broadly describing what is required rather than specifying details. For example, the information on what is required in the National Action Plan is limited and the form of training is not specified (other than the topics to be covered in Annex 1). Art 5.2 requires the people who are trained to receive certificates that "…shall, as a minimum, provide evidence of sufficient knowledge of…." But what is defined as 'sufficient' is unclear. Member States shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides. These targets may cover different areas of concern, for example worker protection, protection of the environment, residues, use of specific techniques or use in specific crops (art. 4.1). Requirements for sales of pesticides shall be established (art. 6). Systems for gathering information on pesticide acute poisoning incidents shall be formed and the Commission along with MSs shall develop a strategic guidance document on monitoring (art. 7.2 and 7.3). Aerial spraying, except under strict regulations, shall be prohibited (art. 9). In areas like public parks, recreation grounds, schools, hospitals etc. appropriate risk management measures shall be taken and use of pesticides reduced. When possible, alternative measures shall be used instead (art. 12).	The lack of precision in the goals gives MS states the opportunity to develop training, inspection regime that suit farming practices in a particular country. Active substances that do not comply with standards set in Annex II, points 3.6 to 3.8 of Reg. no 107/2009, shall be prohibited, or at least limited. Covering different areas of concern, for example worker protection, protection of the environment, residues, use of specific techniques or use in specific crops, requirements for sales of pesticides… Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage etc. (art. 13).
Monitoring requirements		
Obligation to monitor the condition of	No direct monitoring is required as part of this directive. However, although not clearly	Not in this Directive specifically, but topic of pesticides can be found in other directives concerning waters.

aquatic environments and/or their pressures	stated, a water quality metric could be included under Art 15.	
Type of scientific information to be included in planning	Not stated except for reference to the precautionary principle in the opening text.	The lack of definition on the type of scientific evidence to be included in the plans has consequences for farmers. Where no scientific information is available to make evidenced based decision (e.g. to support integrated pest management practices) then the precautionary principle has to be applied which is often to the detriment of agricultural stakeholders.
Coordination with national and EU authorities		
Who runs the planning process?	Member States and the Commission. Responsible authority for the implementation of the directive in member states is not specified.	This may have relevance for farming. Depending on which MS organisation/department is assigned responsibility for implementing the directive, this could change the impact on the farming sector.
Inclusion of other domestic sectoral authorities in the planning process	No.	
Inclusion of industries and the public in the planning process	Yes, provisions on public participation as detailed in Art 2 of Directive 2003/35/EC shall apply to the preparation and the modification of the National Action Plans (art. 4.5).	This is important for the farming sector in order to give them some input into the development of the plans Public participation is required under Directive 2003/35/EC while preparing NAPs.
Inclusion of authorities from other countries in the planning process	Member States shall communicate their National Action Plans to other MSs (art. 4.2).	
Inclusion of EU institutions in the planning process	Member States shall communicate their National Action Plans to the Commission (art. 4.2).	
Public participation		
Access to information	Member States shall inform the general public about the topic of pesticides, in particular regarding the risks and the potential acute and chronic effects, and	Yes, especially concerning risks and potential harmful effects of pesticides.

	about the use of non-chemical alternatives (art. 7.1). The Commission shall make information communicated with MSs about their National Action Plans available to the public on a website (art. 4.4).	
Access to justice	No, except as already available under Directive 2003/35/EC	
Instrument choice		
Direct regulation as the main policy instrument?	Yes. Member States shall use all necessary means designed to achieve these targets (art. 4.1).	Relevance to farming as it makes the regulations compulsory.
Does direct regulation embrace complementary policy instruments?	The measures provided for in this Directive should be complementary to, and not affect, measures laid down in other related Community legislation, in particular Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (5), Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (6), Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (7), Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin (8) and Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 on the placing of plant protection products on the market (9). These measures should also not prejudice voluntary measures in the context of Regulations for Structural Funds or of Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development.	Member States shall establish appropriate incentives to encourage professional users (such as farmers) to implement crop or sector-specific guidelines for integrated pest management on a voluntary basis. Public authorities and/or organisations representing particular professional users may draw up such guidelines..
Enforcement		
Legal bindingness of goals		
Procedural	Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 26 November 2011.	Regulations are compulsory for farmers, with no derogation allow in terms of participation.

	Member States shall communicate their National Action Plans to the Commission and to other Member States. A strategic guidance document on monitoring of pesticides shall also be developed by the Commission along with MSs (art. 4.2). Member States shall establish certification systems and designate the competent authorities responsible for their implementation (art. 5.2). Measures concerning requirements for sales of pesticides shall be established (art. 6.4). The Commission shall submit to the European Parliament and to the Council a report on the experience gained by Member States on the implementation of National Action Plans (art. 4.3).	Member States shall establish certification systems and requirements for sales of pesticides.
Substantive	Legally binding.	
Specific obligations to meet the goals		
Procedural	A strategic guidance document on monitoring of pesticides shall be developed by the Commission along with MSs (art. 4.2). Member States shall establish certification systems and designate the competent authorities responsible for their implementation (art. 5.2). Measures concerning requirements for sales of pesticides shall be established (art. 6.4). The Commission shall submit to the European Parliament and to the Council a report on the experience gained by Member States on the implementation of National Action Plans (art. 4.3).	
Substantive	Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive (art. 23).	
Time frames		
Procedural	Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 14 December 2011 (art. 23). By 14 December 2012, Member States shall communicate their National Action Plans to	Implementation of legislation by 2011, only a two year lead in for farmers to adopt the new regulations.

	the Commission and to other Member States. A strategic guidance document on monitoring of pesticides shall also be developed by the Commission along with MSs (art. 4.2). By 30 June 2013, Member States shall report to the Commission whether the necessary conditions for implementation of IPM are in place (art. 14). By 14 December 2013, Member States shall establish certification systems and designate the competent authorities responsible for their implementation (art. 5.2). By 14 December 2014, the Commission shall submit to the European Parliament and to the Council a report on the information communicated by the Member States in relation to the National Action Plans. Measures concerning requirements for sales of pesticides shall be established by 14 December 2015 (art. 6.4). By 14 December 2018, the Commission shall submit to the European Parliament and to the Council a report on the experience gained by Member States on the implementation of National Action Plans (art. 4.3).	By 2013 report on whether implementation of IPM was successful, also if certification systems were implemented. Requirements for sales of pesticides shall be implemented by 2015. By 2018 a report shall be published on implementation of NAPs.
Substantive	By 14 December 2018 main objectives shall be met and the Commission shall submit to the European Parliament and to the Council a report on the experience gained by Member States on the implementation of National Action Plans (art. 4.3).	By 2018 main objectives shall be met.
Review	National Action Plans shall be reviewed at least every five years (art. 4.2).	Pesticide application equipment shall be inspected at least every 5 years until 2020, and after that at least every 3 years (art. 8.1). This does not apply for equipment that represents very low scale of use (i.e. handheld applicators, knapsack sprayers…), but operators must be informed about risks involved (art. 8.3).
Sanctioning of non-compliance	Member States shall determine penalties applicable to infringements of the national provisions adopted pursuant to this Directive and shall take all measures necessary to ensure that they are implemented (art. 17).	Sanctions and penalties shall be used to make sure that all measures are implemented. This may have financial implication for farmers.
Coherence references to other EU directives		

Strategies to prevent and control pollution of groundwater	The measures provided for in this Directive should be complementary to, and not affect, measures laid down in other related Community legislation, *inter alia* Directive 2000/60/EC, Regulation No 396/2005, Regulation No 1107/2009, Regulation No 1698/2005… (Whereas (3)).	
Combined approach for point and diffuse sources.	Not stated.	
Other Directives/Regulations	The Pesticide Directive is not a stand-alone directive and needs to be considered in the context of multiple other directives/regulations including Water Framework Directive 2000/60/EC; Public Participation Directive (2003/35/EC); Conservation of Wild birds Directive (79/409/EEC); Conservation of Natural Habitats Directive (92/43/EEC); Regulation (EC) No 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin; Regulation (EC) No 1107/2009 on the placing of plant protection products on the market.	All of the Directives/regulations listed have relevance to the farming sector.

HABITATS DIRECTIVE (92/43/EEC)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	- To contribute towards ensuring biodiversity through the conservation of natural habitats and wild fauna and flora in the European territory of the MS (art.2.1) - To maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community interest (art.2.2)	Many of the habitats and species that are protected under the Habitats and Birds Directives are dependent on, or associated with, agricultural practices. farmland makes up around 40% of the total area included in Natura 2000.
Clarity of the goals	Ambiguous, but specified in detail in articles 3-16:	
Exemptions from the substantive goals	No	
Procedural goals	- A coherent European ecological network of special areas of conservations shall be set up under the title Natura 2000 (art.3.1)	Natura 2000 areas may be terrestrial and aquatic
Preciseness of the goals	Very precise	
Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	MS shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species. (art. 11) MS shall establish a system to monitor the incidental capture and killing of the animal species listed in Annex IV (a) (art. 12.4)	
Type of scientific information to be included in planning	Measures taken pursuant to the Habitats directive shall take account of economic, social and cultural requirements and regional and local characteristics (art.2.3)	

Coordination with national and EU authorities		
Who runs the planning process?	Member states	
Inclusion of other domestic sectoral authorities in the planning process		Necessary conservation measures that are required in order to fulfil these objectives and targets should be identified and negotiated with all involved so that they are effectively implemented.
Inclusion of industries and the public in the planning process		
Inclusion of authorities from other countries in the planning process	The Commission shall be assisted by a committee consisting of representatives of the MS and chaired by a representative of the Commission (art 20). This committee shall deliver its opinion on the draft of measures within a specific time limit (art 20.2)	
Inclusion of EU institutions in the planning process	Yes, EU Commission and EU Council	
Public participation		
Access to information	As regulated in Directive 2003/35/EC	
Access to justice	As regulated in Directive 2003/35/EC	
Instrument choice		
Direct regulation as the main policy instrument?	Yes	
Does direct regulation embrace complementary policy instruments?	The Commission can co-finance estimates which MS consider necessary to allow them to meet their obligations pursuant to Art.6.1.	
Enforcement		
Legal bindingness of goals		

Procedural	Binding. If a national list fails to mention a site hosting a priority natural habitat or priority species, a bilateral consultation procedure shall be initiated between the MS and the Commission (art. 5.1). If the dispute remains unresolved, the Commission shall forward the dispute to the Council (art. 5.2). The Council shall take a decision within three months.	
Substantive	Binding, but with a possibility for an exemption: Art. 16 – MS may derogate from the Art. 12-15.b in the interest of protecting wild fauna and flora and conserving natural habitats; to prevent serious damage, in particular to crops, livestocks, forests, fisheries and water and other types of property […]	
Specific obligations to meet the goals		
Procedural	- MS shall designate sites as special areas of conservation (art 3.2) - Each MS shall propose a list of sites (art.4) - MS shall take the requisite measures to establish a system of strict protection for the animal species listed in Annex IV (a) in their natural range prohibiting capture or killing, disturbance destruction, and deterioration of breeding sites (art. 12.1) - MS shall take the requisite measures to establish a system of strict protection for the plant species listed in Annex IV (b) […] (art. 13.1)	
Substantive	- For SAC's, MS shall establish the necessary conservation measures (art. 6.1) - MS shall take appropriate steps to avoid, in SAC's, the deterioration of natural habitats and the habitats of species as well as disturbances of species for which those sites have been designated, in so far as such a disturbance could be significant (art. 6.2) - Projects or plans with a likely significant effect shall be subject to an appropriate assessment (art. 6.3) - Compensatory measures can be required (art 6.4) -MS shall endeavor in their land-use planning and development policies to encourage the management of features of the landscape which are of major importance for wild fauna and flora (art.10)	Conservation measures can include both site-specific measures (i.e. management actions and/or management restrictions), and horizontal measures that apply to many Natura 2000 sites over a larger area (e.g. measures to reduce nitrate pollution or to regulate hunting or resource use). Appropriate instruments for implementing these conservation measures can include management plans specifically designed for the sites or integrated into other development plans, and/or appropriate statutory, administrative or contractual measures. Agri-environmental agreements with farmers within the Rural Development Regulation are one example of a voluntary contractual

		measure aiming at maintaining a favourable conservation status of certain habitat types. Horizontal measures can be suitable for certain habitat types/species across a whole region or country, or to tackle diffuse pressures such as eutrophication from agricultural run-off.
Time frames		
Procedural	- The list of proposed sites shall be transmitted to the Commission, within three years of the notification of this Directive, together with information on each site (art. 4.1) - The list of sites of community importance shall be established within six years of the notification of this Directive (art. 4.3) - Once such a site of community importance has been adopted, the MS concerned shall designate the site concerned asap and within six years at most (art. 4.4) - MS shall forward to the Commission every two years a report on the derogations applied under art. 16.1 (Art. 16.2)	
Substantive	- MS shall bring into force the laws, regulations and administrative provisions necessary to comply with this directive within two years of its notification (art.23.1)	
Review	- The Commission shall periodically review the contribution of Natura 2000 towards achievements of the objectives set out in article 2 and 3 (art.9) - every six years MS shall draw up a report on the implementation of the measures taken under the directive. (Art. 17.1)	
Sanctioning of non-compliance	Yes (art .258 TFEU).	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	No	
Combined approach for point and diffuse sources.	No	

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ENVIRONMENTAL IMPACT ASSESSMENT DIRECTIVES (2011/92 AND 2014/52)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	The 2011/92/UE and 2014/52/UE directives establish the principles for the environmental impact assessment of projects by introducing minimum requirements, with regard to the type of projects subject to assessment, the main obligations of developers, the content of the assessment and the participation of the competent authorities and the public, and it contributes to a high level of protection of the environment and human health.	
Clarity of the goals	The above mentioned directives are an evolution of Directive 85/337/CEE that for the first time established a methodology to evaluate the impacts of projects (and then policies and plans, especially with the advent of the Strategic Environment Assessment Directive 2001/42/EC), before the implementation of those projects, policies or plans. In this respect it embodies a preventive dimension of the Environmental Law, and is applicable to almost all (defence projects may not be subject to it, see nº 4 of article 2) areas of activity. The Directives are not specific directed to Agriculture activities, other than the specified in Annexes I and II (which are rather limited and for many countries are much more extended and restricted), or refers directly to biocides or fertilizers. These subjects will only be dealt with if during the Environmental Impact Study there is evidence that they may be important. In this case, a scientific evaluation has to be performed and prevention and mitigation solutions have to be studied and implemented.	It makes mandatory to certain projects, above a given dimension have to undergo a EIA process, and present solutions to effectively solve of mitigate to acceptable level the environmental problems posed by the activities listed on Annex I of 2011/92/EU Directive. Of particular interest is point 17: Installations for the intensive rearing of poultry or pigs with more than: (a) 85 000 places for broilers, 60 000 places for hens; (b) 3 000 places for production pigs (over 30 kg); or (c) 900 places for sows. Some Countries (such as Portugal, have much more detailed and restricted rules, divided in general cases and special cases for particular sensitive cases. They include agriculture, forestry and rearing activities). In addition, under 2011/92/UE Directive, Annex II.1 refers to Agriculture, Silviculture and Aquaculture.
Exemptions from the substantive goals	Some areas are of particular interest, namely in what concerns livestock rearing and the industrial production of fertilizers and biocides (at the 2011/92/EU Directive, Annex I is related to Agriculture activities, namely on point 17, and point 1 of Annex II is also related with Agriculture).	
Procedural goals	The Directives establish the procedures and principles behind the implementation of Environmental Impact Assessment.	
Preciseness of the goals	The process of EIA is well established and adapted to the conditions, culture and administrative costumes and traditions in each country. For the EU above	

	mentioned directives, the procedure is formulated by articles 3 to 6, 9 to 11 and in Annex III and IV). These provide a common framework to the entire European Union Territory and regulating the transboundary cases. The transboundary cases are regulated by articles 7 and 8. In this context, the detailed information on specific targets are often more precisely defined at national level, often with tighter limits and procedures. Nevertheless, for the first time, and in the scope of this analysis, the 2014/52/EU states at point 9 of the considerations: "The Commission Communication of 22 September 2006 entitled 'Thematic Strategy for Soil Protection' and the Roadmap to a Resource-Efficient Europe underline the importance of the sustainable use of soil and the need to address the unsustainable increase of settlement areas over time ('land take'). Furthermore, the final document of the United Nations Conference on Sustainable Development held in Rio de Janeiro on 20-22 June 2012 recognises the economic and social significance of good land management, including soil, and the need for urgent action to reverse land degradation. Public and private projects should therefore consider and limit their impact on land, particularly as regards land take, and on soil, including as regards organic matter, erosion, compaction and sealing; appropriate land use plans and policies at national, regional and local level are also relevant in this regard".	
Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	If required in the Environmental Impact Study (performed by the promotor and evaluated by the public authorities and by the public through a public participation process) or in the Environmental Impact Decision (Issued by the Government [managing authority] that may require as a condition the implementation of a monitoring network and procedure, and that the results are made available)	
Type of scientific information to be included in planning	To be specified in the Environmental Impact Study and/or Environmental Impact Decision, for each project. No provision is made on the directives on this. This answer results from my personal experience on how things work in Portugal and in transboundary cases (with Spain)	
Coordination with national and EU authorities		
Who runs the planning process?	Member States run the process, even in transboundary situations (the country where the project will be located will lead the process and will ask for the collaboration of the affected countries (articles 7 and 8).	

Inclusion of other domestic sectoral authorities in the planning process	Each relevant sectoral authority analyses the Environmental Impact Study and issues a report with their considerations on the seriousness of the study and if relevant with measures to be taken in addition to those set in the study. The authorities include always the biodiversity, water, agriculture and forestry authorities. Not defined in the directives, out of my experience with the Portuguese case study)	
Inclusion of industries and the public in the planning process	Yes, see public participation process.	
Inclusion of authorities from other countries in the planning process	Yes, if there are transboundary impacts, the Kyiv protocol applies.	Compensation may be envisaged if the impacts of a project in one side of the border have an impact on the other country. This is negotiated and mitigation measures and compensations are given by the promotor.
Inclusion of EU institutions in the planning process	Only if no agreement is achieved, then the European Courte of Law may be called to judge upon. Although the article 9, nº 2 and 4 of the Aarhus Convention may apply, the process is draw to prevent any contestation since the entire directives framework are based on the article 6 of the above mentioned convention	
Public participation		
Access to information	Full access to information (via internet) to all during the participatory processes. These may be three. One optional at the scoping phase, one obligatory during the appreciation of the Environmental Impact Study, and one obligatory when, after the project implementation, audits are performed to the project performance. Data is made available to all, and reactions are received during a stipulated period of time. Although Article 6 refers to this issue, my experience with the Portuguese system is that all the information is made available on line for all the three phases where public participation can happen (e.g. during scoping, evaluation of the Environmental Impact Study and during the Auditing of project performance, after the installation and when the project is running and being monitored. In all cases public participation may lead to changes in the prevention/mitigation measures.	Informed as the general public
Access to justice	The idea is to find a common ground based on the relevant legislation and avoid justice.	

Instrument choice		
Direct regulation as the main policy instrument?	Yes.	
Does direct regulation embrace complementary policy instruments?	In some cases the Strategic Environment Assessment can apply. The Directives embody the conventions on public participation and transboundary environmental impacts. Many of the details are established at national (and eventually at Regional level) reflecting the tradition, culture, administrative and modus operandis of national/regional communities.	
Enforcement		
Legal bindingness of goals		
Procedural	Legally binding. The decisions have law force.	
Substantive	Legally binding.	
Specific obligations to meet the goals		
Procedural	Member States transfer (and in many cases improve) the directives to their national legal framework, giving it force of law. The Environmental Impact Study and the Decision on Environment Impact are binding and their decisions and provisions must be observed, having force of law (according with nº5 of article 11, these procedures have to be defined by each country, presumably according with their legal tradition)	
Substantive	Member States will transfer the directives to their national legal framework. They can deepen the directives provisions, which is often the case, since the directives are very basic.	
Time frames		
Procedural	This is a procedure inforce since 1985, when the first directive was published in Europe, and is expected to remain applicable, since it is one of the more important tools in Environmental Management, applicable worldwide.	
Substantive	EIA is applicable since 1985, and suffered, at least 3 revisions ever since, maintaining the same basic structure of implementation. Future changes are expected to change only the details.	

Review	No provisions are made or information is given on this.	
Sanctioning of non-compliance	The non-compliance is regulated by article 11, and can result in the establishment of the initial situation previous to the project implementation.	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	Compliance with all the pollution regulation legislation, namely in what concerns drinking water, wastewater quality, wastewater sludge quality, WFD. Whenever a project is expected not to comply with the limits set by legislation, prevention or mitigation measures have to be studied and implemented.	Compliance with legislation is expected for the projects listed in Annex I and II (they may differ from country to country..
Combined approach for point and diffuse sources.	Not mentioned.	
……		

INDUSTRIAL EMISSIONS DIRECTIVE (2010/75/EU)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	This Directive lays down rules on integrated prevention and control of environmental pollution arising from industrial activities. It also lays down rules designed to prevent or, where that is not practicable, to reduce emissions into air, water and land and to prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole (Article 1). The IED is based on several pillars, in particular (1) an integrated approach, (2) use of best available techniques, (3) flexibility, (4) inspections and (5) public participation.	
Clarity of the goals	Clear in general. The IED aims to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques (BAT). The IED applies, *inter alia*, to the following industrial activities: combustion plants, waste incineration plants, installations using organic solvents and installations producing titanium dioxide (art. 4).	IED is relevant to the following categories of the farming sector (Annex 1, 6.6): Intensive rearing of poultry or pigs: (a) with more than 40 000 places for poultry; (b) with more than 2 000 places for production pigs (over 30 kg), or (c) with more than 750 places for sows Animal or vegetable raw materials processing plants with finished product capacities as follows (Annex I, 6.4): (a) slaughterhouses with carcass production capacity greater than 50 t/day; (b) treatment and processing of animal raw materials (75 t/day), vegetable raw materials (300 t/day) or both and milk (200 t/day) On most livestock units., BAT are aimed at minimizing ammonia emissions to the atmosphere (e.g. slurry store covers, precision slurry application techniques and in-house

		manure drying), dust and odour as well as nutrient losses to water
Exemptions from the substantive goals	In case of disproportionately high costs compared to the environmental benefits due to specific circumstances, competent authorities should be able to set emission limit values deviating from those levels. Such deviations should be based on an assessment taking into account well-defined criteria. The emission limit values set out in this Directive should not be exceeded. In any event, no significant pollution should be caused and a high level of protection of the environment taken as a whole should be achieved (consideration 16 and Article 15.4). Some limited life time derogations are allowed under special circumstances (small combustion plants with low thermal input, limited operation time…), but mostly only until years 2019-2023 (Articles 33, 34, 35)	
Procedural goals	MS shall take the necessary measures that installations are operated as such that all appropriate preventive measures are taken against pollution, best available techniques are applied, no significant pollution is caused, generation of waste is prevented…. (Article 11) When adopting general binding rules, Member States shall ensure an integrated approach and a high level of environmental protection based on BATs (criteria for determining BATs is in Annex III) and make sure to update BATs as new techniques become available (art. 17). Provisions must be made in permits to limit or close down operations in case of malfunction or breakdown (art. 37).	
Preciseness of the goals	Specified categories should be licensed. Permit conditions included BATs (Best Available Techniques), limit values for emissions, registration and reporting requirements for the operators (farming industry, specified categories). A baseline report of the situation prior to the activity should be set up. MS ensure that no installations or plants operate without a permit (Article 4). If changes are done to installations MS shall ensure none are done without notifying the competent authority and when necessary the permit must be updated (art. 20).	Annex II holds a list of polluting substances for each of the environmental domains. Water (and relevant to farming sector): Biocides and plant protection products # 10. Substances which contribute to eutrophication (in particular, nitrates and phosphates) # 12. Operators have to provide information with application for permits, including sources of emission, baseline report on

	Competent authority grant a permit if the installation complies with the requirements of this Directive (Article 5).	environmental status prior to activity, measures to monitor and comply with emission limit values (Article 12.1). Any appropriate complementary measure that is necessary to limit environmental consequences in case of incident or accident can be ordered to operator by competent authority (Article 7).
Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	A baseline report should be set on the environmental status prior to the activity. Annual reporting on monitoring emissions (Article 14). Article 16: ● Monitoring requirements based on BAT conclusion ● Frequency to be set in permit by competent authority or in general binding rules. ● Monitoring groundwater: at least every 5 years unless based on systematic risk appraisal. Emissions from waste water treatment plants shall be monitored at the point where water leaves the treatment plant. Emission limit values set in Part 5 of Annex VI shall apply.	Base line report on the status prior to the activity. Supply competent authority at least annually with information on emission monitoring and other required data to enable competent authority to check on compliance. Article 22.3: Upon cessation of activities: assessment of soil and groundwater pollution by relevant hazardous substances used. In case of significant pollution compared to baseline report: operator shall take necessary measures to address that pollution so as to return to the baseline state.
Type of scientific information to be included in planning	Specific requirements are set to the information included in applications for permits (Article 12) Based upon BAT conclusions (Article 16) List of polluting substances in Annex II	
Coordination with national and EU authorities		
Who runs the planning process?	MS run the planning process.	
Inclusion of other domestic sectoral authorities in the planning process	MS designates the competent authorities responsible for carrying out the obligations in IED. Competent authorities grant permits.	
Inclusion of industries and the public in the planning process	Public has a right to participate in the decision-making process, and to be informed of its consequences, by having access to permit	

	applications, permits and the results of the monitoring of releases (Article 24, 25).	
Inclusion of authorities from other countries in the planning process	Article 26 Transboundary effects: if operation of an installation is likely to have significant effect on environment of another MS, information shall be forwarded and serve as basis for consultation. Public concerned shall be informed in accordance to Article 24.	
Inclusion of EU institutions in the planning process	BAT reference documents are based on expert information exchange. This work is coordinated by the European IPPC Bureau commissioned by the European Commission.	
Public participation		
Access to information	Public has a right to participate in the decision-making process, and to be informed of its consequences, by having access to permit applications, permits and the results of environmental inspections and the monitoring of releases (Article 24, Annex IV).	
Access to justice	Article 25 sets the requirements to ensure access to justices for its citizens.	
Instrument choice		
Direct regulation as the main policy instrument?	Yes. MS are bound to ensure that none of the industrial activities mentioned are operated without permit and to ensure that the permit conditions are complied with (art. 4, art. 8)	
Does direct regulation embrace complementary policy instruments?	Yes. Use of BAT reference documents as a basis for licensing. Registration of emission data reported by MS through the European Pollutant and Transfer Register (E-PRTR).	
Enforcement		
Legal bindingness of goals		
Procedural	Legally binding	
Substantive	Legally binding	
Specific obligations to meet the goals		
Procedural	MS take necessary measures to provide that installations are operated in accordance with	

	basic obligations (Article 11). MS shall make the information regarding implementation of this Directive available to the Commission. Permits includes all measures necessary for compliance with requirements Article 11 and 18. Periodic reconsideration by competent authority of permit conditions and updated with BAT conclusions (within 4 years after publication), new or revised environmental quality standards, significant pollution of the installation, necessary additional measures (Article 21). Article 23: Environmental inspections with an interval of 1-3 years, depending upon the risk profile of the installation.	
Substantive	Article 21 Reconsideration and updating of permit conditions by competent authorities. Article 18: additional measures shall be included in the permit upon BAT if necessary to achieve environmental quality standards.	Article 22.3: Site closure and significant pollution: Operator has to address this pollution so as to return to the baseline state
Time frames		
Procedural	3 yearly reporting by MS starting on 1 January 2016 (Article 72). Commission shall at the same occasions submit a report about implementation of IED to the EU Parliament and Council. For combustion plants that got or applied for permit before 27 November 2002 and started operating no later than one year later, MSs shall implement a transitional national plan during the period 1 January 2016 to 30 June 2020. Implementing rules concerning start-up or shut-down periods and transitional national plans shall be made. Commission shall make appropriate proposals no later than 7 July 2011 (art. 41).	
Substantive	MS Shall bring into force laws, regulations and administrative provisions necessary to comply with this Directive by 7 January 2013 and apply them from the same date (art. 80).	
Review	3 yearly review of the Commission to the European Parliament and to the Council on the implementation of this Directive based upon MS reports (Article 73), including the assessment of the need for Union action.	

	The operator of installations and activities using organic solvents shall supply, on request, the competent authority with data to verify compliance with limit values, derogations or other requirements (art. 62). Article 73.2: Specific review by 31 December 2012 on the necessity of controlling emissions from the intensive rearing of cattle and the spreading of manure (COM(2013) 286 final). Article 73.3: Report on the establishment of (a) differentiated capacity thresholds for the rearing of different poultry species, including the specific case of quail; (b) capacity thresholds for the simultaneous rearing of different types of animals within the same installation. ….by December 2011 (COM(2013) 286 final).	
Sanctioning of non-compliance	Article 8 on non-compliance: in case of an immediate danger and until compliance is restored: the installation will be suspended. Article 79 MS shall determine effective, proportionate and dissuasive penalties applicable to infringements of the national provisions adopted pursuant to this Directive and notify the Commission by 7 January 2013.	Operator immediately informs competent authority on breach of permit conditions and takes necessary measures (considered necessary by the competent authority) to restore compliance.
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	MS ensure this by developing a system of licensing. Competent authorities by granting permits, review and enforcement.	Baseline report prior to activity on environmental status. In case of incidents, necessary measures. After cessation, remediate significant pollution that is due to the activity
Combined approach for point and diffuse sources.	Within permit conditions, although Directive does not explicitly distinguish point and diffuse sources of pollutions in the information needed for the permit application.	
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RURAL DEVELOPMENT REGULATION (1305/2013)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	This Regulation lays down general rules governing Union support for rural development. It sets out the objectives to which rural development policy is to contribute and the relevant Union priorities for rural development (art. 1).	Restore, preserve and enhance ecosystems, improving water management including fertilizer and pesticide management. (art.5)
Clarity of the goals	Overall ambiguous, but clarified with the following objectives: fostering the competitiveness of agriculture; ensuring the sustainable management of natural resources, and climate action; achieving a balanced territorial development of rural economies and communities including the creation and maintenance of employment (art. 4). Objectives get broken down even further in Chapter I of Title III.	Intended objectives: Fostering the competitiveness of agriculture Ensuring sustainable management of resources Achieving a balanced territorial development of rural economies and communities…
Exemptions from the substantive goals	Not stated.	
Procedural goals	This Regulation outlines the strategic context for rural development policy and defines the measures to be adopted in order to implement rural development policy. In addition, it lays down rules on programming, networking, management, monitoring and evaluation on the basis of responsibilities shared between the Member States and the Commission and rules to ensure coordination of the EAFRD with other Union instruments (art. 1).	
Preciseness of the goals	Regulation mentions six Union priorities for rural development: (1) Fostering knowledge transfer and innovation in agriculture, forestry, and rural areas (fostering innovation, cooperation, and the development of the knowledge base in rural areas; strengthening the links between agriculture, food production and forestry and research and innovation, including for the purpose of improved environmental management and performance; fostering lifelong learning and vocational training in the agricultural and forestry sectors).	MSs shall implement necessary measures to: -Foster knowledge transfer and innovation in agriculture, along with cooperation with other industries and life-long learning. -Enhance farm viability (economic performance) and competitiveness of agriculture and promote innovative farm technologies (adequately skilled farmers).

	(2) Enhancing farm viability and competitiveness of all types of agriculture in all regions and promoting innovative farm technologies and the sustainable management of forests (improving the economic performance of all farms and facilitating farm restructuring and modernisation, notably with a view to increasing market participation and orientation as well as agricultural diversification; facilitating the entry of adequately skilled farmers into the agricultural sector and, in particular, generational renewal).	-Promote food chain organisation, including processing and marketing of agricultural products, animal welfare (introducing quality schemes) and risk management in agriculture.
	(3) Promoting food chain organisation, including processing and marketing of agricultural products, animal welfare and risk management in agriculture (improving competitiveness of primary producers by better integrating them into the agri-food chain through quality schemes, adding value to agricultural products, promotion in local markets and short supply circuits, producer groups and organisations and inter-branch organisations; supporting farm risk prevention and management).	-Restore, preserve and enhance ecosystems related to agriculture (preserving biodiversity, Natura 2000, improve water management, including fertiliser and pesticide management; prevent soil erosion and improve soil management). -Promote resource efficiency (water, energy) and support the shift towards a low carbon and climate resilient agriculture sector (renewable resources, reducing emissions).
	(4) Restoring, preserving and enhancing ecosystems related to agriculture and forestry (restoring, preserving and enhancing biodiversity, including in Natura 2000 areas, and in areas facing natural or other specific constraints, and high nature value farming, as well as the state of European landscapes; improving water management, including fertiliser and pesticide management; preventing soil erosion and improving soil management). **(5) Promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors (increasing efficiency in water use by agriculture; increasing efficiency in energy use in agriculture and food processing; facilitating the supply and use of renewable sources of energy, of by-products, wastes and residues and of other non-food raw material, for the purposes of the bio- economy; reducing greenhouse gas and ammonia emissions from agriculture; fostering carbon conservation and sequestration in agriculture and forestry).**	Not all 6 priorities need to be addressed at the same time. National programme shall address less than 4, but regional programmes at least 4 (art. 5). Member State may submit either a single programme for its entire territory or a set of regional programmes. Alternatively, in duly justified cases, it may submit a national programme and a set of regional programmes (art. 6). Such programmes may relate to *inter alia* young farmers, small farms, mountain areas, short supply chains, women in rural areas, climate change mitigation and adaptation and biodiversity, in accordance with Annex IV (art. 7.1).
	(6) Promoting social inclusion, poverty reduction and economic development in rural areas (facilitating diversification, creation and development of small enterprises, as well as job creation; fostering local development in rural areas; enhancing the	EAFRD support is intended for investments concerning national programmes (art. 45). For support concerning irrigation, river basin management plans are

	accessibility, use and quality of information and communication technologies (ICT) in rural areas). (art. 5) Contents of Rural development programmes are laid out in depth in article 8.	required in affected areas in accordance with Article 11 of the Water Framework Directive (art. 46).
Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	Not specifically for aquatic environments, but rural development programmes shall be subject to monitoring.	
Type of scientific information to be included in planning	Managing authority shall ensure that there is an appropriate secure electronic system to record, maintain, manage and report statistical information on the programme and its implementation required for the purposes of monitoring (art. 66).	Programs have to be monitored, statistical data on programmes and their implementation (art.66)
Coordination with national and EU authorities		
Who runs the planning process?	Member States.	
Inclusion of other domestic sectoral authorities in the planning process	Each Member State shall establish a national rural network, which groups the organisations and administrations involved in rural development (art. 54). Member States shall designate, for each rural development programme, the following authorities: the Managing Authority to be in charge of the management of the programme concerned, the accredited paying agency and the certification body.	Network and its activities may be financed with EAFRD support and shall aim to, *inter alia*: increase the involvement of stakeholders in the implementation of rural development; improve the quality of implementation of rural development programmes; inform the broader public and potential beneficiaries on rural development policy and funding opportunities; foster innovation in agriculture, food production, forestry and rural areas.
Inclusion of industries and the public in the planning process	No.	
Inclusion of authorities from other countries in	A European network for rural development for the networking of national networks, organisations, and administrations active in the field of rural development at Union level shall be put in place (art. 52).	With the aim to increase the involvement of all stakeholders, and in particular agricultural, forestry and other rural development stakeholders in the implementation

the planning process	Also, a European Innovation Partnership network shall be put in place to support the EIP for agricultural productivity and sustainability. It shall enable the networking of operational groups, advisory services and researchers (art. 53).	of rural development, support the development and evaluation of programmes… (art. 52.2) EIP operational groups shall form part of the EIP for agricultural productivity and sustainability. They shall be set up by interested actors such as farmers, researchers, advisors and businesses involved in the agriculture and food sector (art. 56).
Inclusion of EU institutions in the planning process	Yes, Member States shall submit to the Commission a proposal for each rural development programme (art. 10) and if necessary request amendments from the EC (art. 11).	
Public participation		
Access to information	National rural network shall inform the broader public and potential beneficiaries on rural development policy and funding opportunities (art. 54.2a, 66.1i)	NRN shall inform potential beneficiaries on rural development policy and funding opportunities.
Access to justice	No.	
Instrument choice		
Direct regulation as the main policy instrument?	Yes.	
Does direct regulation embrace complementary policy instruments?	Yes. Member States shall adopt the measures in order to implement rural development policy according to, *inter alia*, CAP, Article 317 TFEU, Article 258 TFEU, Regulation (EU) No 1306/2013, Regulation (EU) No 1303/2013…	Regions have choice between a range of support measures with higher standards to fertilizer and pesticide management than CAP (Art 28)
Enforcement		
Legal bindingness of goals		
Procedural	Legally binding. Member States shall bring into force national and/or regional programmes concerning 6 main priorities for rural development (art. 6).	
Substantive	Legally binding.	
Specific obligations to meet the goals		
Procedural	Member States shall bring into force national and/or regional programmes concerning, *inter alia*; 'restoring, preserving and enhancing ecosystems	Fostering knowledge transfer; Enhancing competitiveness;

	related to agriculture and forestry' and 'promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors' (art. 6).	Promoting food chain organisations, animal welfare, risk management in agriculture; Restoring, preserving and enhancing ecosystems related to agriculture; Promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy; Promoting social inclusion, poverty reduction and economic development…
Substantive	Member States shall bring into force national and/or regional programmes concerning 6 main priorities for rural development (art. 6).	
Time frames		
Procedural	For the period from 1 January 2014 to 31 December 2020, the total amount of Union support for rural development under this Regulation shall be EUR 84 936 million, in 2011 prices (art. 58). By 30 June 2016, the Member State shall submit to the Commission a report on implementation of the rural development programme in the calendar years 2014 and 2015 (art. 75).	
Substantive	This Regulation shall apply from 1 January 2014 (art. 90). In 2024, an ex post evaluation report shall be prepared by the Member States for each of their rural development programmes. That report shall be submitted to the Commission by 31 December 2024 (art. 78).	
Review	By 30 June of each year after 2016 until and including 2024 the Member State shall submit to the Commission an annual implementation report on implementation of the rural development programme in the previous calendar year (art. 75).	
Sanctioning of non-compliance	Yes. If the Commission considers that a Member State has failed to fulfil an obligation under the Treaties, it shall deliver a reasoned opinion on the matter after giving the State concerned the opportunity to submit its observations. If the State concerned does not comply with the opinion within the period laid down	Member States shall ensure that the fund arrangements provide for penalties in case of negligence on the part of the farmer (art. 38).

	by the Commission, the latter may bring the matter before the Court of Justice of the European Union. (art. 258 TFEU).	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	Compliance with WFD is expected.	Compliance with WFD is expected.
Combined approach for point and diffuse sources.	Not mentioned.	
……		

COMMON AGRICULTURAL POLICY (CAP)		
	Provisions and requirements	**Relevance to the farming sector**
Ecological goals		
Substantive goals	The original objectives of CAP were enumerated in the Treaty of Rome: ● to increase agricultural productivity, ● to ensure a fair standard of living for the agricultural community, ● to stabilise markets, to assure the availability of supplies, and ● to ensure that supplies reach consumers at reasonable prices. Since then, the dimensions of the environment, rural issues, animal welfare and food safety have been added to the CAP (major reforms in 1992, 1999, 2003 and 2013): ● to improve agricultural competitiveness in the EU without excessive recourse to subsidies, ● to preserve the level of farmers' income and its stability, ● to respect the environment and the diversity of the countryside, ● to improve the quality of agricultural produce and ● to simplify and decentralise the CAP ● to contribute to the 'greening of agriculture' Four main regulations govern the CAP: ● direct payments linked to environmental-friendly practices (Regulation (EU) No 1307/2013). ● market measures (Regulation (EU) No 1308/2013): ● rural development (Regulation (EU) No 1305/2013): ● horizontal issues (Regulation (EU) No 1306/2013): lays down the rules for CAP expenditure, the farm advisory system, control systems set up by EU countries and the cross-compliance system The ecological aspects of the CAP mainly relate to ● the cross-compliance regulation, forcing farmers to implement the environmental directives (including the WFD, ND, GD) and good agriculture and environmental conditions (including soil organic	Very relevant, as the income of many farmers strongly depends on farm payments. This holds specially for extensive grassland areas and arable farmers.

	matter content, minimizing soil erosion, buffer strips, water extraction). ● The greening of the CAP, including diversifying crops (crop rotations), maintaining permanent grassland, and dedicating 5% of arable land to 'ecologically beneficial elements' ('ecological focus areas'). This contributes (i) making soil & ecosystems more resilient by growing a greater variety of crops, (ii) contribute to conserving soil carbon & grassland habitats associated with permanent grassland, and (iii) contributes to protecting water & habitats by establishing ecological focus areas. ● Also, the CAP regulates the farm advisory system, which helps to improve farming practices.	
Clarity of the goals	The overall goals of the CAP are clear, but the regulations are (very) complex. There are no specific water ecological goals/targets, but general goals related to the sustainability of agriculture, including crop rotation, maintenance of permanent grassland, ecological focus areas.	Because of the complexity, it is difficult to verify whether farmers in practice comply with the regulations of the CAP
Exemptions from the substantive goals	The regulations hold for all Member States. In case farmers, Member States do not comply with the requirements, farm payments will be withheld. Member States may allow farmers to meet one or more greening requirements through equivalent /alternative practices, as defined in the basic regulation. Equivalent practices must be based on agri-environment schemes under EU countries' rural development programmes or national/regional certification schemes. National governments must make sure that equivalent measures do not benefit from both direct payments for mandatory greening and rural development funds.	
Procedural goals	All procedures are laid down in the regulations mentioned before. Direct payments are payments granted directly to farmers to ensure them a safety net. They are mainly granted in the form of a basic income support, decoupled from production, stabilising their income stemming from sales on the markets, which are subject to volatility. In order to maximise their profits, producers must respond to market signals, so that they produce goods that are demanded by consumers. Direct payments also contribute, through greening, and in combination with cross-compliance, to providing basic public goods. Farmers who do not comply with certain requirements in the areas of public, animal and plant health, environment and animal welfare are subject to reductions of or exclusion from direct support. This system - called 'cross-compliance' - forms an integral part of EU support under direct payments	
Preciseness of the goals	Goals of the CAP are the result of detailed preparations, intensive discussions and fear negotiations between Member States and the European commission. As a result, goals are compromises with little precision.	

Monitoring requirements		
Obligation to monitor the condition of aquatic environments and/or their pressures	The implementation of the CAP 2014-2020 will be measured against a set of indicators that covers all policy areas and provides information at various levels. ● **Output indicators** report on the degree of activity of a policy measure (e.g., the number of projects funded); they are linked to individual policy interventions. ● **Result indicators** measure the direct, immediate effect of the policy measure (e.g., the number of jobs created), in relation to the specific policy objectives. ● **Impact indicators** look at the effect in the longer term (e.g. rural unemployment rate). Overall, impact indicators are linked to the general objectives of the CAP. ● **Context indicators** reflect relevant aspects of the general contextual trends in the economy, environment and society that are likely to have an influence on the implementation, achievements and performance of the CAP. These indicators are performance indicators and to some extent also pressure indicators. There is no monitoring related to the conditions of aquatic environments	There are three surveys to collect farm data in EU members to monitor the effects of the CAP and related policies. These are: ● The Farm Accountancy Data Network (FADN), which mainly relates to economic performance of (a not-representative) commercial farms in EU-Member States. Currently, the annual sample consists of more than 80.000 holdings. They represent a population of about 5.000.000 farms in the EU, which covers approximately 90% of the total utilised agricultural area (UAA) and account for about 90% of the total agricultural production. This survey is conducted almost every year. ● Farm Structure Survey (FFS) which targets basically all farms in all Member States and which is carried out once in 1-4 years (depending on member state) ● Survey on Agricultural Production Methods (SAPM), which so far has been carried out only once, and which deals with production methods, including tillage, manure storage and application, irrigation practices, etc. These surveys are laid down in regulations and farmers have to comply with these regulations.

Type of scientific information to be included in planning	The basis of the CAP regulations and reforms is science and there are many reports and forecast studies used in the preparation of the CAP (reforms). However, the final result of (the reforms of) the CAP regulations comes from negotiations between the European Commission and the Member States. The Commission uses public contracts to buy services such as studies, technical assistance and training, consultancy, conference and publicity services etc. The providers are selected via calls for tender	The results of the negotiations have direct impact on farmers in all EU Member States
Coordination with national and EU authorities		
Who runs the planning process?	The European Commission. Various committees - composed of government representatives and chaired by a Commission representative - are attached to the Commission. In addition, civil dialogue groups assist the Commission and help to hold a regular dialogue on all matters relating to the common agricultural policy and its implementation.	
Inclusion of other domestic sectoral authorities in the planning process	See above, there are civil dialogue groups that assist the Commission and help to hold a regular dialogue on all matters relating to the common agricultural policy. Also, the Commission has organised public Conferences to provide a forum for civil society to debate the CAP reform proposals for post-2013 and to discuss the degree to which they meet the challenges identified during the public debate. Further, trade analyses are made, and there are discussions within the framework of WTO, TTIP and CETA. The EU is the world's largest trading block, and is a key player in the WTO, where the European Commission negotiates on behalf of the 28 countries of the EU as a single entity. The EU actively supports the work of the WTO on multilateral rule-making and trade liberalisation, seeking to: • maintain open markets and ensure new markets for European companies; • strengthen multilateral rules and ensure their observance by others; • promote sustainable development in trade. Finally, there are many bi-lateral discussions and agreements with countries and country-groups, including Africa, Latin America, etc.	
Inclusion of industries and the public in the planning process	See above	
Inclusion of authorities from other countries in	See above	

the planning process		
Inclusion of EU institutions in the planning process	See above	
Public participation		
Access to information	The reforms of the CAP, the implementation as well as the likely results of the CAP are extensively described and reported, and the information can be obtained through the websites of the European Commission (DG Agri; https://ec.europa.eu/agriculture/index_en), as well as through the websites of DG Eurostat (http://ec.europa.eu/eurostat/web/agriculture/methodology) European Environmental Agency (https://www.eea.europa.eu/themes/agriculture), Joint Research Centre (https://ec.europa.eu/info/departments/joint-research-centre_en), and through the websites of the Member States.	
Access to justice	On procedural and substantive grounds	
Instrument choice		
Direct regulation as the main policy instrument?	No command and control regulations but economic incentives (instruments), laid down in regulations, which are applicable to all Member States	
Does direct regulation embrace complementary policy instruments?	No	
Enforcement		
Legal bindingness of goals		
Procedural	Articles 38 to 44 of the Treaty on the Functioning of the European Union (TFEU). Regulations (EU) Nos 1303 to 1308/2013 (OJ L 347, 20.12.2013). But, there are no specific, quantitative, ecological targets in the CAP, apart from the greening regulations (diversifying crops (crop rotations), maintaining permanent grassland, and dedicating 5% of arable land to 'ecologically beneficial elements' ('ecological focus areas')).	
Substantive		

Specific obligations to meet the goals		
Procedural	Not applicable	
Substantive	Not applicable	
Time frames		
Procedural	The regulations of the CAP are evaluated and reconsidered every other 5 to 6 years, and series of reforms of the CAP have been implemented	
Substantive	Environmental protection, animal welfare and sustainability aspects have received much greater attention in the CAP from 2000 onwards.	
Review	Extensive reviews of the apparent effects of the CAP every 5 to 6 years.	In part on the basis of the farm data collected through the FADN, FFS and SAPM discussed earlier.
Sanctioning of non-compliance	For ensuring sustainable agricultural activities, farmers are obliged to respect common rules and standards for preserving the environment and the landscape. The common rules and standards are mandatory and form the basis for ensuring that agricultural activity is undertaken in a sustainable way. If farmers and/or Members do not comply with the statutory requirements (Cross-compliance), there will reductions in the payment.	
Coherence references to other EU directives		
Strategies to prevent and control pollution of groundwater	The Common Agricultural Policy integrates environmental concerns into the policy via two mechanisms: Linking the respect of selected statutory requirements (Cross-compliance) to most CAP payments and sanctioning non-compliance by payment reductions. Paying for the provision of environmental public goods and services going beyond mandatory requirements (Agri-environment measures). The actual prevention and control of groundwater and surface water pollution has to come from the Nitrates Directive, Groundwater Directive and Water Framework Directive; the CAP just facilitates their implementation through the cross compliance regulation.	
Combined approach for point and diffuse sources.	See above. No specific distinction between point and diffuse sources in the CAP.	
……		

APPENDIX II - AVERAGE SCORES FOR VERTICAL COHERENCE PER REQUIREMENT PER DIRECTIVE

Average scores for coherence of WFD articles with FAIRWAY objective

Article	Score
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (Art.1)	2.6
MS shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (art. 4.1(a)(ii))	2.5
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (art. 4.1(a)(iii)).	2
Member states shall implement the necessary measures with the aim of progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (art. 4.1(a)(iv)).	2.3
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (art. 1).	2.3
To identify river basins in their area (art. 3.1); to ensure an analysis of each river basin's characteristics, to review the impact of human activity on the status of surface waters, and to conduct an economic analysis of water use according to the technical specifications set out in Annexes II and III (art. 5.1).	1.8
To ensure that a river basin management plan is produced for each river basin district lying entirely within their territory (art. 13.1).	1.8
To ensure the establishment for each river basin district, of a programme of measures, in order to achieve the objectives established under article 4 (art. 11.1).	1.9
To identify all bodies of water used for significant abstraction for human consumption (art. 7)	2

Average scores for coherence of GWD articles with FAIRWAY objective

Article	Score
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (art. 1).	2.6
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (art. 3.1).	2.5
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (Annex I).	2.8
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(art.6)	2.4
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (art. 1).	2.6

Average scores for coherence of DWD articles with FAIRWAY objectives

Article	Score
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (art. 1).	2.8
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (art.2, annex 1)	2.1
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (art. 4).	2.8
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).	2
Materials used in new infrastructure should not deteriorate in any way the quality of water for human consumption (art. 10).	0.4

Average scores for coherence of ND articles with FAIRWAY objective

Article	Score
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (art. 1)	2.9
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (Annex III)	2
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (Annex I)	2.7
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (art. 3.3)	2.5
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (art 4.1.b).	2.2
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (art. 5.1 to 5.4).	2.5

Average scores for coherence of PD articles with FAIRWAY objectives

Article	Score
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (art. 1).	2.6
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (art. 4.1).	2.5
MS have to establish regulations about use of application equipment (art. 8).	2.2
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (Art.13)	2.2
Establish harmonised risk indicators (art. 15).	1.9
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of	2.7

pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)	
Aerial spraying, except under strict regulations, shall be prohibited (art. 9).	2.2

APPENDIX III - COMPLETE HORIZONTAL COHERENCE SCORINGS PER DIRECTIVE

Boxes in green are identified by the project respondents as highly positive interactions. Boxes coloured in blue are highlighted as potential challenging interactions between legal requirements and objectives that require further investigation.

COHERENCE OF WFD WITH OTHER DIRECTIVES

Article	Directive	Score
Prevent deterioration		
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	2
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		2
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		2
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	2
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		2
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		3
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		3
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		1
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		2
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	3
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		3
Where threshold values from Annex II (50 mg/L for nitrates and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		3
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous		3

substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	1
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		1
MS have to establish regulations about use of application equipment (PD, art. 8).		1
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		1
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		2
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		1
Measures & artificial water bodies		
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	0
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		0
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		1
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	2
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		-3
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		-3
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		1
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		1
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		1
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).		0

Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).	GWD	2
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		2
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		0
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	1
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		1
MS have to establish regulations about use of application equipment (PD, art. 8).		1
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		1
Establish harmonised risk indicators (PD, art. 15).		1
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		2
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		1
Reduce pollution		
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	0
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		0
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		0
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	0
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		0
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		0
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		0

MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		0
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		0
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	0
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		0
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		1
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		1
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	1
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		1
MS have to establish regulations about use of application equipment (PD, art. 8).		0
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0
Establish framework		
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	2
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		2
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		2
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)		2

Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)	ND	2
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		2
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		2
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		1
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		2
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	3
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		2
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		1
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment (GWD, art.6)		2
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	1
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		2
MS have to establish regulations about use of application equipment (PD, art. 8).		2
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		1
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		1
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		1

COHERENCE OF GWD WITH OTHER DIRECTIVES

Article	Directive	Score
Criteria for assessment		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	1
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		2
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		1
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		1
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		2
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		1
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	1
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		1
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		1
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		1
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).		1
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		2
MS have to establish regulations about use of application equipment (PD, art. 8).		1

Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)	PD	1
Establish harmonised risk indicators (PD, art. 15).		1
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		1
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		1
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	2
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		1
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		1
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		1
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		1
Chemical threshold values		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	1
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		2
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		1
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		1
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		1
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		1
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	2
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		1
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		1
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		1

To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	2
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		2
MS have to establish regulations about use of application equipment (PD, art. 8).		1
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		1
Establish harmonised risk indicators (PD, art. 15).		1
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		1
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		1
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	2
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		1
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		1
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		2
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		2
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		2
Establish strict thresholds		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	0
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		1
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		0
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		0
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		0
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		0

To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	2
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		1
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		0
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	0
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		0
MS have to establish regulations about use of application equipment (PD, art. 8).		0
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	0
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		-1
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		-1
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		-1
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		0
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		0
Programme of measures		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)		-1
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		0

MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).	WFD	0
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		0
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		0
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		0
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	0
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		-1
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		0
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	0
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		2
MS have to establish regulations about use of application equipment (PD, art. 8).		?
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)		0
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		?
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		?

MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)	ND	?
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		?
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		?

COHERENCE OF DWD WITH OTHER DIRECTIVES

Article	Directive	Score
Contamination		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	2
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		2
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		2
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		2
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		2
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		2
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	**-1**
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		2
MS have to establish regulations about use of application equipment (PD, art. 8).		2
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		2
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		2
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		3
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)		1
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		1
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		2

MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)	ND	2
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		2
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		2
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	3
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		1
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD,Annex I).		2
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		2
Micro-organisms & parasites		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	**-1**
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		0
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		0
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		2
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		**-1**
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		**-1**
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	0
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		0
MS have to establish regulations about use of application equipment (PD, art. 8).		0
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0

To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	2
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		1
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		1
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		0
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		1
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		1
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD art. 1).	GWD	?
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		?
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD,Annex I).		?
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		?
Deterioration & pollution		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	3
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		2
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		2
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		3
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		3
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		3
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	3
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		3
MS have to establish regulations about use of application equipment (PD, art. 8).		3
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		3
Establish harmonised risk indicators (PD, art. 15).		3

Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		3
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		3
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	2
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		1
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		2
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		2
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		2
MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		2
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD art. 1).	GWD	2
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		2
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD,Annex I).		2
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		2
Remedial action		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	3
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		3
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		2
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		2
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		3
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		2
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).		1
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		1

MS have to establish regulations about use of application equipment (PD, art. 8).	PD	2
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		2
Establish harmonised risk indicators (PD, art. 15).		2
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		2
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		?
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND, art. 1)	ND	0
Amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		0
MS apply common criteria for water pollution. Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		0
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). Concertation in case of transnational vulnerable zones (ND, art. 3.3)		0
MS shall establish codes of good agricultural practice: MS shall submit details (art 4.1a and 4.2) and set up a programme for the promotion of codes of good agricultural practice (ND, art 4.1.b).		0

COHERENCE OF ND WITH OTHER DIRECTIVES

Article	Directive	Score
Reduce pollution		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	3
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		3
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		3
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		2
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		2
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		3
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	2
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		0
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		0
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		1
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	3
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		3
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		3
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		2
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).		0

MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).	PD	0
MS have to establish regulations about use of application equipment (PD, art. 8).		0
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0
Livestock manure limits		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	0
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		0
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		0
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		0
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		0
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		0
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	0
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		0
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		0
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).		0
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		0

Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).	GWD	0
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		0
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	0
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		0
MS have to establish regulations about use of application equipment (PD, art. 8).		0
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0
Groundwater limits		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	0
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		0
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		0
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		0
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		0
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		0
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).		0
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		0
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		0

If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).	DWD	2
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	2
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		2
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		2
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		0
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	0
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		0
MS have to establish regulations about use of application equipment (PD, art. 8).		0
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0
Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0
Vulnerable zones		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	0
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		0
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		0
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		0
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		1

To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		1
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	0
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		0
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		0
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		0
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	3
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		3
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		3
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		0
To establish a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticides and promoting the use of integrated pest management and of alternative approaches or techniques (PD, art. 1).	PD	0
MS shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use. They should encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides (PD, art. 4.1).		0
MS have to establish regulations about use of application equipment (PD, art. 8).		0
Storage, mixing spots and packaging of pesticides should be constructed in such a way to prevent spillage (PD, Art.13)		0
Establish harmonised risk indicators (PD, art. 15).		0

Specific measures to protect the aquatic environment and drinking water from the impact of pesticides shall be established (art. 11.1). Use of pesticides that are not classified as dangerous for the aquatic environment should be given precedence, ways of application where drift is minimised should be used and use of pesticides near water bodies should be limited (Art. 11.2 PD)		0
Aerial spraying, except under strict regulations, shall be prohibited (PD, art. 9).		0

COHERENCE OF PD WITH OTHER DIRECTIVES

Article	Directive	Score
Establish a framework		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	2
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		2
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		2
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		3
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		2
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		3
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	3
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		3
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		3
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		3
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).		2
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		2

Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).	GWD	3
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		3
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND. art. 1)	ND	0
The amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (Annex III)		0
Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		0
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		1
National Action Plan		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	1
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		1
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		1
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		3
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		3
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		1
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	1
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		2
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		1
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		1
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).		1
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		1

Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).	GWD	3
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		3
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND. art. 1)	ND	0
The amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (Annex III)		0
Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		0
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		1
Measures		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	3
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		3
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		3
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		3
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		3
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		3
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	3
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		3
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		3
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		3
To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).		1
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with,		1

associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).	GWD	
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		3
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		3
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND. art. 1)	ND	0
Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		0
The amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (Annex III)		0
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		3
Regulations		
Protection of surface waters, transitional waters, coastal waters and groundwater to prevent their further deterioration and enhance their status, and to promote sustainable water use (WFD, Art.1)	WFD	2
To prevent deterioration of the status of all bodies of surface water (art. 4.1(a)(i)); and protect, enhance and restore all bodies of surface water to achieve good water status (WFD, art. 4.1(a)(ii))		2
MS shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status (WFD, art. 4.1(a)(iii)).		2
To progressively reduce pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances (WFD, art. 4.1(a)(iv)).		0
Establish a framework for achieving or maintaining good status of inland surface waters, coastal waters, transitional waters and groundwater (WFD, art. 1).		2
To identify river basins in their area (Art. 3.1), identify all bodies of water used for significant abstraction for human consumption (art.7), produce river basin management plans for each river basin (art. 13.1), and to establish a programme of measures (WFD 11.1)		2
To protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (DWD, art. 1).	DWD	2
To ensure that water used for human consumption should be free from any micro-organisms and parasites and from any substances which, in numbers or concentrations, constitute a potential danger to human health (DWD, art. 2, annex 1)		2
To ensure that measures taken do not cause any deterioration or increasing pollution of waters used for drinking water (DWD, art. 4).		1
If, despite the measures taken, water does not comply with the standards, and is used in public premises and establishments, further remedial action should be taken to restore its quality as soon as possible (or in accordance with the extent to which the relevant parametric value has been exceeded) (DWD, art. 8).		2

To prevent and control groundwater pollution by forming criteria for (1) assessment of good groundwater chemical status and for (2) identification and reversal of significant and sustained upward trends and for the definition of starting points for trend reversals (GWD, art. 1).	GWD	3
Threshold values applicable to good chemical status shall be based on the protection of the body of groundwater, having particular regard to its impact on, and interrelationship with, associated surface waters and directly dependent terrestrial ecosystems and wetlands (GWD, art. 3.1).		2
Where threshold values from Annex II (50 mg/L for nitrate and 0,1 µg/L for pesticides) are not sufficient to prevent damage to environment or safety of humans… more strict values shall be established (GWD, Annex I).		1
MSs shall ensure that the programme of measures established in accordance with Article 11 of the WFD includes all measures to prevent inputs into groundwater of any hazardous substances and also non-hazardous pollutants when considered by MS to be dangerous for environment.(GWD, art.6)		2
To reduce pollution of ground-, surface and estuarial water by nitrates from agricultural sources, and prevent further such pollution (ND. art. 1)	ND	1
Groundwaters should not contain more than 50 mg/l nitrates, and surface waters should not be eutrophic. (ND, Annex I)		2
The amount of livestock manures applied on land shall not exceed 170 kg/ha each year. (ND, Annex III)		2
MS shall identify vulnerable zones which drain into waters which are or could be affected by pollution within a 2-year period (art. 3.2). MS shall establish action programmes in respect of the designated vulnerable zones or part of it (ND, art. 5.1 to 5.4).		1

APPENDIX IV - HIGHLIGHTS OF POSITIVE AND POTENTIAL NEGATIVE INTERACTIONS BETWEEN LEGAL REQUIREMENTS

	Articles	WFD	DWD	GWD	ND	PD
WFD	*Prevent deterioration*			Article 1, 6, Annex 1	Annex 1, Article 3.2, 3.3	
	Measures & artificial water bodies				Annex I, III	
	Reduce pollution					
	Establish framework			Article 1		
DWD	*Contamination*			Article 1		Article 1
	Mirco-org & parasites	Article 1, 3.1, 7, 11.1, 13.1				
	Deterioration & pollution	Article 1, 4.1(a)(iv), 3.1, 7, 11.1, 13.1				Article 1, 4.1, 8, 9, 11.1, 11.2, 13, 15
	Remedial action	Article 1, 4.1(a)(i), 4.1(a)(ii)				
GWD	*Criteria for assessment*					
	Chemical threshold value					
	Establish strict thresholds				Annex I, Annex III, Article 3.3	
	Programme of measures	Article 1	Article 2, Annex 1			
ND	*Reduce pollution*	Article 1, Article 4.1(a)(i)(ii), 3.1, 7, 11.1, 13.1		Article 1, 3.1, Annex 1		
	Livestock manure limits					

	Groundwater limits					
	Vulnerable zones			Article 1, 3.1, Annex 1		
PD	*Establish a framework*	Article 4.1(a)(iv), 3.1, 7, 11.1, 13.1	Article 1, 2, 4, 8, Annex 1	Article 6, Annex 1		
	National Action Plan	Article 1, 4.1(a)(iv)		Article 6, Annex 1		
	Measures	Article 1, 4.1(a)(i)(ii)(iii)(iv), 3.1, 7, 11.1, 13.1	Article 1, 2, 4, 8, Annex 1	Article 6, Annex 1	Article 5.1-5.4	
	Regulations			Article 1		