from source to NAPSEA

DELIVERABLE 2.3

RECOMMENDATION ON IMPROVING COHERENCE FOR CURRENT NUTRIENT REDUCTION STRATEGIES AS APPLIED TO THE WADDEN SEA

Work Package 2
Governance and Policies

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Abstract	The document highlights the need for effective nutrient management in the Wadden Sea, focusing on reducing eutrophication through improved policy coherence and coordination. It emphasizes supporting authorities, aligning nutrient reduction measures, and enhancing monitoring and funding. A holistic approach is recommended to address the interconnection of terrestrial, freshwater, and marine ecosystems.
Keywords	Nutrient reduction strategies, policy instruments, policy recommendations, coherence

Contents

Acronyms

Acronym	Definition
BD	Birds Directive (2009/147/EC)
BLANO	Federal/State Working Group on the North Sea and Baltic Sea
BMLEH	German Federal Ministry of Agriculture, Food and Regional Identity
CAP	Common Agricultural Policy
CIS	Common Implementation Strategy
CSP	CAP Strategic Plan
DAW	Task Force Agricultural Water Management
DG	Directorates-General
DWA	German Association for Water, Wastewater and Waste
EC	European Commission
EU	European Union
F2F	Farm to Fork
GES	Good Environmental Status
GWD	Groundwater Directive (2006/118/EC)
HD	Habitats Directive (92/43/EEC)
HELCOM	Baltic Marine Environment Protection Commission
I&W	Infrastructure and Water Management
ICPER	International Commission for the Protection of the Elbe River
ICPR	International Commission for the Protection of the Rhine
ISC	Interservice Consultation
LAWA	German Working Group on water issue
LVVN	Ministry of Agriculture, Fisheries, Food Security and Nature
MS	Member State
MSFD	Marine Strategy Framework Directive (2008/56/EC)
N	Nitrogen
NAPSEA	Nitrogen and Phosphorus load reduction measures from Source to sEA, considering the effects of climate change
ND	Nitrates Directive (91/676/EEC)
NECD	National Emission Reduction Commitments Directive (2016/2284/EU)
NGO	Non-Governmental Organisation
NH_3	Ammonia
NO_x	Nitrogen oxides

NPLG	National Programme for Rural Areas
NWP	National Water Program
OGewV	Surface Water Protection Ordinance
OSPAR	Oslo-Paris Agreement
P	Phosphorus
p.e.	Persons equivalent
QSRs	Quality Status Reports
RBD	River Basin District
RBMP	River Basin Management Plan
RBO	Regional Administrative Consultation (regionaal bestuurlijk overleg).
RLN	Rijkswaterstaat
RSC	Regional Sea Convention
TN	Total Nitrogen
TP	Total Phosphorus
TWSC	Trilateral Wadden Sea Cooperation
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UWWTD	Urban Waste Water Treatment Directives (91/271/EEC) and (EU 2024/3019)
WFD	Water Framework Directive (2000/60/EC)
WHG	Water Resources Management Act

Executive summary

This document is part of the NAPSEA project, which aims to enhance the effectiveness of nitrogen and phosphorus load reduction measures from source to sea while also considering climate change impacts. The focus is on the Wadden Sea, a UNESCO World Heritage Site, and its catchment, specifically the case studies Rhine, Elbe, and Hunze. The Wadden Sea faces significant nutrient pollution primarily from riverine and atmospheric inputs stemming mainly from agriculture and wastewater discharges and leading to eutrophication.

Key objectives:

- Policy coherence: improve coherence between existing nutrient reduction strategies at EU, intergovernmental, national, and subnational levels.

Main findings:

- Policy instruments: various policy instruments at different governance levels address nutrient reduction, including EU directives (WFD, MSFD, ND), intergovernmental agreements (OSPAR, Trilateral Wadden Sea cooperation (TWSC)), and national policies in Germany and the Netherlands.
- Governance and coordination: effective nutrient management requires improved vertical and horizontal coordination among institutions. The document highlights the need for the better integration of freshwater and marine water policies and enhanced transboundary cooperation.

Recommendations:

- Strengthen Source-to-Sea approach: ensure better alignment of nutrient reduction measures from inland to marine waters.
- Enhance coordination: improve coordination between regional sea conventions and river basin authorities.
- Set clear targets: establish and harmonize nutrient reduction targets across different governance levels.
- Increase funding: ensure adequate financial resources for implementing nutrient reduction measures.
- Improve monitoring and reporting: develop integrated monitoring systems to track the effectiveness of nutrient reduction strategies.

The document emphasizes the importance of a holistic approach to nutrient management, considering the interconnection of terrestrial, freshwater, and marine ecosystems.

1. Introduction and background

1.1. The NAPSEA project

This project addresses the effectiveness of 'Nitrogen and Phosphorus load reduction measures from Source to sEA, considering the effects of climate change' (NAPSEA). The primary objectives of NAPSEA are to support national and local authorities in the selection of effective measures to reduce nutrient loads and to create political support for their execution. The project employs an integrated approach spanning from pollution sources to sea, considering governance, nutrient pathways and measures, as well as ecosystem health. Geographically, the project focuses on the Wadden Sea catchment, with specific case studies for the Rhine, Elbe, Hunze, and the Wadden Sea itself. NAPSEA serves as a platform to show practices in the implementation of socially acceptable, sustainable, and efficient measures.

Efforts to combat eutrophication have significantly advanced in Europe, but certain challenges remain, such as disjointed policies, adverse effects of high nutrient inputs, and limited public acceptance of measures. Work package 2 aims to analyse the policy and socio-economic aspects of nutrient management. This includes analysing barriers and highlighting good practices for implementing sustainable and effective strategies to reduce marine pollution – encompassing administrative, legal, financial, technical, and social dimensions.

1.2. Eutrophication of the Wadden Sea

The recently published report "State of Europe's Water" is an integrated water assessment of water, biodiversity and pollution and names reasons why Europe does not have enough water bodies in good quality[1]. Today, all over Europe, 18 % of surface waters fail good ecological status for nutrients stemming mainly from agriculture (including animal manure) and urban wastewater. The report concludes that agricultural activities are the main pressures that led to over 70 % of surface water bodies in Europe not achieving the good ecological status. Nonetheless, solutions such as enhanced wastewater treatment and the restoration of natural floodplains have helped to reduce nutrient pollution and to offer additional ecological benefits, including improved water purification and flood risk reduction[2]. The latest implementation report states that for the North – East Atlantic Basin pollution from a wide range of hazardous substances, excessive nutrients (leading to eutrophication) and marine litter have not been fully addressed, even if there has been a significant reduction in the nutrients reaching the marine environment, particularly from agricultural sources, wastewater and industrial and atmospheric sources. Consequently, pollution persists in river plumes and in coastal areas[3].

The Wadden Sea Quality Status Report[4] states that climate change has resulted in a further increase in temperatures (including heatwaves in 2018, 2019 and 2022) and in sea level, as well as in changes in patterns of precipitation (cloudbursts and droughts) and wind (summer storms). The business-as-usual scenario under a moderate climate change (NAPSEA scenario 6) projects variable changes of phosphorous (P) and nitrogen (N) loads and concentrations for rivers Rhine and Elbe[5].

The Wadden Sea, a UNESCO World Heritage Site, is a unique and ecologically valuable coastal area spanning the coasts of Denmark, Germany, and the Netherlands. This intertidal zone, characterized by extensive mudflats, salt marshes, and diverse wildlife, including migratory birds and marine species, is an essential habitat for numerous species. However, it faces significant environmental threats, primarily from nutrient pollution, which has far-reaching consequences for its ecological integrity and biodiversity such as seagrass.

Nutrient pollution primarily originates from agricultural runoff, wastewater discharges, and atmospheric deposition. The compilation of the contribution of the main emission sources in both the Netherlands and Germany to the N and P loads of the largest rivers (Rhine and Elbe)[6] reveals that agriculture is the main source for both N and P (Figure 1). Urban wastewater is another important source, particularly for P. The relative contribution of atmospheric deposition on freshwater depends on the surface water area. It is therefore higher in the Netherlands than in Germany. On marine waters, the influence of atmospheric deposition may be relatively large, especially when the impact of river plumes is reduced.

[1] European Environment Agency, 2024a
[2] European Environment Agency, 2024a, pp. 9-43.
[3] European Commission, 2025a.
[4] Philippart et al., 2024.
[5] Musolff and Ledesma, 2024.
[6] Gericke & Leujak, 2023.

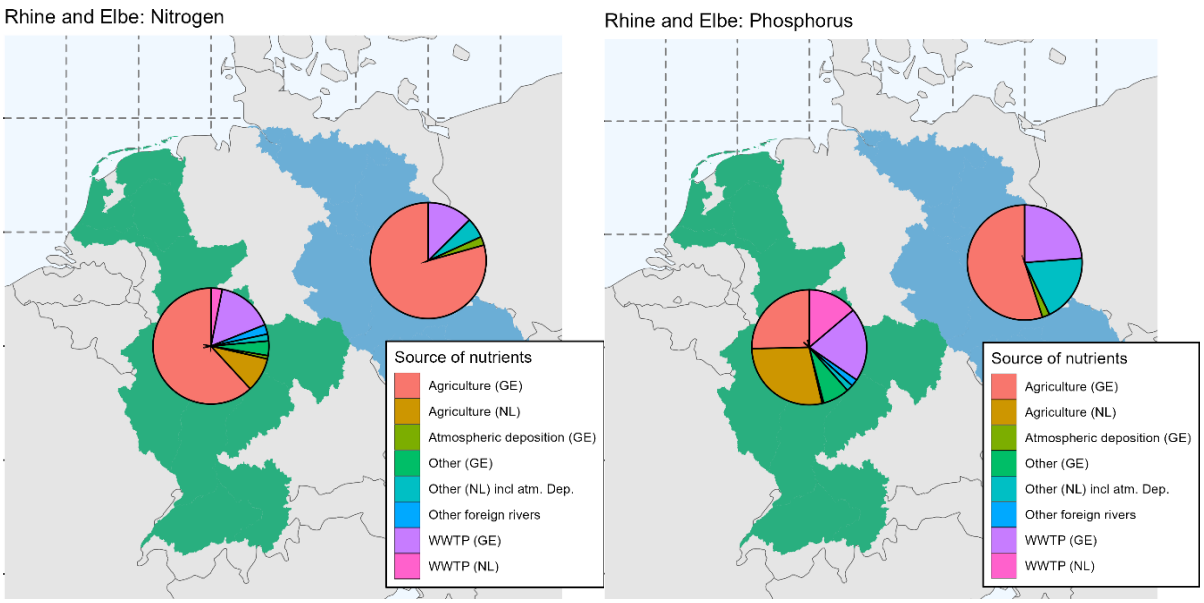

Figure 1: Contribution (%) of sources of total nitrogen and phosphorus loads in Germany and the Netherlands for the Rhine and Elbe rivers (source Gericke & Leujak, 2023).

N and P inputs from major rivers into the Wadden Sea peaked in the 1980s followed by a yearly decrease since the 1990s. During the 2010s, this decrease was less pronounced and even turned into a (albeit statistically not significant) increase in total P (TP) concentrations in the Elbe. While the Rhine already achieved the current German N target yearly average concentration of 2.8 mg N/l, which closely corresponds to the Dutch summer average concentration of 2.5 mg/l, the concentration (normalised load) of the Elbe needs to be further reduced by 20 % (25 %) for TN and 35 % (37 %) for TP[7]. In line with the nutrients, phytoplankton biomass has substantially decreased since the 1980s[8].

These excess nutrients led to eutrophication, a process that causes algae blooms, depletes oxygen levels, and creates hypoxic conditions detrimental to aquatic life. Eutrophication disrupts the food web, affecting species dependent on the Wadden Sea for breeding and feeding, such as fish and migratory birds. It also degrades water quality, impacting biodiversity and the ecosystem services provided by the Wadden Sea, including fisheries and tourism. Moreover, nutrient pollution contributes to the loss of habitats, such as seagrass beds, and exacerbates the effects of climate change on coastal ecosystems[9].

The main drivers for plankton growth in the coastal waters off the Wadden Sea are the nutrient inputs of the large rivers (Rhine, Maas, Weser, Elbe, Ems, IJsselmeer) and atmospheric deposition[10]. In addition, nutrients are imported to the Wadden Sea from the open North Sea (mainly organic material) and from other coastal areas by transboundary nutrient transport[11]. The contribution from different rivers to nutrient concentrations in the Wadden Sea shows that the Rhine and Elbe rivers are the main sources of nutrients[12].

2. Objectives

This report focuses on the policy instruments targeting nutrient reduction at the EU, intergovernmental, national and subnational levels and their implementation, including the assessment of legal aspects, the analysis of the governance structures and resource availability. It presents the analysis of policy instruments which are also partly discussed in the NAPSEA report D2.2[13] and provides recommendations how to improve coherence of current nutrient reduction strategies as applied to the Wadden Sea.

[7] Gericke & Leujak, 2023.
[8] Van Beusekom et al., 2019.
[9] Van Katwijk et al., 2024.
[10] van Beusekom, J. E. E., 2001
[11] OSPAR, 2023.
[12] Musolff, 2025.
[13] Gericke & Leujak, 2023.

The urgency to reduce nutrient inputs into the Wadden Sea is underlined by the need to preserve its ecological functions and the services it provides. The Wadden Sea is not only a critical habitat for wildlife but also a natural buffer against coastal erosion and flooding. Effective nutrient management is vital to maintaining the health and resilience of this ecosystem, ensuring its continued role in supporting biodiversity, protecting coastal areas, and providing economic and recreational benefits. Therefore, this study does not only look at the governance framework that rules nutrient inputs coming from inland water but also considers the air pollution-related policy and policies related to nature conservation.

3. Overview of policy instruments addressing nutrient reduction

A variety of policy instruments at different governance levels address nutrient reduction, each varying in their binding nature and specific provisions. While several policies contribute to nutrient reduction, none focuses explicitly on protecting the Wadden Sea from nutrient inputs, except the Wadden Sea Strategy. In addition, we also give an overview of all policy instruments which indirectly affect the Wadden Sea. These policy instruments are equally important, because they jointly provide a framework on how many nutrients end up in the Wadden Sea.

3.1. European Union Legislation

EU environmental legislation is highly relevant for the Wadden Sea, with directives such as the Water Framework Directive (WFD)[14] the Groundwater Directive (GWD)[15], the Marine Strategy Framework Directive (MSFD)[16] and the Birds (BD) and Habitats Directives (HD)[17], being particularly important. In the following, a general overview on relevant regulations is provided (cf. Figure 2). Further information can also be found in the NAPSEA report D2.2[18].

The WFD aims to achieve the good status for all water bodies by 2027, addressing nutrient pollution through the regulation of ecological status. The Directive mandates that nutrient conditions support the biological elements for which the status will be determined, making it a key instrument in nutrient management. The MSFD also contributes to nutrient reduction by aiming to achieve the good environmental status (GES) for marine waters, which includes MSFD Descriptor 5 “eutrophication” as one of the descriptors of the Directive. Descriptor 5 addresses eutrophication expressly, while the WFD on biological quality components and on chemistry. Coherent implementation of the MSFD across EU Member States (MS) is supported by the Regional Sea Conventions (RSC), OSPAR being one of them.

The WFD and MSFD apply holistic approaches to target the ecological impact of nutrient inputs (cf. report D2.2). They are complemented by source-oriented regulations. The Nitrates Directive[19] (ND) targets agricultural sources of nutrient pollution, requiring MS to establish action programs to reduce nitrate leaching into waters and reduce eutrophication in surface waters. The Urban Waste Water Treatment Directives (UWWTD)[20] regulate the discharge of nutrients from wastewater treatment plants to prevent water pollution. The National Emission Reduction Commitments Directive (NECD) (2016/2284/EU)[21] mandates limits on air pollutants, including those contributing to eutrophication, such as ammonia (NH_3) and nitrogen oxides (NO_x). This directive sets emission reduction targets for MS, aiming to reduce air pollution and its impacts on ecosystems, including the Wadden Sea.

Agriculture, especially the use of fertilisers, is a major source of nutrients. The CAP is the key tool in supporting the sustainable use of fertilisers in agriculture, ensuring that farmers can maintain productivity while also reducing harmful effects on the environment. The CAP governance system[22] sets out the rules for the financing of CAP expenditure and the relevant management and control systems. The most recent Common Agricultural Policy (CAP) 2023-27 entered into force on 1 January 2023. Support for farmers and rural stakeholders across the 27 EU countries is based on the CAP 2023-27 legal framework and the choices detailed in the CAP Strategic Plans (CSP), approved by the European Commission (EC).

The Farm to Fork (F2F) strategy is central to the EU Green Deal and outlines a comprehensive ten-year plan. Alongside the biodiversity strategy, it forms a package of 27 measures aimed at recognizing the connections between healthy individuals, societies, and the planet. F2F seeks to mitigate the climate crisis, reverse species

[14] European Union, 2000.
[15] European Union, 2006a.
[16] European Union, 2008.
[17] European Union, 1992.
[18] Gericke & Leujak, 2023.
[19] European Union, 1991a.
[20] European Union, 2024a.
[21] European Union, 2016.
[22] European Commission, 2021a.

extinction, and secure food supplies. For these measures to take effect, they must be enacted into legislation by responsible EU bodies and MS to contribute to the achievement of EU-wide goals[23].

One additional, important policy instrument is the Zero Pollution Action Plan[24], which aims to better prevent, remedy, monitor and report on pollution in air, water and soil. It is relevant as a policy instrument for this report, because it sets some specific targets and includes action recommendations for enhanced water quality across Europe by 2030. However, it does so mainly by listing existing legal obligations and ongoing reviews of EU laws. For example, it re-iterates the goal of the EU Green Deal, that by 2030 the EU should reduce by 50 % (as compared to 1990): nutrient losses[25], the use and risk of chemical pesticides, the use of the more hazardous pesticides, and the sale of antimicrobials for farmed animals and in aquaculture. It also echoes the goals of the Sewage Sludge and the UWWTD. The Zero Pollution Action Plan is also connected to the Integrated Nutrient Management Action Plan.

The proposed Soil Health Law[26] of the EU aims to establish sustainable soil management in the EU. MS will have to define which practices should be implemented by soil managers and which should be banned because they cause soil degradation. The proposed Directive lists 7 soil descriptors with criteria for healthy soils, 4 of which to be established at Union level. Some descriptors are linked to the nutrient input to surface waters, either directly (soil erosion, soil Organic Carbon) or indirectly (by changing water flow, soil chemistry).

To safeguard the natural diversity of Europe the EU has made the protection of nature a matter of common concern and has enacted the BD and the HD for this purpose. Based on these two Directives several legal provisions on the protection of species and habitats have to be implemented in all MS. This can also include nutrient reduction/restriction actions. ANNEX VII provides a list of examples of restoration measures referred to in Article 14(16) that can also reduce nutrient loads to water bodies. The law is not further assessed in this report in detail as the MS currently are at the beginning of the implementation and the national restoration plans referred to in Articles 14 and 15 need only be reported to the EC by 1 September 2026.

The Nature Restoration Law is a key element of the EU Biodiversity Strategy, which sets binding targets to restore degraded ecosystems, in particular those with the most potential to capture and store carbon and to prevent and reduce the impact of natural disasters. The establishment of riparian areas / riparian buffers and floodplains under the Directive can increase instream nutrient retention.

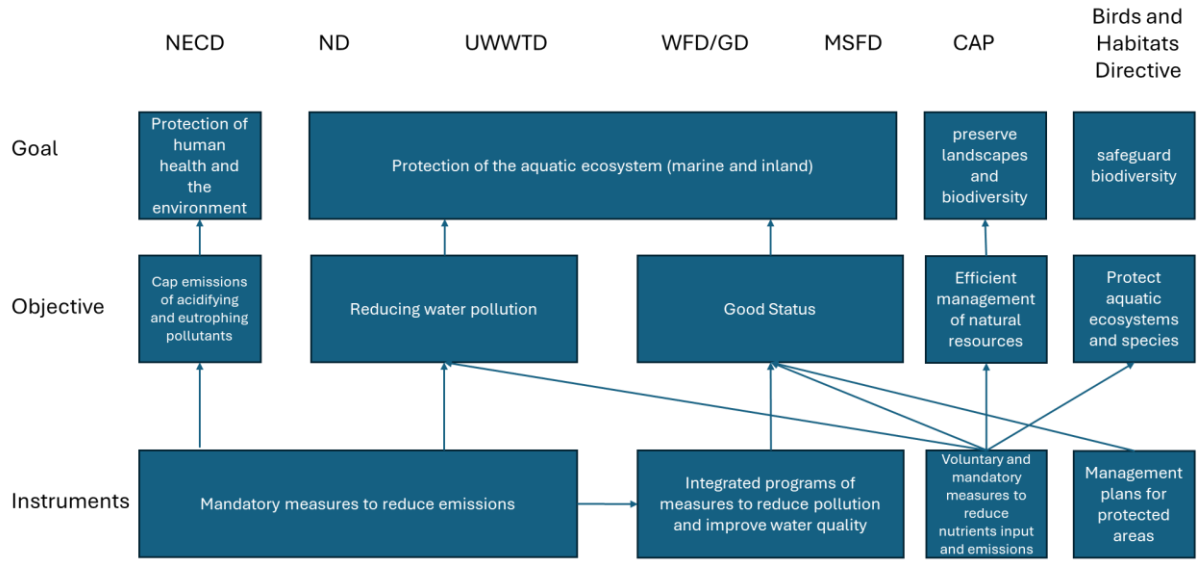

Figure 2: Goals, objectives of the different EU Directives in force related to the control of nutrient loads from manure and fertiliser which are evaluated in this study. Based on Grinsven, Aaldrik & Carin, 2016[27]. Please note that strategies and proposed Laws are not considered in the figure as they have no legal binding character.

[23] Ehlert, 2021.
[24] European Commission, 2021f.
[25] No reference period is given.
[26] European Commission, 2023d.
[27] Grinsven et al., 2016.

3.2. Intergovernmental Agreements

The Convention for the Protection of the Marine Environment of the North-East Atlantic[28], or OSPAR Convention, is the current legislative instrument regulating the international cooperation on environmental protection in the North-East Atlantic. Work carried out under the convention is managed by the OSPAR Commission, which is made up of representatives of the governments of the 15 signatory countries[29], and representatives of the EC, representing the European Union[30].

The OSPAR Eutrophication Strategy[31] aims to combat eutrophication in the OSPAR maritime area to achieve and/or maintain a healthy marine environment where anthropogenic eutrophication does not occur. OSPAR's Eutrophication Monitoring Programme[32] and Riverine Inputs and Direct Discharges (RID)-database support nutrient reduction through long-term data collection and modelling activities, helping to direct future actions in combating eutrophication.

One of the working areas is eutrophication where the OSPAR Eutrophication Strategy has been developed and its implementation is supported by periodical assessments of the status of eutrophication and the progress being made towards the Strategy's objective[33]. The Common Procedure assists Contracting Parties to follow a common, agreed and shared approach when assessing the eutrophication status of marine waters[34].

OSPAR's assessment work is supported by monitoring under the Eutrophication Monitoring Programme. This includes long-term data collection under the OSPAR monitoring programmes for[35]:

- atmospheric inputs (Comprehensive Atmospheric Monitoring Programme)
- riverine inputs and direct discharges (Comprehensive Study on Riverine Inputs and Directive Discharges)
- concentrations and effects in the marine environment (Coordinated Environmental Monitoring programme)

The TWSC[36] plays a crucial role in managing and protecting the Wadden Sea. This cooperation involves Germany, Denmark, and the Netherlands and has led to the protection of the entire Wadden Sea coast through national parks and nature reserves. The Trilateral Wadden Sea Plan[37], adopted in 1997 and updated in 2010, serves as the common policy and management plan for the area, outlining a framework for sustainable management and protection.

Despite these efforts of reducing nutrient pollution, the need for a more targeted approach to nutrient reduction in the Wadden Sea remains. The Wadden Sea Plan (2010)[38] is unique in its specific focus on this issue, highlighting the importance of coordinated and comprehensive policies to protect this valuable ecosystem from nutrient pollution.

For international rivers such as the Rhine and Elbe, International Commissions have been established. The International Commission for the Protection of the Elbe River (ICPER) is based on the Convention on the ICPER[39] and prepares recommendations for the contracting parties (Germany, Czech Republic) to (a) enable use to be made of the river, in particular the obtaining of supplies of drinking water from bank-filtered waters and the agricultural use of the waters and sediments; (b) achieve as natural an ecosystem as possible with a healthy diversity of species; and (c) reduce substantially the pollution of the North Sea from the Elbe basin.

For the Rhine the International Commission for the Protection of the Rhine (ICPR) Switzerland, France, Germany, Luxemburg, the Netherlands and the EC successfully co-operate with Austria, Liechtenstein and the Wallonian region of Belgium as well as Italy in order to harmonize the many interests of use and protection in the Rhine basin.

[28] OSPAR Commission, 2025a.
[29] The fifteen Governments are Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.
[30] OSPAR Commission, 2025b.
[31] OSPAR Commission, 2010.
[32] OSPAR Commission, 2021.
[33] OSPAR Commission, 2024.
[34] OSPAR Commission, 2025f.
[35] OSPAR Commission, 2024.
[36] Common Wadden Sea Secretariat, 2024a.
[37] Common Wadden Sea Secretariat, 2010.
[38] Common Wadden Sea Secretariat, 2010.
[39] European Union, 1991b.

3.3. National and Subnational Policies

In addition to the EU and international policies, which are implemented on MS level, Germany and the Netherlands have set national policies. So, countries have the flexibility to implement EU policies in their national context and adopt new practices to meet evolving environmental standards.

The German Surface Water Protection Ordinance (OGewV)[40] forms the basis for the assessment and management of surface waters, with nutrients such as nitrogen and phosphorus playing a central role, as excessive concentrations lead to eutrophication. While the ordinance does not directly specify environmental quality standards for all nutrients, it defines water-type-dependent guideline values for total phosphorus for good ecological status, supplemented by national measures such as the Fertilizer Ordinance to reduce nutrient inputs and improve water quality. The German Federal Government's Sustainability Strategy[41] establishes a target average N surplus of the total balance of 70 kg N per ha agricultural land and year from 2026 to 2030[42]. However currently Germany has in the repealed the Material Balance Ordinance [43], which ends the obligation for farmers to prepare material flow balances, but at the same time aims to reduce nitrogen surpluses through a planned national nitrogen strategy[44].

The Germany's Federal Nature Conservation Act[45] and the establishment of national parks along the Wadden Sea coast aim to protect the area and its natural processes. The coastal federal states of Hamburg, Lower Saxony, and Schleswig-Holstein implement these measures through respective National Park Acts.

In the Netherlands, marine protection is guided by the Key Planning Decision Wadden Sea and the Nature Conservation Act 1998, supported by additional designations such as the Flora and Fauna Act. These national frameworks provide a basis for the protection and management of the Wadden Sea, ensuring that conservation objectives are met at regional and local levels.

On the regional level in the Netherlands, the National Programme for Rural Areas (NPLG) addressed challenges in rural areas, including reducing N emissions. This programme, with environmental goals regarding N, climate and water quality describes targets for each Dutch Province, focused on agriculture and nature. The 12 provinces in their turn had to make integral plans to achieve the goals. Initially, a budget of almost 25 billion euros was raised to finance the implementation of measures, but the recently installed new government has transformed it to a less ambitious program and significantly reduced this budget. The first two packages of the NPLG have started, for which a budget has already been allocated. In addition to the reduction needs according to the NECD, the Dutch Ministry of Agriculture, Nature and Food Quality intends to induce actions of the 3000 top peak emitters to reduce N deposition on Natura 2000 areas[46].

4. Methodology

The methodology applied here was developed in the NAPSEA report D2.1[47]. The first stage focused on data collection, aiming to gather detailed information on each selected policy instrument and its functioning across various governance categories. A structured template was completed using official documents and supporting literature. To fill remaining gaps and ensure practical insights, interviews were conducted with NAPSEA team members as well as external experts, thereby complementing the document review with experiential knowledge. The second stage was dedicated to data analysis, examining the coherence of nutrient reduction strategies both vertically and horizontally. Special attention was given to transboundary coordination and the interlinkages between freshwater and marine water issues. Finally, the third stage aimed to transform assessment results into concrete recommendations.

However, during the application some adjustments to the original methodology have been made. In so the initial approach with having a template for each policy instrument to fill in as a bass (stage 2) was not fully implemented. The reason for this was that some policy instruments have been too complex to fit into the template as they are

[40] German Federal Ministry of Justice and Consumer Protection, 2016.
[41] German Federal Government, 2025.
[42] Umweltbundesamt (2024) is tracking the agricultural nitrogen surplus development in Germany, see Indicator: Agricultural nitrogen surplus
[43] German Federal Ministry of Justice and Consumer Protection, 2025.
[44] German Federal Ministry for the Environment, Climate Action. Nature Conservation and Nuclear Safety (BMUKN), 2024c.
[45] German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN), 2009.
[46] van der Maas et al.,2023.
[47] Geidel et al., 2023.

designed to work in interplay with others. This interplay could not be captured with the template. Further, it was reported that during the assessment the initial set of questions has been further refined and further developed in order to be more precise and to reflect comments from NAPSEA policy experts (in particular from UBA and Rijkswaterstaat). The revised approach can be found below.

4.1. STAGE I: Data collection

Overall Goal of this stage: The goal is to collect data about each selected policy instrument regarding the way it works by answering questions about the governance categories.

Step 1: Selection of policy instruments: The policy instruments have been selected based on their relevance to nutrient reduction. The list of assessed instruments is provided in chapter 3.

Step 2: Policy Instrument review: For the data collection, a template for each policy instrument was filled in by an assessor based on the policy instrument document, and other relevant documents. The template was developed in report D2.1 and is structured along 5 governance categories (legality, governance, resources, implementation, monitoring and reporting)[48] following a set of questions as provided below.

Step 3: Interviews and own experience: In order to close gaps in the assessment, but also to bring in the own long-standing working experience interviews with NAPSEA team members and external experts have been conducted[49].

4.2. STAGE II: Data analysis

Overall goal of this stage: The objective of Stage II is to understand and evaluate how well the different nutrient reduction strategies are coherent and support one another. Based on the information from Stage I, the policy instruments are analysed vertically and horizontally.

Vertical and horizontal analysis: While national, sub-national governments face different challenges and opportunities in reducing nutrient inputs, their policies and actions must be coherent and aligned with the same overall objectives. Therefore, the analysis aims to assess whether this coherence is achieved both vertically (across different levels of governance) and horizontally (across the instruments, Figure 3).

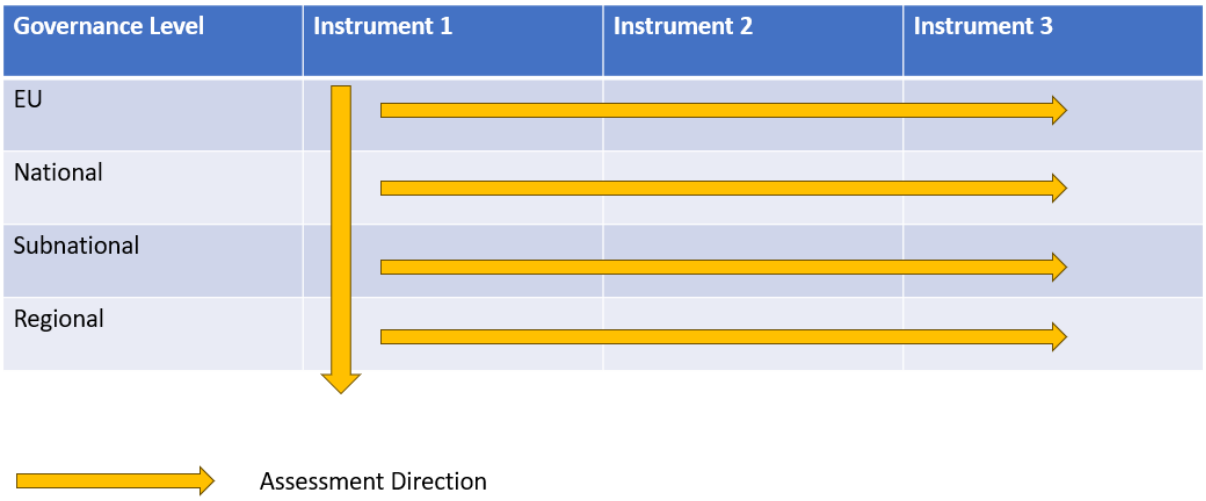

Figure 3: Vertical and horizontal policy assessment (own illustration) Source own.

The policy instruments are analysed along the following set of questions which are based on the methodology set out in NAPSEA report D2.1[50]:

Legal issues (see chapter 5.1.)

1. Are there clearly quantified nutrient reduction targets and if so, do they have legally binding thresholds?

[48] However, during the completion of the template, it was recognised that answering the questions set out in chapter 5 and drafting the text was the more appropriate approach. In other words, the templates have been skipped at one point.
[49] The following persons have been interviewed: Felix Klickermann, Umweltforschungszentrum Leipzig (13.03.2025), Marcel van den Bergm RWS (22.10.2024), Peter Ramakers, RWS (17.09.2024), Franz Emde, BMUV (16.09.2024), Daniel Menges, SVK Sachverständigen-Kuratorium e.V. (29.1.2025)
[50] Geidel et al., 2023.

Governance (see chapter 5.2.)

2. Are there vertical or horizontal coordination instruments in place with other institutions to improve regulatory processes towards nutrient reduction and how do they function?
3. Are roles and responsibilities regularly reviewed across policy levels to adapt to changing circumstances and if yes, how?
4. Are there transboundary coordination mechanisms in place at all levels (where relevant)?
5. How is the interlinkage of freshwater and marine water issues established?

Implementation (see chapter 5.3.)

6. Are there sufficient financial resources for the implementation of all policies at all levels?
7. Do agencies and municipalities (Germany) and provinces (Netherlands) have the capacity and skills to implement nutrient reduction measures?
8. Is there guidance for implementation?

Monitoring and reporting (see chapter 5.4.)

9. Is there a monitoring and reporting process in place that informs and reports along the implementation chain? Is this reporting process- and/or impact-based?

4.3. STAGE III: Development of Recommendations

Overall goal of this stage: The goal of Stage III is to turn the assessment results into recommendations to improve the overall policy framework and its enabling environment.

Step 1: Investigating the enabling environment further: To validate the analysis results under stage II, scientific and grey literature was analysed.

Step 2: Interpretation and forming recommendations: Based on the results from the previous steps, recommendations for improving coherence between the strategies are derived This was done by expert judgement of the NAPSEA consortium but also in two workshops (see reports on D2.4/2.5[51] and D2.6[52]) where the findings and the recommendations have been presented and discussed.

5. Assessment of the policy framework

Chapter 5 assesses the policy framework based on the questions and the information gathered as outlined in Stage II above.

5.1. Legal issues

This section summarizes whether quantitative nutrient targets are set in the policy instruments listed in chapter 3. It complements the assessment in the NAPSEA report D2.2[53].

Are there clearly quantified nutrient reduction targets and if so, do they have legally binding thresholds?

5.1.1. EU Level

The WFD does set clear binding targets by asking for the achievement of the good status / good potential under Article 4. The good status/potential is defined by a set of supporting parameters of which nutrient status is one (see Annex V WFD). However, clear threshold values for these parameters are not set by the WFD, but MS are required to define waterbody type-specific values. Exemptions from these targets are possible (Article 4.5) but need to be justified.

Similar to the WFD, the MSFD requires to reach the GES (Article 1). MS shall, in respect of each marine region or subregion, establish a comprehensive set of environmental targets and associated indicators for their marine waters to guide progress towards achieving the good environmental status. In the context of nutrients, this refers to Descriptor 5 Eutrophication. Commission Decision (EU) 2017/848[54] is laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for

[51] Geidel & Dworak, 2025.
[52] Gericke & Leujak, 2025.
[53] Gericke & Leujak, 2023.
[54] European Union, 2017.

monitoring and assessment and therewith also for D5. In coastal waters, the values set in accordance with Directive 2000/60/EC and beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. MS shall establish those values through regional or subregional cooperation. In other words, the quantification is delegated to the MS level.

The GWD states that to assess groundwater chemical status in accordance with Article 4, the nitrate concentration shall not exceed 50 mg/l for the good groundwater chemical status[55].

The ND requires EU MS to monitor the quality of waters and to identify areas that drain into polluted waters or at risk of pollution. These concern waters that due to agricultural activities are eutrophic or could contain a concentration of more than 50 mg/l of nitrate. Those areas are defined as Nitrate Vulnerable Zones, but MS are also free to define its total territory as Nitrate Vulnerable Zones as Germany and the Netherlands have done[56]. In Annex III the ND prescribes that here the amount of livestock manure applied to the land each year, including by the animals themselves, shall not exceed 170 kg/ha.

For urban wastewater entering collecting systems discharged to fresh water and estuaries from agglomerations of less than 2,000 p.e. and from discharges to coastal waters from agglomerations of less than 10,000 p.e. shall be subject to appropriate treatment. However, no targets are provided. The recasted UWWTD ((EU) 2024/3019)[57] sets clear thresholds for TP and TN for wastewater treatment plants larger than 10,000 population equivalents (p.e., Annex 1 UWWTD). For instance, the TP in the wastewater needs to be reduced by at least 87.5 % and TN by 82.5 % by 31 December 2045 (Article 7(8)) for urban wastewater treatment plants treating urban wastewater with a load of 150 000 p.e. and above and not applying tertiary treatment on 1 January 2025. Additionally, the UWWTD sets targets on the maximum concentration in the outflow.

The CAP has no quantified nutrient targets on EU level but under Article 5 it is stated that one of the general objectives is to support and strengthen environmental protection, including biodiversity and climate action, and to contribute to achieving the environmental and climate-related objectives of the European Union, including its commitments under the Paris Agreement[58].

Under the HD and BD, no targets and thresholds related to nutrients are provided.

The NECD sets clear targets to reduce national emissions of NO_x and NH_3, which eventually has an impact on the atmospheric N deposition on surface waters and the Wadden Sea. These targets are agreed on MS level and MS are obliged to draw up and implement National Air Pollution Control Programmes, including measures to reduce emissions from relevant sectors to meet national emission reduction commitments and improve air quality. These programmes should work in connection with other policies. The NECD implements the international Göteborg Protocol, which set national emission ceilings for 2010 up to 2020 for four pollutants including NO_x and NH_3. In 2020, the second implementation report was published[59] and a public consultation process started (Autumn 2024). The NECD has been modified and establishes new national commitments for the period 2020-2029, and more ambitious reduction commitments for 2030 and beyond. It includes (mandatory and voluntary) reporting of the emissions of further pollutants, without requiring their reduction over time[60]. The NECD work is also closely linked with the EU Zero Pollution Action plan.

Under the EU Zero Pollution Action Plan, by 2030, 50 % reduction of nutrient losses should be achieved. How the share is split between MS is not outlined. Furthermore, it remains unclear whether the 50 % reduction has to be achieved at source upstream or for riverine inputs or whether it only relates to agricultural nutrient losses. The reduction target seems more like an aspirational goal with no scientific reasoning and it will be very difficult to achieve considering that nutrient inputs have already been substantially reduced since the 1980s, especially for phosphorus. To achieve this target, it refers to the Farm to Fork Strategy and the Biodiversity Strategy. The references across the policy instruments strengthen the coherence and integration across sectors and policy levels, but the Zero Pollution Action Plan falls short of specific measures, and it is difficult to measure how much it is supporting the reduction of nutrients.

The proposed Soil Health Law includes clear criteria for healthy soil condition and sets clear thresholds for all descriptors.

[55] European Union, 2006a.
[56] See Nitrates Directive – Vulnerable Zones Reporting 7 (European Commission, 2025m).
[57] Council of the European Union, 2024.
[58] United Nations Framework Convention on Climate Change, 2025.
[59] European Commission, 2024a.
[60] European Commission. 2024b.

5.1.2. Intergovernmental Level

The Contracting Parties of the OSPAR Eutrophication Strategy[61] committed themselves to reduce the input of nutrients (N and P) at their source (agriculture, industry and wastewater) and have committed to a 50 % reduction of nutrient inputs. However, since full compliance was not universally achieved by 1995, the goal has been reiterated and extended in subsequent OSPAR strategies. Today the 50 % reduction target has been achieved by most but not all Contracting Parties and OSPAR has embarked on work to derive area-specific reduction targets. Another objective is to achieve a water quality which does not exceed a level which is 50 % above the ”pre-eutrophic state" as in 1880/1900[62]. These reductions primarily focus on sources like agriculture, industry, and wastewater discharges but most of the OSPAR recommendations addressing these sectors have now been set aside since they were replaced by EU regulations[63]. In contrast to HELCOM, OSPAR has few if any specific recommendations that propose measures to reduce nutrient inputs and OSPARs eutrophication work has largely focussed on eutrophication status assessments.

The Wadden Sea Plan refers to the MSFD and WFD targets and implementation as well as to the OSPAR agreements and activities. In addition, natural nutrient concentrations should be achieved in dunes. No targets or thresholds are set in the plan.

In February 2020, the ICPR adopted the program “Rhine 2040“[64]. It aims at a sustainably managed Rhine catchment with valuable lifelines for man and nature that is resilient to the impacts of climate change. A specific goal is set for nutrients, namely that in 2040, the Rhine should continue to be a usable resource for drinking water production using the simplest possible, most natural treatment processes. The introduction of nutrients into surface waters and groundwater is to be further reduced, but no quantification is provided.

The ICPER released in 2019 a Strategy for Nutrient Reduction[65]. It defines supraregional objectives for nutrients in terms of target concentration, and target load for crucial sections of the Elbe River to achieve the environmental objectives for marine environments. The corresponding objectives for loads are 30799 t N/yr and 962 t P/yr at the national border as well as 66580 t N/yr and 2385 t P/yr at the limnic-marine border.

5.1.3. National Level

Germany

The German Water Resources Management Act (WHG) implements the WFD in Germany and is further specified by the OGewV and the Grundwasserverordnung. In the first one, clear nutrient thresholds for all types of water are provided[66]. In the Grundwasserverordnung, the thresholds provided by the GWD are set. Further clear objectives are defined for average concentrations of TN and TP at the German-Czech border (3.2 mg N/l, 0.1 mg/l) and at the limnic-marine border in Germany (2.8 mg N/l, 0.1 mg P/l) are set.

The MSFD is implemented in Germany via Article 45 WHG. The N targets for freshwaters at the limnic-marine border are set in § 14. Type-specific values for P are listed in Appendix 7.[67] Being aware of the interconnection between marine and inland waters, the LAWA has agreed on national targets for nutrient reduction to reach the good status in the North Sea[68]. A corresponding reduction in TN concentrations in the coastal water bodies can be achieved for the German North Sea inflows if the TN targets and type-specific TP concentrations for North Sea and Baltic Sea as mentioned in the OGewV are met.

The ND is implemented in Germany via the Düngeverordnung[69]. This Fertilizer Ordinance sets clear thresholds for nitrate and P application in agricultural areas. In §13a, the ordinance demands to delineate areas at risk based on chemical status of the groundwater bodies according to the Grundwasserverordnung or high (increasing) nitrate concentrations for which stricter rules apply[70].

[61] OSPAR Commission, 2010.
[62] Van Leeuwen et al., 2023.
[63] OSPAR Commission, 2024.
[64] International Commission for the Protection of the Rhine (ICPR), 2020.
[65] International Commission for the Protection of the Elbe River (ICPER), 2025a.
[66] Enserink et al., 2024.
[67] Enserink et al., 2024.
[68] ARGE BLMP (Ed.), 2011.
[69] German Federal Ministry of Justice and Consumer Protection, 2017.
[70] General fertilizer requirements: Maximum 170 kg total nitrogen/ha per year for organic fertilizers.
Areas contaminated with nitrate (red area): Reduction of the calculated nitrogen fertilizer requirement by 20 % on average of the contaminated areas.
Exception: LW a maximum of 160 kg total nitrogen/ha, of which a maximum of 80 kg mineral nitrogen/ha.
Autumn fertilization: Limit to 30 kg ammonium nitrogen/ha or 60 kg total nitrogen/ha for winter rapeseed and winter barley.

The UWWTD and its recast in Germany are implemented via the WHG and the Wastewater Ordinance (Ordinance on Requirements for the Discharge of Wastewater into Waters). According to the WHG, many possible uses of water are subject to a state permit requirement. The discharge of wastewater into a body of water therefore requires official permission in the form of a so-called water law permit per Section 10 WHG. The authorities may only grant such a permit if the pollutant load of the wastewater is kept as low as possible by adhering to the relevant state-of-the-art procedure (Section 57 § 1 WHG). Anyone who wants to discharge wastewater is therefore forced to bring their wastewater to a certain quality level as set out in the Wastewater Ordinance[71] using technical treatment processes before it can be discharged into a water body. Since 1996, these minimum requirements have been based on the state of the art (Section 3 No. 11 WHG). The permissible pollutant load is therefore determined by how emissions into the water can be minimized for the respective industry if technically and economically feasible, advanced procedures are observed.

The 43rd ordinance for implementing the NECD[72] builds the legal basis for the National Air Pollution Control Program. Measures to reduce air pollution to achieve the targets as set in the NECD are set in this program. In the programme of measures of the MSFD Germany has established a measure for a targeted implementation of the National Air Pollution Control Programme with the aim to set a focus on measures that reduce nitrogen emissions in the coastal Federal States to reduce the deposition on German coastal and marine waters, but implementation of this measure is lacking behind[73].

The National Biodiversity Strategy[74] sets the target that by 2030, N emission from all sources will be reduced by 50 % in 2030 and for P04 the thresholds of the OGewV are met. Other targets also have a (more indirect) impact, e.g. more organic farming, different crop rotations lead to lower risk of soil erosion which can be assumed leads to less P emissions.

The national CAP in Germany[75] addresses the issue of nutrient pollution and refers to the WFD and MSFD. It is seen as a contribution to the reduction of nutrients in inland and coastal waters and refers to the target value as set in the OGewV.

Netherlands

In the National Water Program (NWP), the National Government describes the main issues of the national water policy and the implementation of this policy for the national waterbodies and waterways. The programme acts as an umbrella and involves the RBMPs, the flood risk plan, and the programme for the North Sea. It describes the national policy and management targets regarding climate adaptation, water security, freshwater availability, water distribution, water quality and nature conservation, shipping, and other functions of the national waters[76].

The ND is implemented via the Meststoffenwet (Fertilizer Act) and several underlying regulations. The Ordinance sets area and crop-specific thresholds for N and P in agricultural areas and regulates the transport, storage and application/handling of manure and fertilizer. Also, nutrients from compost, sludge and other organic fertilizers are taken into account.

The Environment and Planning Act (Omgevingswet)[77] regulates the physical environment in which people live, work and spend their leisure time. This new law combines existing rules and regulations on things like permitted activities, noise nuisance and pollution. The Environment and Planning Act entered into effect on 1 January 2024. This law, with a view to sustainable development, the habitability of the country, and the protection and improvement of the living environment, is aimed at, in mutual coherence:

> a. achieving and maintaining a safe and healthy physical living environment and good environmental quality, also due to the intrinsic value of nature, and

Liquid organic fertilizers on grassland:
Application between September 1st and the start of the closure period is limited to a maximum of 80 kg total nitrogen/ha (area-wide).
In polluted areas, further reduction to 60 kg total nitrogen/ha during this period.
Subsequent adjustment of the fertilizer requirement: A maximum excess of 10 % of the originally determined fertilizer requirement is permitted if objectively necessary (e.g. weather conditions).
Percentage increases in efficiency
Minimum effectiveness of liquid fertilizers: Increase by 10 % points in the minimum effectiveness of total nitrogen (e.g. cattle manure from 50 % to 60 %)

[71] Appendix 1 to the Wastewater Ordinance applies to domestic and municipal wastewater, the other annexes concern individual branches of trade and industry. German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN), 1991.
[72] German Federal Ministry of Justice and Consumer Protection, 2018.
[73] German Federal Ministry for the Environment, Climate Action. Nature Conservation and Nuclear Safety (BMUKN), 2025b.
[74] German Federal Ministry for the Environment, Climate Action. Nature Conservation and Nuclear Safety (BMUKN), 2024b.
[75] German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH), 2023.
[76] Informatiepunkt leefomgeving, 2024a.
[77] Informatiepunkt leefomgeving, 2024b.

b. efficiently managing, using, and developing the physical living environment to fulfill societal needs.

This law is worked out in more detail in a decision (Omgevingsbesluit), measures to be taken are described in the Activities Decree (activiteiten besluit); which is a set of general obligatory environmental regulations. To achieve the good ecological status, it is still required that quality elements meet the definitions for good ecological status that have been developed for that type of surface water body in the Stowa report for natural water types[78].

The larger part of regulations concerning water quality and manure/fertilizers is placed under the umbrella of this new, integral act, without changing the regulations. The Nitrogen Reduction and Nature Improvement Act regulates, among other things, three result obligations for N reduction: by 2025, at least 40 % of the area of N-sensitive nature in protected Natura 2000 areas must have a healthy N level; by 2030, at least half; and by 2035, at least 74 %.

In terms of targets related to biodiversity, the targets for N, P and biological quality parameters are based on a system that has been established on the MS/EU level. In the Netherlands, target values are determined for each WFD waterbody by the respective regional water board and formally established by the provinces or Rijkswaterstaat. The latter also advises the Ministry of Infrastructure and Water Management (I&W) on targets for the MSFD water bodies. For the ND, measures are implemented on a national scale, depending on soil type and groundwater regime. For the UWWTD, specific limits for loads are determined, given the characteristics of the receiving water body.

To improve the quality of nature and to implement the Nature Directives, one of the measures taken by the Dutch government is to decrease the amount of N deposition. In 2021, the Dutch government adopted legal targets for 2025, 2030 and 2035. These targets indicate the surface area of nature where the deposition must be under the critical N load. The critical load indicates how much N nature can endure without risking damage[79].

In 2013, the Dutch agricultural and horticultural organisation and the Union of Water Boards (Dutch regional water authorities) decided to join forces in the reduction of emissions from farms to water and formed the Delta Programma Agrarisch Waterbeheer (Task Force Agricultural Water Management, DAW). In addition to the water boards, the provinces (Dutch regional public bodies) and drinking water companies have joined this initiative over the years, as well as the Ministries of Infrastructure & Water Management and Agriculture, Nature & Food Quality[80]. Besides promoting water quality, the DAW also focuses on the improvement of soil quality and the reduction of desiccation, flooding/waterlogging and soil subsidence. The DAW mainly operates through area planning processes and transfer of knowledge, (in this way) reaching many farmers and gardeners. Target of DAW is to support farmers in the transition to a more sustainable practice, in order to contribute to achieving WFD targets in the field of both water quality and quantity.

5.1.4. Subnational Level

The laws of the German states (Länder) affect water bodies (protection, use, water supply, disposal, water classification) and supplement and specify the federal water law regulations. Within the framework of the concurrent legislation according to Article 72, § 3, No. 5 of the Basic Law, the states can only partially stipulate deviations in the state water laws and use the opening clauses of the WHG[81]. With regard to nutrients, the state laws do not deviate from the WHG.

According to the CSP Regulation, each MS submits only one strategic plan. This can also contain regional parts, which is the case in Germany[82]. However, these regional parts cannot change the general objectives set on the EU and national level, it only leaves the option to influence the measures taken in the relevant Länder.

The German states are responsible for implementing Ordinances such as the Düngeverordnung and Acts like the Federal Immission Control Act. In the latter case, for instance, they are responsible for monitoring and approving plants. The first point of contact for plant-related environmental impacts is the lower environmental protection authorities of the districts and independent cities. In individual cases, the upper environmental protection authorities of the district governments may also be responsible. The State Immission Control Acts contains particular requirements for individual behaviour which can cause harmful environmental impacts (for example, noise and air pollution). As a basic rule, this law contains the requirement of consideration, according to which everyone must behave in such a way that harmful environmental impacts are avoided. The local public order office of the respective city is responsible for problem cases of behaviour-related environmental impacts.

[78] Dutch Government, 2022.
[79] For further details please see Gericke & Leujak, 2023.
[80] Deltaplan Agrarisch Waterbeheer (DAW), 2024.
[81] Drost & Ell, 2013.
[82] German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH), 2023.

In the Netherlands, the DAW combines both national and regional approaches to address water management, particularly focusing on the role of agriculture in improving water quality and climate resilience. The DAW allows regional water authorities and farmers' collectives to develop customized approaches suited to local conditions, such as soil types, water systems and agricultural practices. Furthermore, DAW funds and supports regional pilot projects, and it collaborates with regional water boards.

To restore nature, much less N must be deposited in nature. The Nitrogen Reduction and Nature Improvement Act establishes, among other things, three result obligations for N reduction: by 2025, at least 40 % of the area of N-sensitive nature in protected Natura 2000 areas must have a healthy Nlevel; by 2030 at least half; and by 2035 at least 74 %.

The cabinet has agreed in the coalition agreement that by 2035, 74 % of the N-sensitive nature in Natura 2000 areas will no longer exceed the so-called 'critical deposition values'. These values are derived specifically for each Natura 2000 area. Therefore, a nature target analysis has been made for each N-sensitive Natura 2000 area. A nature target analysis shows how a nature area is doing and whether additional measures are needed to restore and maintain the health of nature. Above this 'critical deposition values', there is a risk that the quality of habitats for animals and plants will be damaged, resulting in the disappearance of species and the disruption of ecosystems. Additionally, the national government, provinces, and other stakeholders are working together on an area-specific approach to restore nature. The act is national law, but the measure programs will be developed at a regional scale under the responsibility of the provinces. Until 2024 the act was called the NPLG, under the current government: RLN (ruimte voor landbouw en natuur; space for agriculture and nature).

5.2. Governance

This section describes the coordination and communication across various levels of governance and between different policies. The questions address the alignment of responsibilities, the presence of exchange mechanisms, and the effectiveness of coordination instruments.

Are there vertical or horizontal coordination instruments in place with other institutions to improve regulatory processes towards nutrient reduction and how do they function?

5.2.1. EU Level

An important aspect is the procedure used within the EC for requesting and obtaining the formal opinion of other Directorates-General (DGs) with a legitimate interest in a proposal, which is called **interservice consultation** (ISC)[83]. During an ISC, the lead DG circulates a proposal to all the other EC departments that could be interested in (or affected by) it to coordinate the issues cross-sectoral. Generally, ISCs are mandatory for all documents requiring a decision by the College of Commissioners and for EC staff working documents. For example, each proposal of the CAP is also reviewed by DG Environment as regard to water management issues.

The WFD emphasizes integrated river basin management across EU, national, and regional levels. MS must coordinate their efforts, particularly their programmes of measures, to achieve the environmental objectives set out in Article 4 for the entire river basin district (RBD), as further specified in Article 3(4) regarding the establishment of administrative arrangements within each river basin district. This should lead to vertical and horizontal coordination. Further, the WFD requires under Article 11 and Annex VI to align with the UWWTD and the ND (vertical coordination). In other words, as a “framework directive”, the WFD seeks to bring together other individual acts of legislation and international conventions relating to water utilisation and water conservation.

To ensure an EU-wide coordination approach, the coordination with other acts of legislation and to address several shared technical challenges, the MS, Norway and the EC agreed on a Common Implementation Strategy (CIS) for the WFD after the entry into force of the Directive. The CIS aims to ensure the coherent and harmonious implementation of the WFD and its daughter directives, the Floods Directive and the MSFD (horizontal coordination but also vertical ass MS follow similar approaches). In this process, the highest legally non-binding coordination and decision-making body is the Water Directors meeting[84].

The WFD CIS process often links to other policy areas such as nature conservation, bringing in experts from these areas and working on solutions between the water and other sectors (horizontal coordination). For example, for

[83] European Commission, 2000.
[84] European Union, 2000.

several years a specific expert group on agriculture and water existed, producing a broad range of recommendations for reducing nutrient loads[85] across the water and agricultural sectors.

The MSFD emphasizes under Article 5(2) regional cooperation and the designation of competent authorities to manage marine environmental protection. MS collaborate through existing international frameworks like the RSCs (e.g. OSPAR see chapter 5.2.2) and develop Programmes of Measures to achieve Good Environmental Status in their marine waters[86].

Similar to the WFD, there is a CIS process that vertically coordinates the implementation of the MSFD with other policies (e.g. WFD) at the EU level and fosters the exchange between MS to streamline the implementation[87].

The ND provides for the implementation of a committee[88] (Article 9), which is composed of the representatives of the MS. The committee is responsible for the adaptation of scientific and technical progress and the implementation of the directive to protect water against pollution caused by nitrates from agricultural sources. It reviews and approves MS' codes of good agricultural practice and action programmes for Nitrate Vulnerable Zones. The Committee oversees monitoring and reporting activities, ensuring data reliability and compliance with the Directive. Additionally, it facilitates coordination and information exchange between MS (vertical coordination), proposes amendments based on scientific advancements, and supports research and development efforts[89].

According to the protocols, there is also information exchange on other policies (in particular the CAP) meetings[90].

The UWWTD in its Art. 2 states that "appropriate treatment" means the treatment of urban wastewater by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and the relevant provisions of this and other Community Directives". However, no explicit reference to a specific Directive is made in the legal text, but it "inherits" the reference to WFD and other Directives. In its last implementation report, the EC stated that full implementation of the Directive is a pre-requisite for meeting the environmental objectives set out in the WFD and the MSFD[91]. Also, these Directives make explicit reference to the UWWTD (Art. 10 of the WFD and Art. 13 of the MSFD).

The Common Agricultural Policy (CAP) has the aim to better integrate environmental and climate measures set under EU legislation. Specific Objectives under Article 6(1)e fosters sustainable development and efficient management of natural resources such as water, soil and air, including by reducing chemical dependency of farmers; and Article 6(1)f contribute to halting and reversing biodiversity loss, enhance ecosystem services and preserve habitats and landscapes; provide a chance to support other policies that aim to reduce nutrient inputs into water. The Regulation therefore requires under Article 106 that *"the public competent authorities for the environment and climate are effectively involved in the preparation of the environmental and climate-related aspects of the CAP Strategic Plan."*. This refers to vertical coordination.

However, this governance system is mainly related to financial aspects and not to the details of measures that could influence the nutrient inputs into the water. To cover the latter aspect under Regulation (EU) 2021/2115 the European CAP Network was created under Art Article 126(2). Its structure and its operation are defined by the EC Implementing Decision (EU) 2022/1864 of 5 October 2022 setting out the organizational structure and operation of the European CAP network and repealing Implementing Decision 2014/825/EU. The Network brings together stakeholders from the European Network for Rural Development (including the Evaluation Helpdesk) and EIP-AGRI. Through networking, the EU CAP Network helps drive and steer all aspects of the implementation of the CAP. It includes two main bodies[92]:

- The Assembly is the overarching body that provides strategic guidance for networking activities. Three Subgroups focus on thematic work with CAP stakeholders and EU MS' administrations
- The Steering group is the operational and coordination body ensuring that the Network's activities are coherent and complement each other.

The available information[93] shows that the issue of nutrients is only indirectly covered by discussing more holistic issues such as fostering the exchange of knowledge and good practices in the implementation of the CSPs.

[85] CIRCABC, 2024.
[86] European Commission, 2025c; European Commission WISE Marine, 2024.
[87] European Commission, 2025c.
[88] European Commission, 2024c.
[89] See European Commission, 2024c for detailed documents assessed.
[90] European Commission, 2024c.
[91] European Commission, 2025d.
[92] EU CAP Network, 2024a.
[93] See agendas of the meetings of the three subgroups under: EU CAP Network, 2024b.

The **HD and BD** promote horizontal coordination between institutions and bodies relevant to nutrient reduction. The EC provides oversight and guidance, promoting best practices for integrated land and water management that consider nutrient reduction[94]. For example, the Marine Expert Group under the Birds and Habitats Directive helps to implement Marine Natura 2000 and builds the bridge to the MSFD implementation[95]. The Group was set up by the EC to promote the exchange of experience, information and best practices in site designation and management.

The **NECD** is primarily managed at the EU level by the EC. It oversees the implementation of the Directive and ensures that MS comply with their national emission reduction commitments for key pollutants, including N oxides (NO_x) and ammonia (NH_3). Under Article 12, the EC has set up a European Clean Air Forum[96] to provide input for guidance and facilitate the coordinated implementation of Union legislation and policies related to improving air quality, bringing together all stakeholders including competent authorities of the MS at all relevant levels, the EC, industry, civil society, and the scientific community at regular intervals.

The **Farm to Fork Strategy (F2F)**, established by the EU in 2021, does not refer to a specific governance mechanism. It is only stated that the EC will develop with MS an integrated Nutrient Management Action Plan to address nutrient pollution at source and increase the sustainability of the livestock sector (see section 2.1 of the strategy[97]). A similar situation can be found in the Biodiversity Strategy 2030, where no clear governance mechanism is in place but a link to the Farm to Fork Strategy is established by referring to its announced Nutrient Management Action Plan in 2022. This Action Plan is still lacking.

EU Zero Pollution Action Plan refers to the UWWTD, the proposed Nutrient Management Action Plan, the CAP, the Farm to Fork and the Biodiversity strategy as regards nutrients. Furthermore, it states that "*the proposed 'Mission in the area of Soil Health and Food', together with the agricultural European Innovation Partnership (EIP AGRI)... will promote the wide-spread uptake of practices for pesticide and nutrient reduction by promoting innovations and exchange of knowledge*."[98]

The proposed Soil Health Law would establish soil districts within MS (Article 4). Further, MS shall designate the competent authorities responsible at an appropriate level for carrying out the duties laid down in the Directive, but there is a need to designate one competent authority for each soil district. The authorities should consider when taking measures to establish sustainable soil management practices the CSPs, the Code of Good Agricultural Practice and the action programmes for designated vulnerable zones under the ND, the conservation measures and prioritized action framework established for Natura 2000 sites, the measures under the WFD and the national air pollution control programmes prepared under the NECD.

5.2.2. Intergovernmental Level

The eutrophication-related work is implemented by OSPAR's Hazardous Substances and Eutrophication Committee (HASEC). HASEC works on coordinating OSPAR's work on hazardous substances and eutrophication, developing programs and measures related to these issues, and monitoring the marine environment to assess their impact[99]. These coordination includes also the requirements under several EU Directives (horizontal coordination) OSPARs main focus with respect to eutrophication are regionally coordinated eutrophication assessments. OSPAR has recently agreed on transboundary assessment areas and common thresholds for eutrophication parameters and has published a first fully coordinated eutrophication assessment in the 2023 Quality Status report. OSPAR has failed to establish recommendations that include measures to combat eutrophication and is mainly relying on EU regulations in this respect[100]. With respect to measures to combat eutrophication OSPAR serves mainly as a platform to exchange information, but not as a platform for undertaking coordinated actions.

The **Wadden Sea Plan:** The governance structure of the Wadden Sea Plan is designed to facilitate coordinated management and conservation efforts across Denmark, Germany, and the Netherlands through the TWSC. The TWSC, established in 1978, officially plays a role in the management and protection of the Wadden Sea, but its impact is limited by the small number of people involved. The successful implementation of nutrient reduction measures largely relies on the combination of national standards and policies, with most progress occurring in the Netherlands during the 1990s.

The **Trilateral Governmental Council** is the highest decision-making body, consisting of the ministers responsible for Wadden Sea affairs from the three countries. The council meets every three to four years to discuss policies,

[94] European Commission, 2024d.
[95] European Commission, 2025l.
[96] European Commission, 2024e.
[97] European Commission, 2020b.
[98] European Commission. 2021f
[99] OSPAR Commission, 2025c.
[100] OSPAR Assessment Portal, 2025.

harmonization, and management strategies, setting the overall direction for the cooperation, and the outcomes are documented in a declaration. Another important governing body is the **Wadden Sea Board** which operates between the council meetings to oversee the implementation of the Wadden Sea Plan and other policies. The board consists of four members and advisors from each country, representing various sectors and expertise, including NGOs and the Wadden Sea Forum. On behalf of the Wadden Sea Board, **Task Groups and Expert Groups** are built, to handle expert topics and specific projects, also related nutrients[101].

International River Basin Commissions include coordination mechanisms (such as general assembly or working groups) that ensure coordination among the contracting parties[102]. Activities regarding nutrients are exchanged but as the responsibility is within the contracting party only minor evidence for coordination has been found.

5.2.3. National Level

Germany

The federal and state governments in Germany's environmental sector collaborate at various levels. The highest decision-making body for all environmental matters is the "Umweltministerkonferenz" (Conference of Environmental Ministers). The conference includes several working bodies, such as the "Bund/Länder-Arbeitsgemeinschaften" (Federal/State Working Groups) and "Länderausschüsse" (State Committees), where representatives from federal and state administrations regularly meet. These meetings aim to prepare uniform administrative enforcement and vertical and horizontal coordination.

One of these working bodies is the "Bund/Länder-Arbeitsgemeinschaft Wasser" (LAWA), or Federal/State Working Group on Water[103]. The LAWA coordinates the implementation of the WFD and its daughter directives. To fulfil its objectives, it has established permanent committees and thematic ad-hoc committees. Their topics include water law, hydrology, water and marine protection, ecology, flood and coastal protection, groundwater, water supply, municipal and industrial wastewater, handling water-hazardous substances, and technical coordination processes with the EU. The outcomes of LAWA's work form the basis for uniform water management enforcement across the states, allowing sufficient room for regional specificities. The LAWA regularly informs the public about its work results through various publications and makes its policy papers available to all interested parties.

For the MSFD, the Federal/State Working Group on the North Sea and Baltic Sea (BLANO)[104] takes care of the management of the German part of the North and Baltic Seas and is coordinated on a national and international level (the latter through cooperation with the regional seas conventions)[105]. According to the MSFD implementation report[106], coordination is strongest for the WFD and is done at the level of both the Federal Government and the Länder. On the contrary, it was identified that some of Germany's river basin management plans (RBMP) include only weak references to the MSFD and that the coordination between competent authorities is limited in particular when it comes to land-based pollution sources for the marine environment. Also, cooperation between LAWA and BLANO takes place to an extent, but it needs to be strengthened to ensure that land-based pollution of coastal and marine waters is adequately addressed. Cooperation between the MSFD and other EU legislations (e.g. Maritime Spatial Planning Directive, Common Fisheries Policy) also exist and was presented in the programme of measures[107].

The heads of departments of the ministries and senate administrations responsible for marine protection are represented in the BLANO. To implement the technical tasks, experts from the federal states and the federal government work together in various cross-sectional and numerous working groups and are supported by external experts, e.g. from research institutions.

The ND is implemented in Germany by the agricultural and environmental ministries via the Fertilizer Act (Düngegesetz)[108]. The German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) employs a scientific advisory board for fertilisation issues. This interdisciplinary body advises the ministry with expert opinions on all fertilisation issues[109]. Furthermore, the German Environment Agency which oversees the environmental

[101] Common Wadden Sea Secretariat, 2024b.
[102] International Commission for the Protection of the Elbe River (ICPER), 2025b; International Commission for the Protection of the Rhine (ICPR). 2025a.
[103] Bund/Länderarbeitsgemeinschaft Wasser (LAWA), 2025.
[104] German Federal Ministry for the Environment, Climate Action. Nature Conservation and Nuclear Safety (BMUKN), 2025a.
[105] German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN), 2025a.
[106] Gea, G. et al., 2024.
[107] Gea, G. et al., 2024.
[108] German Federal Ministry of Justice and Consumer Protection, 2009a.
[109] German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH), 2024.

impact of agriculture, focusing on nutrient management and water quality protection. It develops strategies to reduce agricultural pollution in water bodies and maintain sustainable farming practices[110].

The HD and BD is under the responsibility of the Ministry of Environment with the support of the Federal Agency for Nature Conservation. However, the states are responsible for the selection, protection, management and financing of the Nature 2000 areas as well as the regulations for species protection on land and in the coastal sea. Beyond the 12-nautical-mile zone, in the exclusive economic zone, the federal government is responsible.

In Germany, BMLEH is responsible for implementing the CAP at the federal level, while 13 regional administrative authorities handle the actual implementation and financial management. Regular meetings between regional and central authorities aim to optimize coherence and achieve CAP objectives. Similar to the EU level, the German strategic plan details the implementation of Article 126, which mandates the establishment of a national network for the CAP, facilitating the networking of organizations, administrations, advisors, researchers, and other innovation actors in agriculture and rural development. The implementation of the WFD and the protection of drinking water is one of the objectives of the network[111].

The **"**Bund/Länder-Arbeitsgemeinschaft Immissionsschutz" is the key body that ensures coordinated air quality management across Germany's federal states. It assists and advises the federal government in the implementation of European directives into practical national regulations. It develops interpretation guidelines to address questions that arise in practice within the states regarding nationally applicable regulations. Additionally, it creates technical interpretations on topics such as air quality control, noise, traffic, and electromagnetic fields. It also prepares and supports European legislative procedures and facilitates the exchange of information and opinions on developments in emission control law and their evaluation[112].

Netherlands

In the Netherlands, several national-level coordination instruments facilitate collaboration among institutions and ministries to improve regulatory processes for nutrient reduction. Key mechanisms include interministerial coordination committees and interdepartmental water policy coordination, which involve the Ministry of Infrastructure and Water Management, the Ministry of Agriculture, Nature and Food Quality, and the Ministry of Health, Welfare and Sport. These bodies ensure aligned policies and streamline efforts across sectors.

The Delta Programme integrates water safety, freshwater supply, and spatial adaptation with nutrient reduction measures[113], so it as a horizontal coordination role. The DAW was embraced in 2013 by the National Water Steering Group, which includes various ministries, the National Association of Municipalities, the National Association of Regional Water Authorities and the Interprovincial Consultation. The Dutch agricultural and horticultural organisation and the Cadastre[114] (in Dutch: Kadaster) facilitate the DAW process. This includes guiding and supporting DAW projects and regional processes and facilitating discussions between agricultural entrepreneurs and water managers. Since 2015, this group has been supported by a so-called 'DAW Support Team' which consists of regional coordinators, Sector Knowledge Matchers, national advisors, regional staff, and a DAW program manager. The Support Team raises knowledge questions and provides support in answering those questions. The team also disseminates knowledge on best practices, among other things through publications on projects, information meetings for sectors, organizing company visits and the website[115]. For the provinces, water boards and other stakeholders, the DAW coordinators form the link with provincial dossiers such as the Rural Development Program, WFD, Delta Plan Freshwater (aimed at water quantity management), and Agricultural Nature and Landscape Management.

Advisory and stakeholder engagement bodies like Rijkswaterstaat and the Council for the Environment and Infrastructure provide strategic oversight and independent recommendations to the government, ensuring scientifically and economically sound policies. Cross-sectoral initiatives such as the Dutch Green Deals foster innovation and collaboration between the government, private sector, and NGOs, focusing on sustainability and nutrient reduction. Research and monitoring are supported by joint research initiatives and institutions like the National Institute for Public Health and the Environment.

Specifically, for the Wadden Sea, in March 2020, a governance structure was established for the Wadden area, strengthening both the horizontal and vertical coordination of policy and the management of the Wadden Sea. The

[110] Meunier, C, 2023.
[111] German Federal Office for Agriculture and Food (BLE), 2025a.
[112] Bund/Länder-Arbeitsgemeinschaft Immissionsschutz (LAI), 2023.
[113] Ministerie van Infrastructuur en Waterstaat, 2023.
[114] The Cadastre was still part of the Ministry of Infrastructure and Water Management at that time and could be well utilized as an implementing organization for this purpose.
[115] Deltaplan Agrarisch Waterbeheer (DAW), 2025.

new structure consists of three pillars: for Strategic decision-making, Testing or agenda-setting of policy proposals, and implementation of the integrated management plan. Organizations involved are a.o.: the Dutch Ministry of Infrastructure and Water Management and the Ministry of Agriculture, Fisheries, Food Security, and Nature (LVVN), the Wadden provinces, the coastal and island municipalities, the water boards. After four years, an evaluation of the introduced governance structure will be conducted to determine if organizational adjustments are desired[116]. Rijkswaterstaat is responsible for taking Natura 2000 measures for the part of the Wadden Sea and the Ems-Dollard that is state-owned and managed by Rijkswaterstaat. The goal of Rijkswaterstaat is to allow hydromorphological and ecological processes to proceed, to restore a resilient food web and migration routes for birds and fishes. The principles are the ecosystem approach, passive and adaptive management, and regulating pressure factors through sustainable human use. Rijkswaterstaat works intensively with various stakeholders on nature restoration and development and sustainable co-use. This is done in various contexts and programs, including Natura 2000, the Programmatic Approach to Large Waters (the 2nd tranche), the WFD, and the Ems-Dollard 2050 program.

The **Dutch Rural Network** consists of the provinces, the Ministry of LVVN, the Netherlands Enterprise Agency, the water boards, and all organizations and stakeholders involved in the CAP 2023-2027. The network aims to ensure the smooth implementation of CAP 2023-2027 in the Netherlands. The network also monitors and evaluates progress and shares this knowledge to make adjustments and work together towards resilient agriculture, a healthy natural environment, and a vibrant rural area.

5.2.4. Subnational Level

Germany

In Germany, water authorities are responsible for enforcing the WHG, the water laws of the states and the legal regulations issued based on these laws. It therefore also implements the provisions of the WFD, among other things.

The structure can be two- or three-tiered depending on the state. A distinction is made between

- the highest water authorities, usually the state environmental ministries. This authority is responsible for developing the RMBP within a Land and for the coordination with other Länder in a shared river basin,
- the upper water authorities, usually state offices, state administrative offices or regional councils. These are responsible for the permission of larger wastewater treatment
- the lower water authorities, usually the administrations of the districts and independent cities. With regard to nutrients this authority is relevant for permission related to smaller wastewater treatment and water abstraction.

Firstly, the highest water authorities of the federal states are obligated to coordinate management plans and action programs. This includes substantive coordination of expertise, monitoring, reporting, etc., which is partly ensured by the LAWA.

For lower water authorities, coordination may also be necessary within the framework of groundwater management (Section 47 I WHG), which is not tied to administrative procedures. See, for example, the guidelines in the Saxon Groundwater Management Decree: for groundwater bodies with surface areas in neighbouring federal states, groundwater management extends to the portion located in Saxony, whereby coordination or at least notification regarding water management-relevant decisions should be undertaken. If a groundwater body falls under the jurisdiction of several lower water authorities, management must be coordinated[117].

At the same time, inter-municipal cooperation can be achieved through water associations (Sections 9 and 23 of the Water Management Act) as well as special-purpose or, in certain circumstances, compulsory associations between municipalities.

Netherlands

In the Netherlands, coordination for nutrient reduction is also well-established through various instruments:

[116] Ministerie van Infrastructuur en Waterstaat, Ministerie van Landbouw, Natuur en Voedselkwaliteit & Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2022, p. 276
[117] Saxon State Ministry for the Environment and Agriculture, 2022.

1. **Delta Programme**: This national program focuses on water safety and freshwater supply, incorporating nutrient reduction measures. It involves coordination between national, regional, and local authorities, as well as stakeholders from different sectors.
2. **Regional Water Authorities (Waterschappen)**: These authorities are responsible for water management at the regional level and play a crucial role in implementing nutrient reduction measures. They coordinate with municipalities, provincial governments, and other stakeholders.
3. **Nutrient Management Plans**: Local and regional governments develop nutrient management plans that align with national policies. These plans are created in consultation with various stakeholders, including agricultural organizations, environmental groups, and water boards.
4. **Green Deals**: These are voluntary agreements between the government and private sector parties aimed at promoting sustainability. Several Green Deals focus on reducing nutrient pollution, involving coordination between ministries, local governments, businesses, and NGOs.
5. **Deltaplan Agrarisch Waterbeheer (DAW)**: This plan is a joint initiative of agricultural organizations and water authorities to improve water quality and reduce nutrient runoff from agricultural activities. It involves collaborative efforts between farmers, water boards, and government agencies. The team also develops designated content such as websites, newsletters etc. [118]

Are roles and responsibilities regularly reviewed across policy levels to adapt to changing circumstances and if yes, how?

5.2.5. EU Level

As part of its Smart Regulation policy[119], the EC reviews legislation in European policy through "Fitness Checks", which identify excessive burdens, overlaps, gaps, inconsistencies and/or obsolete measures.

The EU Fitness Check report of 2019 finds that all MS have adapted their administrative and governance systems: some MS have established specific RBD authorities, while several others have adapted existing water administrations to ensure better implementation[120].

Despite variations in the implementation practices in MS or regions, the latest implementation report found that the WFD has generally strengthened the cooperation among MS and with third countries on water management in shared river basins. As an outcome of the review processes, the CIS process was adapted[121]. A comparison of governance structures between the first cycle of implementation and the second implementation cycle shows that the governance structures have been adjusted in many cases to respond to new challenges or needs. This was done by establishing new working groups or new protocols.

The EU Fitness check concludes that the governance structures in general have been improved and further formalised, and the RBMPs and the approaches developed in response to pressures have become more joined up. Overall, the implementation report found that the stronger the governance of the basin and the more developed the RBMPs, the better the results in terms of achieving WFD objectives. Nonetheless, the EC's implementation report also found that there is still some room for improvement, for example in ensuring a harmonised approach for status assessment or the coordination of programmes of measures[122].

For the MSFD, no such fitness check exists, but the MSFD has applied several principles of the WFD in terms of governance structures. Article 23 of the MSFD requires the European Commission to review the directive by mid-July 2023 and where appropriate, propose any necessary amendments. The revision process has started but has not yet been finalised.

An evaluation of the ND by the EC is ongoing. The evaluation will determine whether the Directive remains "fit for purpose," its coherence with EU environmental objectives, and whether cost and administrative burdens can be reduced[123].

Under the UWWTD, the roles and responsibilities related to nutrient reduction measures are regularly reviewed, where MS are required to establish integrated urban wastewater management plans for agglomerations exceeding 100,000 p.e. by 2033. These plans must be reviewed at least every six years, aligning with the WFD[124]. EU MS

[118] Deltaplan Agrarisch Waterbeheer (DAW), 2024.
[119] European Commission, 2010a.
[120] European Commission, 2019.
[121] European Commission, 2019.
[122] CIS Working Programme 2022-2024, 2021.
[123] European Commission, 2024f.
[124] European Council, 2024.

submit updates every four years on their progress in reducing nutrient pollution, particularly by N and P, which are part of the broader UWWTD compliance reporting. These reports evaluate the effectiveness of implemented measures and identify emerging challenges. The EC continuously reviews fields that need improvement, such as handling nutrients from smaller agglomerations and individual wastewater systems. The EC's updates align with broader environmental goals, like the Zero Pollution Action Plan and European Green Deal, which call for further reductions in nutrient pollution. Moreover, nutrient reduction measures are integrated with other EU policies, such as the WFD and the ND, to ensure coordination across sectors. This system of continuous assessment and adaptation ensures the EU remains aligned with its environmental objectives while addressing emerging nutrient management challenges[125].

Within the CAP the responsibilities are regularly reviewed across policy levels to ensure they adapt to changing circumstances. The EC conducts regular evaluations and reviews of the CAP to assess its effectiveness and to ensure that it aligns with existing and emerging challenges, such as climate change and sustainability. The CSPs, which guide national implementation, are revised every seven years. MS must submit updates on their agricultural policies and performance. These plans are assessed based on their contribution to achieving EU environmental and climate goals. Additionally, National CAP Plans allow countries to adapt their strategies to local contexts, promoting flexibility in responding to regional needs[126]. The EU budget and funding mechanisms, such as the European Agricultural Fund for Rural Development, are also periodically adjusted to ensure that funding priorities align with evolving agricultural, environmental, and socio-economic objectives[127].

The F2F Strategy and the European Green Deal further influence CAP reviews, setting targets for reducing agricultural emissions and promoting sustainable farming. This continuous review process helps ensure that the CAP remains effective in addressing current and future agricultural challenges while contributing to the EU's broader sustainability goals[128].

Roles and responsibilities under the HD are regularly reviewed to adapt to changing circumstances. The EC monitors and evaluates the implementation of the Directive through regular reporting cycles where MS provide updates on the conservation status of protected habitats and species. These reports help assess progress and identify gaps in the management and protection of Natura 2000 sites. Based on the findings, the EC may propose amendments to the Directive to address emerging issues, such as new environmental threats or scientific developments. Additionally, national and regional authorities have the flexibility to adapt conservation strategies based on local conditions and changing environmental pressures. This ongoing review process ensures that the HD remains effective in protecting biodiversity while responding to evolving challenges, such as climate change and land use changes[129].

The NECD roles and responsibilities are regularly reviewed to adapt to evolving environmental and policy needs. The EC assesses the progress made by MS in achieving their emission reduction commitments through regular reporting. These reports are submitted every two years and help to identify gaps and emerging challenges in meeting the agreed limits for air pollutants. Additionally, MS are encouraged to revise their National Air Pollution Control Programmes to address shifting priorities or unforeseen challenges. This ensures that the NECD remains flexible and effective in meeting the EU's long-term environmental goals, such as improving air quality and reducing pollution[130].

For the various strategies (Biodiversity Strategy, F2F Strategy, Zero Pollution Action plan; EU Soil Strategy) no governance mechanism is defined and so the roles and responsibilities are unclear.

The proposed Soil Law is not into force now and might be further modified. So, it is further excluded from the assessment.

5.2.6. Intergovernmental level

In the OSPAR Convention, roles and responsibilities are regularly reviewed to adapt to changing circumstances through strategic assessments and working group updates. These reviews are driven by the outcomes of Joint Ministerial Meetings, where national governments decide on new priorities based on the latest scientific data and emerging environmental challenges. OSPAR works on the basis of 10-year strategies. The current North East

[125] European Commission, 2025d.
[126] European Commission, 2025e.
[127] FI Compass, 2021.
[128] European Commission, 2025g.
[129] European Commission, 2025f; European Environment Agency (EEA), 2023; European Union, 2024.
[130] EU Clean Air Farming Project: What is the legal basis at European level for methane and ammonia? (European Environment Agency (EEA), 2024).

Atlantic Environment Strategy has 2030 as a target year. It incorporates an overarching strategic goal and several strategic objectives for eutrophication[131]. OSPAR's working groups, which focus on specific areas like biodiversity and marine pollution, meet regularly to assess progress and adjust policies in response to new information. These groups propose changes to ensure that ongoing actions align with evolving environmental needs. The OSPAR Committee coordinates these activities, ensuring alignment with EU environmental policies and international agreements. The integrated monitoring and assessment program also provides continuous evaluation of the marine environment, informing the need for policy updates. This data-driven approach helps OSPAR remain responsive to both regional and global environmental changes. Through these ongoing reviews, OSPAR adapts to new challenges, ensuring the effectiveness of its measures in the North-East Atlantic[132].

Through the Wadden Sea Plan, roles and responsibilities in the governance of the Wadden Sea are regularly reviewed and adapted to changing circumstances through the framework of the TWSC. This is achieved via Wadden Sea Conferences, held every three years, where the Wadden Sea Plan—outlining joint policies and management strategies—is reviewed and updated. The TWSC relies on a network of advisory bodies and task groups, such as the Wadden Sea Board, to align governance with emerging challenges and scientific developments. Scientific input is provided through the Trilateral Monitoring and Assessment Program and Quality Status Reports (QSRs), which ensure decisions are informed by updated ecological data. Stakeholder input is integrated through platforms like the Wadden Sea Forum, which enables dialogue and adjustments based on diverse perspectives. The Wadden Sea Plan itself is dynamic, and regularly revised to reflect new priorities and international obligations, including EU directives and UNESCO World Heritage criteria. These interconnected mechanisms create a responsive governance structure that continuously evaluates and redefines roles to address evolving ecological, regulatory, and societal conditions effectively. This adaptive approach ensures the protection and sustainable management of the Wadden Sea over time[133].

Unlike the ICPER, the ICPR has a particular working area which addresses eutrophication[134].

In international River Basin Commissions, the roles and responsibilities of the contracting parties and the commission are regulated by legal treaties[135], which also applies to the ICPER[136]. However, concerning nutrients the responsibilities fall under the responsibility of the contracting parties and coordination (horizontal and vertical) is not legally binding.

5.2.7. National Level

Germany

The roles and responsibilities of the WFD, GWD and MSFD are set by the German water Law and further specified by the Länder. In particular, the implementation of the measure is allocated in the RBMPs[137] to different actors (national, regional and community-level authorities). However, as most of the measures are not legally binding the designated bodies might not always take action[138].

In Germany, the implementation of the WFD involves federal, state, and local governments working collaboratively to achieve its goals. Roles and responsibilities are reviewed and adapted through cyclical six-year management plans and programs of measures. The Federal Ministry for the Environment provides overarching guidance, while states (Länder) implement specific actions in their RBDs, reflecting regional priorities. Coordination across state and national levels is facilitated through river basin commissions, ensuring that strategies evolve in response to changing ecological conditions and stakeholder input. Public participation and regular consultations also contribute to refining roles and improving policy implementation[139].

The GWD in Germany is integrated into the broader framework of the WFD and managed primarily by state-level environmental agencies. No review process of the governance system is known.

The implementation of the **MSFD** in Germany involves a national approach overseen by the Federal Ministry for the Environment, with input from scientific institutions and state authorities managing marine areas. Roles are reviewed during the six-year cycle of updates to the program of measures and assessments of GES. Adjustments

[131] OSPAR Commission, 2025e.
[132] OSPAR Commission, 2024.
[133] Slob et al., 2016.
[134] International Commission for the Protection of the Rhine (ICPR), 2025.
[135] International Commission for the Protection of the Rhine (ICPR), 2025; EUR-Lex, 1991.
[136] International Commission for the Protection of the Elbe River (ICPER), 1990.
[137] See for example NRW, 2021. or Schleswig- Holstein, 2021.
[138] European Commission. 2025m.
[139] Jager, N. et al., 2016; German Advisory Council on the Environment, 2015.

are made based on ecological data from extensive monitoring of marine biodiversity, pollutants, and human activities. Collaboration between federal and state levels, as well as with neighbouring countries in the North Sea and Baltic Sea, ensures that responsibilities are reallocated as necessary to address emerging marine challenges[140].

The ND is implemented by the BMLEH, the Federal Ministry for the Environment and the Länder via the fertiliser ordinance. This ordinance is specified further by administrative regulation for the designation of nitrate-polluted and eutrophicated areas by the Länder[141].

The UWWTD is covered by the WHG (§57) and the Wastewater Ordinance[142]. It sets the responsibility of implementation to the community level.

The CAP in Germany and in particular the strategic plan has been developed in cooperation with the Länder by the BMLEH and agreed with the EC. The implementation of the CSP is accompanied by a national committee in which the federal government, states, associations and interest groups are represented[143].

Germany implements the HD and BD through its Natura 2000 network, with federal coordination and state-level execution. Roles are reviewed during the periodic reporting to the EC and through habitat and species monitoring programs. Adjustments are made to management plans to address changes in conservation needs, such as climate impacts or new land-use pressures. The federal government provides strategic guidance and legal frameworks, while states adopt specific conservation measures for sites within their jurisdictions. This multilevel approach ensures that responsibilities evolve to maintain compliance and achieve biodiversity goals under these directives[144].

For the **NEC** implementation in Germany is the federal government responsible[145]. The federal government has to adopt a national air pollution program. Länder and municipalities need to be consulted in that regard.

In Germany for all the Directives mentioned above no systematic review process of roles and responsibilities is carried out. If changes are made, they are event-related.

Netherlands

In the Netherlands, municipalities, water boards, provinces, and the national government share joint responsibility for implementing the WFD. All administrative levels are therefore competent (formal) authorities for the WFD, but each also has its responsibilities.

The national government is responsible for national policies. The Department of Infrastructure and Water Management handles the WFD's implementation at the national level and represents the Netherlands in international coordination. The national government sets national goals for surface water bodies and groundwater bodies, with specific goals for national waters and activities within them.

Rijkswaterstaat, part of the Department of Infrastructure and Water Management, manages national waters, implements WFD measures through physical interventions, and monitors the condition of the national surface water bodies.

Provinces are responsible for setting goals for the regional surface waters, based on advice from the regional water boards. Next to that, the groundwater management is their responsibility.

The Regional Water boards manage regional surface water bodies, implement WFD measures through physical interventions, and monitor their condition. They are also responsible for purification management and operational groundwater management.

Regional Water boards have authority over activities in regional waters and groundwater extractions not governed by the national or provincial government. They can impose extraction bans during (threatened) water scarcity for extractions within their jurisdiction.

To effectively steer the implementation of the WFD impulse program, a Steering Committee has been established alongside the regular Administrative Consultation Water. In this committee, representatives from provinces and

[140] European Commission, 2025c.
[141] German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH), 2018.
[142] German Federal Ministry of Justice and Consumer Protection, 1997.
[143] German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH), 2025a.
[144] European Commission. 2025i.
[145] German Ministry of Justice, 2018.

water boards from the WFD sub-stream areas regularly meet with the national government and the Association of Dutch Municipalities to discuss progress and provide direction.

Further elaboration of spatial measures of the current (agricultural) land use contributes to not fully achieving the WFD water quality goals by 2027. In 2023, a fact sheet was created outlining the legal instruments available to the national government, provinces, water boards, and municipalities under the Environmental Act to steer land use for water quality improvement. In 2024, a framework was developed to help authorities determine the best fitting (mix of) legal instruments to be used by different governing bodies to improve water quality. This framework aligns with the principle of the Environmental Act: "decentralized where possible, centralized where necessary." The framework is designed to be followed in a joint process by authorities. In 2025, further coordination between responsible authorities will follow, specifying who should take action and when.

Some of the agency's recommendations include improving the existing consultation structure and establishing new coordination meetings between the national and regional governments, as well as at the regional level, focusing on progress, goal achievement, and realization.

The MSFD is under the responsibility of the Ministry of Infrastructure and Water Management.

The ND and the WFD give the Netherlands the freedom to decide which instruments to use to achieve the objectives of the directives and which administrative level (national, provincial, municipal, or water board) will be given the authority to achieve those objectives. The ministry responsible for the implementation of the ND is the Ministry of Agriculture. Monitoring and reporting (nitrate report) is a cooperation of both the Ministry of Agriculture and the Ministry of Infrastructure and Water Management. The enforcement is done by Netherlands Food and Consumer Product Safety Authority.

The Ministry of LVVN is the competent authority for the regulations in the Decree on Activities in the Living Environment (besluit activiteiten leefomgeving) that govern the use of fertilizers. Lower-level authorities cannot weaken these regulations but may strengthen them. The Environmental Act's principle is "decentralized unless." This principle requires evaluating whether regulations, which may vary from location to location to achieve the objectives of the ND and WFD, should be imposed centrally by the national government or by the provincial or local competent authority (in the Environmental Plan).

It was explicitly decided to keep the Fertilizers Act outside the Environmental Act, continuing it as the responsibility of the Ministry of LVVN. The Ministry of Infrastructure and Water Management is responsible for the WFD implementation[146].

Implementation of CAP and the Nature Conservation act (now part of the Omgevingswet) is within the responsibility of the Ministry of Agriculture, Fisheries, Food Security and Nature, requiring vertical coordination. Management plans are established by a province, the Ministry of Infrastructure and Water Management, Defense, and/or the Ministry of Agriculture, Fisheries, Food Security and Nature.

5.2.8. Subnational Level

Germany

On the subnational/Länder level in Germany, the roles and responsibilities are clearly defined and regulated. In most states, water management administration follows the three-tier structure of general administration, although the allocation of tasks differs from state to state[147]:

- Highest authority: State ministry with the water management division; usually the Ministry of the Environment. The task is the management of water management and higher-level administrative procedures.
- Intermediate authority: District governments and regional councils are responsible for the regional water management planning, important water law procedures, and administrative procedures.
- Lower authority: Lower water authorities are the districts and independent cities. The tasks are water law procedures, monitoring of water bodies and official decisions, for example on wastewater discharges.

However, some smaller states and city-states only have a two-tier administration or one water management level.

[146] Ministerie van Landbouw, Natuur en Voedselkwaliteit Ministerie van Infrastructuur en Waterstaat, 2021, p.11.
[147] German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN), 2024a.

The water authorities that make decisions on water law must be distinguished from the technical specialist offices (state offices, state institutes, environmental offices, water management offices). They primarily perform advisory and assessment functions. Normally they are not formally involved in review processes.

Municipalities have important environmental protection tasks to fulfil in enforcing federal and state environmental laws, but above all within the framework of their constitutionally guaranteed self-administration. With their decisions, they shape the local living environment of citizens. The traditional mandatory tasks of municipalities include drinking water supply (implementing the GD) and wastewater disposal (implementing UWWTD) following the state water laws. To cover the costs incurred in this regard, they charge users wastewater fees or wastewater charges. As owners of smaller bodies of water, they also have to ensure their maintenance.

The highest water authorities of the federal states (environment ministries) are obligated to coordinate management plans and action programs. This includes substantive coordination of expertise, monitoring, reporting, etc.

At the same time, inter-municipal cooperation can be ensured through water associations (§§ 9 and 23 WVG) as well as special-purpose or, in some cases, compulsory associations between municipalities, administrative associations and districts (e.g. § 44 SächsKommZG)[148].

According to Klickermann[149], the majority of the authorities surveyed by Klickermann confirmed inter-municipal cooperations on groundwater management, although the nature of the Crop rotation varied. Typically, the cooperations took place through non-legal structures such as staff consultations, working meetings, or staff meetings organized by district councils. On the other hand, some reported a tendency towards reducing cooperation with others.

The NECD is implemented by the Länder. No revisions are foreseen.

The CAP is implemented on the farm level, with controls from the Länder level. There is very limited coordination among farmers when it comes to the selection of voluntary measures towards reduction of water pollution[150].

Netherlands

Provinces: Provinces set goals for regional surface water bodies and monitor groundwater conditions. They are responsible for strategic groundwater management, and the Provincial Executives have authority over indirect discharges and industrial extractions exceeding 150,000 m³ per year, drinking water extractions, and open soil energy systems. Provinces can impose regulations in water extraction areas via the provincial environmental regulation.

Municipalities: Municipalities have authority over indirect discharges and are responsible for transporting domestic wastewater to treatment plants via sewers. They also have duties regarding rain and groundwater management.

Provinces and municipalities are shareholders of drinking water companies, responsible for water supply. Various studies have been conducted on the authorities of different government levels regarding nutrient runoff (2016, 2018). Each level has its own mandates, and a voluntary approach is often encouraged, sometimes supported by subsidies. The current division of responsibilities makes regulating direct and indirect discharges complex. Water quality managers (Rijkswaterstaat and water boards) and environmental services (for provinces and municipalities) explore roles and tasks for discharges through existing collaborations. The Human Environment and Transport Inspectorate (Inspectie Leefomgeving en Transport) and the Netherlands Food and Consumer Product Safety Authority (Nederlandse Voedsel en Waren Autoriteit) ensure compliance with national and international laws. The Inspectorate oversees the use of private drinking water sources (often campsites), and the Food Authority ensures water used in food preparation meets legal standards. In situations involving supraregional interests or international obligations, the Ministry of Infrastructure and Water Management can use oversight tools. Provinces oversee water boards and municipalities and can issue instructions or directives as needed. The roles and responsibilities across these policy levels are regularly reviewed and adapted to changing circumstances through collaboration and continuous monitoring, ensuring effective water management aligned with national and international standards.

The Netherlands changed its national agri-environment-climate measures programme to a collective approach in 2016 (farmers have to join collectives to apply for agri-environment-climate measure but remain responsible for the implementation) – as the only country in the EU[151]. The authors found a strong preference of a collective-oriented

[148] Personal Interview (10.03.2025) and additional materials provided with and by Felix Klickermann, UFZ Leipzig.
[149] Personal interview (10.03.2025) with Felix Klickermann, UFZ Leipzig.
[150] Personal interview Daniel. Menges (29.1.2025), Sachverständigen-Kuratorium für Landwirtschaft, Forstwirtschaft, Gartenbau, Landespflege, Weinbau, Binnenfischerei, Pferde und Agrarrecht
[151] Reichenspurner et al., 2023.

view among Dutch farmers rather than business-oriented or environment-oriented perspectives as they perceive advantages compared to the previous individual scheme, including the ecological effects.

The regional water authorities are responsible for complying with legal obligations under the UWWTD.

For the NECD, provinces are the competent authorities.

Are there transboundary coordination mechanisms in place at all levels (where relevant)?

5.2.9. EU Level

Article 3 WFD addressed the river basin management in a transboundary context. MS should endeavour to establish appropriate coordination with neighbouring countries (including non-MS), to achieve the objectives of this Directive throughout the RBD. Therefore, appropriate administrative arrangements, including the identification of the appropriate competent authority, should be applied. An example of cooperation on a river basin level is the ICPR[152] where MS and many provinces in the Rhine watershed cooperate to harmonize the many interests of use and protection.

The GWD does not refer to transboundary aspects but being a daughter Directive of the WFD the transboundary principles of the WFD apply in the case of relevance[153].

The MSFD is intrinsically transboundary. The Directives states that MS should cooperate to ensure the coordinated development of marine strategies for each marine region or subregion. Where practical and appropriate, existing intergovernmental structures established in marine regions or subregions, in particular RSCs, should be used to ensure such coordination (Articles 5 and 6).

Under the Article 12 UWWTD (recast) transboundary coordination is regulated[154].Member states are required to immediately notify other member states and the Commission if their waters are negatively impacted by urban wastewater discharges from another member state or a non-EU country. This is especially critical if the pollution could significantly affect downstream water bodies or poses a risk to health or the environment.

The ND only foresees under Article 3(3) that waters affected by pollution from waters from another MS draining directly or indirectly into them, the MS whose waters are affected may notify the other MS and the EC of the relevant facts. The MS concerned than shall organize, where appropriate with the EC, the concertation necessary to identify the sources in question and the measures to be taken to protect the waters that are affected.

Under the HD and BD, transboundary coordination mechanisms are explicitly designed to ensure the effective conservation of habitats and species that span multiple countries. The Natura 2000 network requires MS to collaborate on the management and protection of sites that extend across borders. Joint Management Plans are developed for transboundary Natura 2000 sites, enabling countries to coordinate conservation efforts and ensure consistency in their protection. Additionally, the HD mandates that neighbouring countries share information and consult on the status of species and habitats, facilitating harmonized conservation actions. The HD also allows for cross-border monitoring and reporting on the conservation status of species, ensuring transparency and collaboration across national borders. Finally, where species or habitats are shared between countries, coordinated actions are required to avoid fragmentation and ensure coherent protection across regions.

The CAP does not foresee any transboundary activities or coordination.

While the WFD and the MSFD refer to transboundary cooperation extensively, the NECD does not do so. Although, emissions (including NO_x and NH_3) are transferred over country borders. The directive only refers to the consultation of other MS in the case their program of measures could affect others (Article 6) and not about directly cooperating with them. An example of transnational cooperation related to air is the Göteborg Protocol, which was signed by 51 countries including all EU MS[155].

The F2F Strategy does not address transboundary issues as the strategy focuses on the EU level. The same is true for the Biodiversity Strategy 2030, but there are references to existing transboundary mechanisms such as the WFD. The EU Zero Pollution Action Plan will foster cooperation between relevant regional fora, such as in

[152] International Commission for the Protection of the Rhine (ICPR), 2024.
[153] Please note that the number of transboundary groundwater bodies is significantly lower than in the case of surface water.
[154] European Union, 2024a.
[155] Umweltbundesamt (UBA/Ed.), 2019.

European river basins and will continue pursuing the global uptake and implementation of the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

Transboundary coordination mechanisms are not foreseen under the proposed Soil Health Directive.

5.2.10. Intergovernmental level

Existing conventions, such as the Wadden Sea Plan, can be used as platforms for cooperation and coordination among contracting parties. It sets clear targets and the cooperation is aligned with the EU legislation. Another example is OSPAR[156] where 16 contracting parties including Germany and the Netherlands aim to prevent and eliminate marine pollution in the North-East Atlantic (including the Wadden Sea area), ensuring that actions taken by individual countries are complementary and effective in addressing transboundary environmental challenges.

The international commissions on the Elbe and Rhine have been founded because of the need for transboundary coordination. This is formalised by the two underlying conventions[157].

5.2.11. National Level

Germany

On the national level, the WHG is committed to compliance with international agreements and the defined objectives (§43a), as well as to cooperation with competent authorities in transboundary river basins (§7).

Transboundary coordination is a key component, as Germany shares river basins and marine ecosystems with neighbouring countries in the North and Baltic Seas. Coordination within the International River Basin Commissions, such as ICPR and ICPER, is a core of the German national water policy. Additionally, Germany participates in regional marine conventions, such as OSPAR for the North-East Atlantic and HELCOM for the Baltic Sea. The regional seas conventions serve as the coordination platform for the implementation of the MSFD and ensure a comprehensive transboundary approach. These mechanisms ensure obligations under the WFD, GWD, ND and MSFD are met while fostering collaborative management of shared marine and freshwater ecosystems[158].

The same accounts for the regulation on national obligations to reduce certain air pollutants („**Verordnung über nationale Verpflichtungen zur Reduktion bestimmter Luftschadstoffe**“), where also consultation among other MS is obligated (§4) but not the cooperation.

With Article 12 of the Bundesnaturschutzgesetz cross border impacts of national programs are subject to an environmental impact assessment. Article 32 further requires international coordination for areas of EU relevance or European bird protection areas.

No transboundary coordination of the CSPs is carried out.

Netherlands

Regional water boards do contact their foreign neighbouring regional board when it concerns a smaller cross-border water body, for the larger rivers (Rijkswateren), the ministry of I&W takes responsibility.

The Deltaplan Agrarisch Waterbeheer does not make links to other MS.

No transboundary coordination of the CSPs is carried out.

5.2.12. Subnational Level

Germany

There are no obligations or efforts of cooperation within the water legislation of the federal states (“Landeswassergesetze”) in Germany.

State representatives (Länder) in Germany play key roles in transboundary coordination for RBDs, which frequently extend across both internal and international borders. These representatives ensure compliance with EU directives by contributing to the development of coordinated RBMPs, which address pollution, hydromorphological alterations, and habitat restoration across jurisdictions[159]. These platforms enable Länder representatives in theory to harmonize monitoring methods, share ecological data, and resolve disputes on water use. Furthermore, they

[156] OSPAR Commission, 2024.
[157] International Commission for the Protection of the Rhine (ICPR), 2025; EUR-Lex. 1991.
[158] Umweltbundesamt (UBA/Ed.), 2023.
[159] European Committee of the Regions, 2024.

ensure that programs of measures, such as pollution control or migratory barrier removal, are consistently implemented across the basin. In practice there are often differences in how the Länder monitor and manage the status of their surface waters, depending on political impetus and available resources.

The federal states also facilitate cross-border public consultations to incorporate feedback from affected stakeholders, ensuring inclusive decision-making. By working within these frameworks, they help achieve WFD and GD goals such as "good ecological status" for water bodies while addressing the unique challenges of managing shared resources[160].

No information on transboundary coordination for the CAP, NECD, BD and HD were found.

Netherlands

In the Netherlands, regional water boards join together and cooperate with the provinces and municipalities in one of the six river basin organisations: North, Rhine-East, Rhine-west, Ems, Meuse and Scheldt. Chairs of these river basin organisations meet frequently to coordinate between the five river basins. Regional water boards do contact their foreign neighbouring regional board when it concerns a smaller cross-border water body, for the larger rivers (Rijkswateren), the ministry of I&W takes responsibility.

No information on transboundary coordination for the CAP, NECD, BD and HD were found.

How is the interlinkage of freshwater and marine water issues established?

5.2.13. EU Level

At the European Union level, several directives have significant input on both freshwater and marine water issues (WFD, GWD and MSFD), but only a few explicitly connect the two. The **WFD** has an approach, which explicitly addresses the connection between freshwater and marine environments, by requiring to consider transitional and coastal waters. The WFD requires MS to take measures to avoid increasing marine pollution and emphasizes the integration of various international agreements aimed at protecting marine waters from land-based sources of pollution (Recital, 22).

The **MSFD** requires under Article 13(2) that the relevant measures required under Community legislation, in particular Directive 2000/60/EC, Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment and Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality, as well as forthcoming legislation on environmental quality standards in the field of water policy, or international agreements is taken into account. However, it is up to the MS how this link is established. The interlinkage of freshwater and marine water issues is addressed within the implementation of the MSFD through coordination with the WFD. One example is the joint targeting of eutrophication, where the WFD's focus on reducing nutrient loads in freshwater systems directly supports marine objectives under the MSFD. Some Member States use shared monitoring data and harmonized measures, to ensure coherence between these interconnected systems. This integrated approach reflects the recognition that activities affecting freshwater systems have significant impacts on marine environments[161].

The ND refers to all waters that are affected by nutrient pollution.

The UWWTD refers to inland and coastal waters.

The NECD does only refer to waterbodies in terms of monitoring (Article 9) and does not draw a link between freshwater and marine water issues.

The HD and BD do not refer to water in its articles. However, in Annex I of the Habitat Directive, different waterbodies are defined including areas that link fresh- and maritime waters (e.g. coastal dunes and inland dunes).

The CAP does refer to water in general and only distinguishes between surface- and ground water bodies.

The Farm 2 Fork Strategy only refers to water pollution but does not distinguish between marine and inland waters. The same applies to the Biodiversity Strategy 2030, the EU Zero Pollution Action Plan and the Soil Strategy for 2030.

[160] International Commission for the Protection of the Rhine (ICPR), 2022.
[161] MSFD reports and assessments - Marine Information System for Europe; Framework Directive Recommendations for implementation and reporting (CIRCABC, 2024).

The Zero pollution Action Plan acknowledges the link between fresh and marine waters as it refers to the WFD and MSFD as the main instruments to achieve the goal of the strategy.

This question is not relevant under the proposed Soil Health Law.

5.2.14. Intergovernmental level

The North-East Atlantic Environment Strategy (NEAES) 2030[162] explicitly addresses pollution from land-based activities, including **nutrient pollution** and **marine litter**, with the aim of significantly reducing inputs to the sea. The strategy's objectives are geared towards creating "clean seas," which involves tackling eutrophication caused by nutrients from agricultural runoff and wastewater.

The **Wadden Sea Plan**[163] is a central management plan that provides a framework for coordinating and integrating policies across the three countries. It establishes common targets for various habitats and species, including those that are directly affected by the interplay of freshwater and saltwater.

The RBMP of the ICRP has a specific chapter on the connection between the WFD and the MSFD[164], which mainly addressed the issue without providing any technical details. It is stated that the connections between the two directives are dealt with in various ICPR committees.

The RBMP of the IKSE refers to the agreed target value of 2,8mg/l TN and the fact that it was not always met[165]. The plan further refers to the strategy to reduce nutrient inputs into water bodies in the Elbe River Basin[166], which addresses the issue as well. The strategy refers to load reductions needed to reach the target values and the goals set under the MSFD.

5.2.15. National Level

Germany

On the German national level, the WHG relates to both freshwater (surface water and groundwater) and coastal water. The process of developing Programs of Measures under the WFD (and its daughter Directives) and MSFD is done in most cases separately. The LAWA and the BLANO have agreed on a combined catalogue of measures[167]. This catalogue builds the basis for all Programs of Measures (WFD and MSFD) and is applied across Germany.

The UWWTD is transposed in Germany via the WHG and the Wastewater Ordinance[168]. The text only refers to water and does not distinguish between marine and freshwater.

Germany has also reported under the MSFD coordination between the MSFD and the WFD through measures that will be delivered under their national RBMPs that will also address MSFD objectives related to Descriptor 5 (Eutrophication)[169].

Germany has set a management value for total nitrogen at the limnic-marine border of rivers entering into the German North Sea (or for transboundary rivers like the Rhine at the point where the river leaves Germany). The management value has been set at 2.8 mg/l total nitrogen and is referred to in the Surface Water Ordinance[170]. The management value is thereby legally binding. It has been derived on the basis of correlations between nutrient concentrations and the concentration of chlorophyll-a under the assumption that the coastal waters would achieve good status when the management value has been reached and further assuming that reaching good status in rivers is not sufficient and that the marine waters need further nitrogen reductions. A corresponding value for phosphorus was not set since it was assumed that coastal eutrophication is mainly triggered by elevated nitrogen concentrations and that the target value for phosphorus in rivers is sufficient to achieve good status in coastal waters. One of the advantages of setting targets at the limnic-marine border is that they can be extrapolated to upstream polluters in the catchment considering retention in order to ensure that nutrient reduction efforts take place along the whole course of the river. Currently, Germany is investigating the need to set a management target for phosphorus as well to achieve the objectives of the MSFD.

[162] OSPAR Commission, 2025e.
[163] Common Wadden Sea Secretariat, 2010.
[164] International Commission for the Protection of the Rhine (ICPR), 2022.
[165] International Commission for the Protection of the Elbe River (ICPER), 2020.
[166] International Commission for the Protection of the Elbe River (ICPER), 2018.
[167] Bund/Länderarbeitsgemeinschaft Wasser (LAWA), 2020.
[168] German Federal Ministry of Justice and Consumer Protection, 1997.
[169] European Commission, 2025h.
[170] German Federal Ministry of Justice and Consumer Protection, 2016.

Netherlands

The Marine Strategy Part 3 (2022)[171] contains the program of measures for the period 2022-2027. This is part of the national implementation of the MSFD and is published as an annex to the North Sea Program 2022-2027 (Noordzeeprogramma), which in its turn was established as part of the NWP at the end of 2021. The programs of measures developed under the WFD through cooperation in the four international river basins Rhine, Meuse, Scheldt, and Ems also contribute to the program of measures of the MSFD. This includes achieving the MSFD objectives for eutrophication, pollutants, migratory fish, marine litter, and achieving the GES in coastal waters[172]. Threshold values are linked to the specific properties of the water bodies, i.e. will not be adapted to downstream issues, although additional measures may be taken in WFD water bodies to reduce eutrophication effects in downstream marine waters that fall under the MSFD.

Formally, the Ems-Dollard and the Western Scheldt are designated as transitional waters based on the WFD, and the Wadden Sea (World Heritage) and the Eastern Scheldt are designated as coastal waters based on the Fisheries Act. Policies for all these areas are formulated in the National Water Program. These waters are not within the scope of the North Sea Program and its implementation of the MSFD and WFD (source: North Sea Program 2022-2027).

In the upcoming planning period, the European Biodiversity Strategy for 2030 will be elaborated for the Netherlands and neighbouring countries around the North Sea. The ambition is to achieve 30 % area along the lines of cross-border coherence of protected nature areas, with one-third strict protection.

Based on the criteria for area protection and legally established nature restoration goals developed in 2021 and adopted by the EU, it will become clear what additional actions (if any) are needed for nature areas at the interface of land and sea. This is particularly relevant for migratory birds, migratory fish, and their habitats. The national government and other authorities (primarily provinces) will work together within their respective responsibilities. Such cooperation is also relevant for implementing the EU's Zero Pollution Action Plan to reduce pollution of air, water, and soil to levels that are not harmful to humans and nature. The Netherlands supports the ambitions of the Zero Pollution Action Plan.

The NWP 2022-2027 outlines the main lines of national water policy and the management of national waters and waterways. Key components of the NWP include the RBMPs, the flood risk management plan, and the North Sea Program, all of which are legally annexed to the NWP. The Marine Strategy Part 3 contains the program of measures for the coming period. It is an Annex to the North Sea Program, which is established as part of the NWP[173].

The National Water Program coordinates plans with water boards and water managers at the municipal and provincial levels. Additionally, the aforementioned regional sessions are organized to test the plans integrally. Moreover, the national government and other authorities frequently collaborate in drafting and coordinating the National Water Program. This is necessary because there are many interfaces between national waters, provincial and regional waters, and the management area of the water boards. In the Netherlands, the relevant departments coordinate the implementation of the MSFD under the direction of the Interdepartmental Directors' Consultation North Sea.

The MSFD is elaborated for the Dutch part of the North Sea in the Marine Strategy. The Netherlands incorporated the Directive into the Water Decree under the Water Act in 2010.

When updating the Marine Strategy Part 1, the MSFD took into account policies, conditions, and ambitions from various policy fields relevant to achieving good environmental status. Where necessary to achieve and/or maintain good environmental status, the Marine Strategy supplements these policy frameworks. This mainly concerns the Common Fisheries Policy, the WFD, the BD, the HD, the OSPAR Convention, and the Convention on Biological Diversity[174].

In 2022, the ministers of Infrastructure and Water Management, Nature and Nitrogen, and Agriculture, Nature and Food Quality approved the OSPAR threshold values for eutrophication in the OSPAR sea area. This means that the threshold values will be included in the assessment of good environmental status in relation to eutrophication at sea under the MSFD. In 2027, an evaluation will be conducted to determine whether any remaining obligations for the MSFD exist, and necessary measures will then be incorporated into the RBMPs.

[171] Ministerie van Infrastructuur en Waterstaat, 2022.
[172] Claessens et al., 2024; Ministerie van Infrastructuur en Waterstaat, 2022.
[173] Informatiepunkt leefomgeving, 2025.
[174] Ministerie van Infrastructuur en Waterstaat & Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2018.

5.2.16. Subnational Level

Germany

In the subnational water legislation of the federal states ("**Landeswassergesetze**"), little information has been identified. Although Schleswig-Holstein provides substantial information on the limnic-marine connection in the terminology section in the further sections no interlink has been identified. The same accounts for Niedersachsen, which only briefly refers to the Wadden Sea at some point.

Netherlands

In the Netherlands, interaction with the marine waters is dominated by the large, national rivers. Even though regional waters do have an indirect impact on the loads to the marine system, regional water boards are not intensively involved in the discussions related to this issue.

5.3. Implementation

Implementation refers to making a measure physical and/or organisational happen. This means that what has been planned becomes operational. Effective implementation is essential to reduce nutrient inputs into the Wadden Sea. Especially when many of the measures and interventions must be implemented upstream along the rivers, there is limited awareness of the effects on the Wadden Sea downstream[175]. Therefore, this chapter describes how nutrient reduction measures are implemented.

Are there sufficient financial resources for the implementation?

5.3.1. EU Level

For the WFD, GWD and the MSFD, no specific funding mechanisms are provided at the EU level. Under the WFD Article 9, however, MS can develop water pricing policies that can support the implementation of measures. Some project-based funding is possible under the LIFE+ Program and grants provided by the European Investment Bank.

Under the CAP (see Article 72 of the CAP Regulation[176]), there is a specific measure that allows farmers to compensate for income foregone due to the implementation of specific measures in line with the WFD. This measure is not applied in the Netherlands and Germany[177]. The funding mechanism for the ND is also part of the CAP regulation. Under the so-called Eco-schemes[178], farmers can get support for adopting practices that minimize the negative impact of agriculture on the environment and climate and help them evolve towards more sustainable farming models. MS had the flexibility to customize the eco-schemes to specific national environmental and climate needs. Within rural development support, as in past rural development programs, MS established different kinds of intervention. This includes many agriculture-related area-based interventions addressing specific environment and climate objectives in combination or in addition to other well-established 'non-area' based instruments (such as investments, cooperation, and knowledge exchange) of green architecture.

The BD and HD also encourage the use of EU funding programs, such as LIFE and the CAP, to support conservation measures that often require coordinated efforts between environmental ministries and other sectors.

For the UWWTD no specific funding mechanism exists except Article 9 of the WFD. Article 9 of the WFD requires MS to take account of the principle of recovery of the costs of water services (such as treatment), including environmental and resource costs.

For the NECD no specific funding program has been set up, but under the CAP funding, it is possible to pay for measures to reduce nutrients on the farm level via the eco-scheme and the rural development measures as described above.

The strategies covered in this assessment do not indicate any funding mechanism. The proposed soil law is not in force yet.

5.3.2. Intergovernmental Level

The OSPAR Commission Secretariat facilitates the work of the Contracting Parties by supporting and organising an annual cycle of meetings together with intersessional work programmes. However, the Secretariat is not

[175] The limited awareness, also linked to lack of social acceptance (due to lack of awareness, or reduced feeling of urgency) will be investigated in the NAPSEA project as well, in task 2.4., with a deliverable being published in spring 2025.
[176] EUR-Lex, 2021.
[177] Only AT, DK, ES, IT, LU are using this possibility. See European Commission, 2023a.
[178] EUR-Lex, 2021, Article 31.

responsible for any implementation of the EU law, which is within the responsibility of the MS /contracting parties, so no funding for measures is provided. OSPAR supports the eutrophication work through data collection, data analysis and regular eutrophication assessments and is occasionally conducting projects that address relevant research questions. However, with respect to eutrophication work resources for these tasks are scarce and OSPAR Contracting Parties need to make additional financial contributions to enable project work.

ICPR and ICPER are similar to OSPAR but focus on the implementation of the WFD (and other Directives) on the land side. They coordinate the implementation of these RBMPs discharging into the Wadden Sea. However, the implementation of measures to reduce nutrient reduction falls in the competence of the contracting parties (Germany and Czech Republic[179] in the case of the ICPER and all MS of the ICPR).

The respective goals of the TWSC are manifested in the Wadden Sea Plan, which is a key tool for policy and management. However also here the implementation of measures lies with the contracting parties.

No coordination for Nd and BD exists, except for the Wadden Sea itself. Also no coordination for the CAP and NECD implementation exists.

5.3.3. National Level

A functioning water management system and the achievement of a good status according to the WFD also depend on the administrative capacity of the administration and appropriate financing instruments[180]. This includes the provisions on the reduction of nutrients, which can also only be enabled through sufficient financial resources and capacities.

Germany

In Germany the funding of measures to reduce nutrient pollution is generally covered by three main levels:

- EU and National level funding programs such as the CAP or the Bundesprogramm Nährstoffmanagement/national program for nutrient management[181].
- Länder funding programs e.g. by the Chamber of Agriculture e.g. machinery[182].
- (Water) Companies: Companies need to pay on the one hand for income losses due to stricter environmental regulations and on the other hand by taking investments that are needed to comply with these regulations.

Due to the complex funding structure and diverse funding sources, it is not possible to estimate the total budget for nutrient reduction measures. According to the seventh implementation report of the EC in relation to the WFD Germany is spending around 12.85 % (€ 7.9 billion), on reducing inputs from diffuse sources (incl. agricultural emissions), 37.9 % (€23.3 billion) on water measures ensuring continuity, improving water management and structure roughly 49.3 % (€ 30,30 billion) will be attributed to wastewater related measures[183].

More than 80 % of the costs of implementing measures in Germany are borne by the federal states and regional and local authorities, 0 % by private individuals and less than 5 % by the federal government. The Länder and municipalities finance a large part of the measures through taxpayers' money and fees and levies[184]. However, these funding and financing sources seem not to be sufficient to reach good status in waters[185]. There is also insufficient personnel at all levels (local, Länder and federal) that can address nutrient management issues and several rounds of past and current cost cutting have diminished personnel resources further[186].

Netherlands

The RBMPs include a comprehensive list of various types of area-specific measures and additional WFD measures. These measures involve adjusting the extraction of ground and surface water, tackling emissions from point and diffuse sources, implementing spatial measures aimed at regulating water movement and hydromorphology, other area-specific measures (including spatial planning measures and incentives for a behavioural change), and research. The total estimated cost for implementing the complete package of measures during the period 2022-2027 is approximately €1.5 billion in government expenditures. The national government's

[179] AT, PL and the EU are beside other observers.
[180] Umweltbundesamt (UBA/Ed.), 2021.
[181] German Federal Office for Agriculture and Food (BLE), 2025b.
[182] E.g. Landwirtschaftskammer Niedersachsen, 2025.
[183] European Commission, 2025j.
[184] Bund/Länderarbeitsgemeinschaft Wasser (LAWA), 2021.
[185] Umweltbundesamt (UBA/Ed.), 2021.
[186] Personal interview Wera Leujak

share is around €0.4 billion. The direct expenditures by provinces and water boards are approximately €0.2 billion and €0.9 billion, respectively, while for municipalities, it is around €45-50 million.

The 7th Nitrates Directive Action Program is currently being implemented. The 8th Action Program will be developed in 2025, and preparations for it have already started. The NPLG, which aims for an integrated approach to rural challenges, including nutrient management, will be continued with a lower budget compared to the previous program. This includes the funds from the Government Program (€5 billion + €500 million annually for agricultural nature management).

Given the great importance of timely implementation of the WFD measures, the key risks and bottlenecks have been identified over the past two years. One of the risks is financing. In 2021, a quick scan of costs and benefits of the WFD has been performed[187]. In this report, the authors estimate that the implementation of agricultural and horticultural measures for the period 2022-2027 is expected to result in costs ranging from approximately €1 to €4.5 billion., though some measures have subsidy options, which can help limit the impact of cost increases.

A large part of these costs stems from revenue losses. It is worth noting that a combination of measures may result in lower costs. However, the most important point is that these choices will most likely never be implemented in 100 % of businesses in practice. The willingness to implement (mainly non-mandatory) measures will depend not only on the environmental awareness of individual entrepreneurs but also on the financial capacity of the sector and the ability to pass on necessary environmental investments in pricing. What stands out is that a large proportion of Dutch agricultural businesses have had a negative net business result on average over the past 10 years. A negative net business result offers little room for additional investments unless they are compensated by the market (or through subsidies or programs that reward farmers' efforts with a premium price). Due to the international orientation of the sector, it is not self-evident that the costs of WFD measures can simply be passed on to buyers[188].

For 37 % of the 108 generic policy measures that have not yet been completed, there is a risk that these actions will not be completed by the end of 2027. For 41 % of the area-specific measures that have not yet been implemented, one or more risks have been identified, giving a considerable chance that the measures will not be implemented by the end of 2027. Compared to other risks, financing is a limited risk. For the measures 'tackling point sources,' 10 to 20 % have a financing risk.

In the current planning period of the RBMP, the urgency to make additional efforts to achieve the WFD goals has increased. In the spring of 2023, the WFD impulse program was initiated. With the WFD impulse program, the national government and regions aim to meet the WFD requirements through strong, additional efforts in implementing improvement actions. The primary focus of the WFD impulse program is to ensure that provinces, water boards, municipalities, and the national government can timely implement the agreed measures. Parties involved often need each other to overcome the challenging hurdles together. Additionally, there is an intensification and supplementation of measures.

There is a budget (DAW-impuls) to support farmers to participate in projects, in case the implementation of a measure requires an investment or may lead to a reduction of income (e.g. the extension of a buffer zone). In some regions, an office is installed to support farmers in obtaining subsidies for the implementation of measures. Also, in their BOOT list[189], knowledge of cost-effectiveness is taken into account, if available.

Dutch Nitrate Action Programme, (Omgevingswet): In the Omgevingswet (2024) the financing of monitoring is arranged, but not for measures. Local authorities are required to act on non-compliance, which drives the need for technical expertise and resource allocation at the local level.

The Delta Plan for Agricultural Water Management has a total funding of € 39 million up to 2027[190] but according to expert judgement from the NAPSEA team more budget would be welcomed.

5.3.4. Subnational Level

Germany:

For the implementation of the WFD and GWD, there are specific funds allocated by the Länder and communities. In both cases, interviews in the context of the development of the national water strategy[191] have shown that the financial resources for measures but also administrative staff are not sufficient in many cases. As the funding and

[187] ECORYS (Ed.), 2021.
[188] ECORYS (Ed.), 2021.
[189] Deltaplan Agrarisch Waterbeheer (DAW), 2022.
[190] European Commission, 2025i.
[191] BMUKN/UBA. 2020

financing structure is the same for the MSFD the same applies for the implementation of the MSFD and Natura 2000 measures.

The interview with Klickermann[192] also showed that inadequate staffing and equipment are a significant obstacle to enforcement. In addition, aspects such as the management mentality (e.g., in the prosecution of administrative offences), internal professional exchanges within agencies, misuse of discretion, and structural politicization in enforcement also play a role in deficient implementation.

Communities need to pay for UWWT facilities and refinance the investments and the operation by wastewater fees.

The implementation of the NATURA 2000 regulations is paid by the landowners, mainly leading to losses in income due to restrictions in land use. In some cases, benefits might be gained as the areas attracts tourist leading to an income generation in the region.

The implementation of the ND is financed by the CAP measures or by farmers having reduced income. However, the voluntariness, the short time period and the minimum funding (in Germany) of the new eco-schemes, in combination with the funding cuts of European Association of Guarantee Institutions (AECM in the Netherlands) restrict the effectiveness of the CAP to achieve the envisaged nutrient losses by 2030[193-194].

The investment costs related to the NECD are paid by the relevant business owners.

Netherlands

Under the area-specific approach under the Nitrogen Reduction and Nature Improvement Act provinces are working on solutions for each area through so-called provincial area programs. Main target of this programme was to reduce the impact of atmospheric deposition on nature area's, but the NPLG should come with a set of measures from an integrated approach, in order to improve soil, water and air quality. The previous cabinet allocated € 24.3 billion for this. This amount has been significantly reduced by the current cabinet[195]. According to the Dutch authors of this report he reduced budget is not enough and only measures in a few top-priority regions can be taken.

For the CAP the same applies as in Germany.

The implementation of the NATURA 2000 regulations is paid by the landowners, mainly leading to losses in income due to restrictions in land use. In some cases, benefits might be gained as the areas attracts tourist leading to a income generation in the region.

Communities need to pay for UWWT facilities and refinance the investments and the operation by wastewater fees.

The investment costs related to the NECD are paid by the relevant business owners.

Do agencies and municipalities (Germany) and provinces (Netherlands) have the capacity and skills to implement nutrient reduction measures?

This question excludes the EU and the intergovernmental levels, as measures are only implemented in the combination of national and subnational level.

5.3.5. National and subnational Level

In general, managing nutrient inputs remains a challenging and complex task. Many different sectors and sources contribute to nutrient inputs and our understanding of the effectiveness of measures (the amount of nutrient reduction provided) are limited especially for diffuse sources such as agriculture and are influenced by numerous and rather unpredictable confounding factors, most importantly climate change.

Germany

The instruments in water management specified by national and European legislation are constantly expanding and leading to new tasks in the regional and local administration. A functioning water management system and the

[192] Personal interview (10.03.2025) with Felix Klickermann, UFZ Leipzig.
[193] Bieroza, et al., 2021.
[194] Heyl, et al., 2023.
[195] Rijksoverheid, 2024, p. 54.

achievement of a good status in accordance with the WFD therefore also depend on the administrative capacity of the administration and suitable financing instruments[196].

Germany has a strong track record of reducing nutrient loads from urban and industrial wastewater. Municipalities and water management agencies have the necessary technical expertise and infrastructure to operate modern wastewater treatment plants. As regards to all other laws the implementation at the local and state levels is often seen as difficult. Municipalities and regional agencies often lack the resources and legal authority to effectively monitor and enforce compliance on farms[197].

Netherlands

In our experience, there is detailed knowledge present at regional organizations. They have detailed, in depth knowledge concerning the eutrophication problems in their water systems. In the Netherlands, there is a yearly/twice a year meeting of organizations involved in the WFD implementation (the so-called Rijk-Regio Dag) for exchanging experiences and capacity building. And a structure for implementation of the WFD, for every River basin (5 in total: Rijn Noord, Rijn Oost, Rijn west, Maas, Schelde), in which all regional organizations are represented also provides support. This enhances the exchange of knowledge, and is a platform for discussion for at which level (national vs regional) measures should be taken.

Is there guidance for implementation?

5.3.6. EU level

For the WFD, GWD MSFD, and ND the EU has produced several guidance documents and additional thematic documents that help MS to implement these Directives[198]. These guidance documents also address the issue of nutrients beside several other issues and provide clear guidance.

For the Habitat Directive, the EU has published some guidance documents providing clear guidance on how nutrient loads can be reduced[199]. Another EU Guidance document on the links between WFD as well as BD and HD[200] provides guidance on how to deal with species that require lower nutrient concentrations than those that are defined by good status. In addition to these EU level guidelines, several other guidance documents have been developed by scientific organizations.

These guidelines are also used on the intergovernmental, national and subnational level. Some of them are translated into national languages to increase application in administration by reducing language barriers.

5.3.7. Intergovernmental Level

OSPAR has guidelines on nutrient reduction to combat eutrophication[201] These guidelines aim to limit nutrient inputs to levels that do not harm the marine environment but are of limited relevance to the local level due to the lack of technical details.

In the OSPAR recommendation PARCOM 88/2 on the reduction of inputs of nutrients Contracting Parties agreed to “take effective national steps in order to reduce nutrient inputs into areas where these inputs are likely, directly or indirectly, to cause pollution” and to “ aim to achieve a substantial reduction (of the order of 50 %) in inputs of phosphorus and nitrogen into these areas between 1985 and 1995, or earlier if possible” [202]. Implementation of PARCOM 88/2 has paused for a while but the recommendation was reactivated in 2025. OSPAR aims at agreeing a new or revised recommendation with area-specific nutrient reduction targets in the coming years. PARCOM Recommendation 94/6 on Best Environmental Practice for the Reduction of Inputs of Potentially Toxic Chemicals from Aquaculture Use covers also nutrient inputs[203]. Beyond these two recommendations, there are no active decisions/recommendations or guidelines that address measures to reduce nutrient inputs in OSPAR.

[196] Umweltbundesamt (UBA/Ed.), 2021.
[197] Personal Interview Felix Klickermann (10.03:2025), UFZ Leipzig.
[198] European Commission, 2025b - see list of CIS guidance and technical documents and https://environment.ec.europa.eu/topics/water/nitrates_en.
[199] European Commission, 2021b; CBD, 2007.
[200] European Commission, 2010b.
[201] E.g. OSPAR Commission, 2025d.
[202] OSPAR, 1988.
[203] OSPAR, 1994.

On the Wadden Sea Secretariat, the ICPR and ICPER websites no guidance documents related to nutrients have been identified.

5.3.8. National and sub-national Level

Germany

The LAWA uses EU guidance documents to further specify national guidance documents[204] for the implementation of the WFD and its daughter directives. No guidance on national level for the MSFD was identified. Germany has also developed guidance documents for the Länder that cover aspects not addressed on the EU level. In both cases, no specific guidance documents released by the German administration for the management of nutrient pollution have been identified. Nevertheless, the German Association for Water, Wastewater and Waste (DWA) an independent interest group[205] has released several guidance documents about nutrient management[206]. These documents are or have to be used by planners and administrations.

On the state (Länder) level also some specific guidance has been identified in the context of the WFD and MSFD[207].

No guidance document for the implementation of the ND in Germany at any level has been identified.

For the implementation of the UWWTD in Germany, again the DWA has published several guidance documents on how to design and operate a treatment plant for industries and households.

For the CAP, no guidance document for administrations is needed as the implementation of the measures is mostly within the farming sector. For farmers, several guidance documents on how to implement nutrient reduction measures on the state (Länder) level exist[208] as well as specific education and advisory services (which are part of the CSP, RMBPs or part of specific drinking water protection activities). Studies have shown that these guidance and advisory services are proven to be effective in reducing nutrient pollution[209], however, the uptake rate by farmers could be higher[210].

No guidance document for the implementation of the NECD has been identified.

Netherlands

For the WFD, national guidance's are in place, e.g. to assess the status of the water bodies on the basis of water body type-specific threshold values[211]. These are regularly updated[212]. For the MSFD assessments and reporting, no national guidance's are in place. The assessments follow the EU-level formats and are done within in the regional collaboration through OSPAR.

5.4. Monitoring and reporting

Effective monitoring and reporting are important measures when it comes to achieving policy objectives. A Monitoring and Evaluation system should allow tracking progress of the measure implementation and based on this facilitate learning from both successes and failures, enabling organizations to adapt their strategies as needed which allows them to develop the policy instrument further

This chapter analyses monitoring and reporting mechanisms within the selected policy instruments and how they are integrated across different governance levels from the EU to the subnational levels. Across the EU and intergovernmental level monitoring and reporting processes for environmental policies typically combine both process-based and impact-based approaches (e.g. WFD, GWD, ND). EU Directives like the ND and the WFD emphasize a balance between ensuring that prescribed measures are implemented (process-based) and

[204] Bund/Länderarbeitsgemeinschaft Wasser (LAWA), 2024.
[205] One of the most important tasks of the DWA is the development and updating of a technical set of rules, which is largely determined by volunteer experts. The DWA set of rules consists of working and information sheets for the areas of wastewater and waste technology, soil and water protection, climate change, hydraulic engineering and water management. The set of rules reflects the current state of the art and at the same time prepares the legislator's requirements for water management practice. It serves to ensure quality and is the basis for training and further education. In addition to the set of rules, the DWA also publishes specialist books, brochures and other publications.
[206] See Reduktion der Stoffeinträge durch Maßnahmen im Drän- und Gewässersystem sowie durch Feuchtgebiete (DWA, 2012.) or Diffuse Stoffeinträge in Gewässer aus der Landwirtschaft (DWA, 2016).
[207] See for example Allianz Gewässerschutz.
[208] E.g. Bayerische Landesanstalt für Landwirtschaft (LfL) 2020, Deutscher Verband für Landschaftspflege (DVL) e. V. 2019
[209] See for example: Allendorf, Arnd. 2017.
[210] European Commission, 2022c.
[211] See Enserink et al., 2024.
[212] Evers, et al., 2023.

evaluating the actual environmental outcomes, such as water quality improvements (impact-based). At the intergovernmental level, agreements like the Wadden Sea Plan and Gothenburg Protocol similarly integrate process and impact monitoring, though the emphasis may vary depending on the specific environmental goals.

Is there a monitoring and reporting process in place that informs and reports along the implementation chain? Is this reporting process- and impact-based?

5.4.1. EU Level

The **WFD** sets out a more comprehensive framework than the ND, requiring MS to establish monitoring programs (Article 8) to assess water status within each RBD. For surface waters, the programs must monitor and assess the ecological and chemical status at the water body level. Monitoring under the WFD is both process- and impact-based, as it not only tracks the implementation of measures but also assesses their effectiveness in achieving "good status" for water bodies. To support the monitoring objectives of the WFD the EC published the Directive 2009/90/EC that outlines technical specifications for chemical analysis and monitoring of water status. It establishes minimum performance criteria for analytical methods, including standards for uncertainty of measurement and limits of quantification[213]. Furthermore, the EC published the Decision 2013/480/EU which focuses on standardising water quality assessment across MS by establishing specific classification boundaries for monitoring systems. This ensures that the ecological status of water bodies is evaluated consistently across different regions[214].

The WFD's reporting cycle occurs every six years, with MS submitting RBMPs to the EC, which include amongst others information detailed monitoring data (Article 15). The reporting should align with Article 5 of the WFD, which mandates an analysis of pressures from nutrients and other significant pollutants. To streamline the reporting and to get information also in electronic format a reporting guidance is developed for each cycle. The document WFD Reporting Guidance 2022 (2023) requires the reporting of impacts of nutrients on rivers, lakes, transitional waters and coastal water is monitored as part of 'Biological Quality Elements used in operational monitoring.[215]

The **GWD** complements the WFD by focusing specifically on groundwater quality. The monitoring is based on Article 8 and the monitoring requirements described in ANNEX V of the WFD. It requires MS to monitor pollutants, including nitrates, and report on the chemical status of groundwater bodies. The monitoring process is impact-based, as it assesses whether groundwater quality meets established thresholds and whether there are trends indicating deterioration.

Under the **MSFD**, reporting is both, process-based and impact-based, but it can be argued that the focus is more on impact-based reporting. Reporting obligations are extensive. MS report on assessments of environmental status (Articles 8,9,10), on monitoring programmes (article 11) and on the programmes of measures (article 13) every six years. While reporting on environmental status is rather detailed, the reporting on the programmes of measures remains on a very general level and does not allow any conclusion on whether the reported measures are sufficient to achieve good environmental status.

Furthermore, the **MSFD** requires MS to establish and implement coordinated monitoring programs for the ongoing assessment of the environmental status of their marine water (Article 8). The coordination of the MSFD with the WFD is essential, as they target a similar range of pressures and drivers across all freshwater, transitional, and coastal water bodies in the EU. Thus, MSFD and WFD reporting on programmes of measures were aligned to better exploit synergies.

The latest analysis report about the monitoring programs across MS reveals gaps, particularly in linking monitoring to other MSFD obligations[216]. However, it does not particularly address the status of nutrient reporting. Nevertheless, MS are encouraged to create more efficient monitoring programs, which are vital for achieving environmental objectives. However, the EC notes that data collected are often not comparable and are sometimes disconnected from environmental targets. As part of its ongoing review of the MSFD, the EC aims to harmonize monitoring efforts, simplify reporting requirements, and ensure that data contribute to broader initiatives like the European Green Deal, the Zero Pollution and Biodiversity Monitoring Frameworks, and the Kunming-Montreal Global Biodiversity Framework[217].

[213] European Union, 2009.
[214] European Union, 2006b.
[215] CIS guidance published by the European Commission, 2023.
[216] European Commission, 2023b.
[217] European Commission, 2023b.

The ND requires MS to monitor the quality of the waters and to identify areas that drain into polluted waters or are at risk of pollution. Every four years, MS send a report to the EC including the designated Nitrate Vulnerable Zones, monitoring results of surface waters and groundwaters concerning nitrates concentrations and eutrophic status, and a summary of their Action Programmes. Based on this information, the EC publishes a report every four years on the implementation of the ND (latest report published in 2021)[218].

The UWWTD mandates MS to monitor the discharges from urban wastewater treatment plants to ensure they comply with the standards set out in the Directive. It also requires the sampling of discharges at the outlet points to verify that the treated water meets quality standards before being released into the environment (Article 15). The assessment report of the new UWWTD proposal states that the monitoring requirements set in Article 15 of the Directive have been effective in fostering compliance. However, technological advancements now enable more efficient and accurate monitoring of both existing and emerging pollutants. MS show large divergences among them in terms of monitoring. Most MS are already collecting more frequent and broader information on more pollutants than what is required by the Directive.

However, the knowledge of the quality and quantity of wastewater is insufficient in many instances. Several cases of over-dimensioning of facilities but also storage capacities to reduce stormwater overflow and urban runoff, leading to excessive costs and inefficient water collection and treatment, could have been avoided with a better understanding of the actual load to be treated. The revised UWWTD aims to improve and simplify monitoring and reporting. New monitoring activities will be necessary to ensure compliance with proposed requirements for micro-pollutants, non-domestic pollution, emission of greenhouse gases, and stormwater overflows/urban runoffs[219].

The revision proposes continuous monitoring for larger facilities and suggests that MS should maintain standardized data sets that are regularly updated. It also calls for aligning new reporting obligations with other EU policies, such as the Industrial Emissions Portal, to ensure coherence and transparency. Furthermore, the EC will conduct regular compliance checks based on MS' reports, using indicators such as the number of facilities equipped with additional treatment for N, P, and micro-pollutants, along with the corresponding reduction in N/P releases and toxic loads at both national and EU levels[220].

The **CAP legislation** lays down a common set of indicators as part of a new performance, monitoring and evaluation framework. Regulation (EU) 2021/2115 of the European Parliament and of the Council establishes rules on support for CSPs[221]. This regulation establishes the performance monitoring and evaluation framework, which applies to the CAP from 2023 until 2027. This set of common performance indicators includes:

- output indicators, which will be used for monitoring the implementation of the CAP.
- result indicators, which will be used to monitor EU countries' progress towards pre-set targets; Not all 44 targets need to be included in each CSP. The planning of targets depends on the needs and planned measures decided at the national level. The coverage or uptake of CAP-funded or co-funded actions is typically expressed in terms of areas (share of agricultural land) or beneficiaries (i.e. share of farms).
- context and impact indicators, which will be used to assess the overall policy performance against CAP objectives.

The indicators will be monitored through annual performance reports and a biannual review of the performance of CSPs to assess the progress of EU countries in reaching their targets and the objectives of the CAP. Further Implementing Regulation (EU) 2022/1475[222] lays down detailed rules for the implementation of the evaluation of the CSPs and the provision of information for monitoring and evaluation. This regulation establishes a set of common rules to collect data which will be used to perform the monitoring and evaluation of activities during the CAP implementation period.

The **NECD** requires MS to monitor and report emissions of key air pollutants (including NO_x and NH_3), which can indirectly affect water quality through atmospheric deposition (Article 9). The monitoring is process-based, focusing on whether national emission ceilings are met, but it also includes impact-based assessments of air quality and its implications for ecosystems[223]. MS must coordinate with other EU monitoring programmes like the WFD monitoring

[218] European Commission, 2021c.
[219] European Commission, 2022a.
[220] European Commission, 2022a.
[221] European Commission, 2021d.
[222] European Commission, 2022b.
[223] European Commission, 2022a, p. 27.

program. Furthermore, to ensure that information on emissions reported by MS is consistent and harmonized with international requirements, the NECD requires MS to follow the methodologies agreed upon by the UNECE Long-range Transboundary Air Pollution Convention (Article 9)[224]. Annex V of the directive specifies monitoring requirements regarding NO_x and NH_3, defining optional indicators which focus on the impact on surface waters and terrestrial ecosystems. Key indicators are the soil acidity, soil nitrate leaching and the nutrient balance in foliage. In addition, MS must ensure that the data reported in their national air pollution control programmes aligns with the methodologies and timelines outlined in the NECD and is consistent with international reporting standards (Article 10).

The **F2F Strategy** does consider water or nutrient management when it comes to monitoring. However, the EC will continue to monitor food security and the competitiveness of farmers and food operators, with an emphasis on developing an EU Code of Conduct for responsible business and marketing practices, which could include water and nutrient-related topics.

Monitoring under the **Biodiversity Strategy** it is stated that the EC will develop a set of indicators for the progressive reduction of pollution, and will establish baselines to help monitor progress[225].

The proposed soil law foresees in chapter two a monitoring and assessment framework of soil health. This framework is currently under discussion among MS and the EC.

5.4.2. Intergovernmental Level

The primary purpose of Decision 2017/848[226] is to ensure greater consistency and comparability across the European Union in the assessment of marine environmental status, particularly in the context of the MSFD. It strengthens the link between the EU and the RSCs by setting criteria, methodological standards, specifications and standardised methods for the monitoring and assessment of predominant pressures and impacts.

The **OSPAR** has developed a Common Procedure[227] to identify the eutrophication status of the maritime area. The procedure includes monitoring and reporting requirements that align with the obligations and commitments of EU MS, particularly under relevant EU legislation, such as the WFD, the MSFD, and the EC Decision on good environmental status[228].

The **Gothenburg Protocol** under the Convention on Long-range Transboundary Air Pollution addresses the reduction of acidification, eutrophication, and ground-level ozone. Monitoring and reporting under this protocol are largely process-based, focusing on the compliance of countries with their emission reduction commitments. However, there is also an impact-based component, as the protocol includes monitoring the environmental effects of air pollution, such as acid rain and its impact on ecosystems (Article 6).

The **Wadden Sea Plan** has implemented the Trilateral Monitoring and Assessment Programme (TMAP), which is a collaborative initiative by the Wadden Sea states to monitor and assess the ecological health of the Wadden Sea, including biodiversity, water quality, and human activities. TMAP aligns with key EU legislation, such as the WFD, the HD and BD, and the MSFD, ensuring compliance and supporting the region's World Heritage status. It provides a scientific basis for policy-making, management, and reporting on environmental outcomes, facilitating coordinated conservation efforts across the region. The TMAP is implemented by national and regional authorities from Denmark, the Netherlands, and Germany, including agencies such as the Danish Environment Protection Agency, the Dutch Ministry of Agriculture, Nature and Food Quality, and the German Federal Ministry for the Environment, among others, with coordination by the Common Wadden Sea Secretariat[229].

Both the ICPR and ICPER do not have their own monitoring systems in place. They use data from the contracting parties to produce status reports and RBMPs.

5.4.3. National Level

Germany

[224] European Environment Agency (EEA), 2024.
[225] European Commission, 2020a.
[226] European Union, 2017.
[227] OSPAR, 2022b.
[228] European Union, 2017.
[229] Common Wadden Sea Secretariat, 2025.

The WHG requires monitoring of all water bodies in Germany to ensure compliance with the WFD, GWD and other EU directives. Monitoring under the WHG is both process- and impact-based, assessing the implementation of protective measures and their effectiveness in improving water quality. In the last management period, water status was monitored at more than 20,000 monitoring sites in surface waters and almost 13,000 monitoring sites in groundwater. The number of monitoring sites in groundwater has also increased significantly in recent years from 6,500 in the first management period to more than 7,200 in the second and to almost 13,000[230]. The law prescribes different monitoring systems to meet requirements and align with:

- **Marine standards**: In order to fulfil the requirements of the MSFD, responsible authorities must establish and implement monitoring programmes to continuously assess the status of marine waters based on initial evaluations. These monitoring programmes must align with other marine protection requirements, including underwater or nature conservation laws and international marine agreements. Additionally, existing programmes for monitoring the ecological and chemical status of coastal waters should be largely considered when developing and implementing these monitoring programmes (Article 45f). In their latest assessment, the EC stated that the German monitoring program is partially adequate for measuring progress towards achieving good environmental status. However, none of the descriptor categories are fully addressed in the current monitoring programs, which Germany has acknowledged and plans to address. Regarding eutrophication further development efforts to address remaining gaps have been identified, e.g. concerning the monitoring of cyanobacteria blooms or atmospheric nutrient deposition, in coordination with the work done in HELCOM and OSPAR[231].
- **Wastewater treatment**: The WHG requires individuals or entities discharging wastewater to ensure it is tested by qualified personnel or an appropriate entity. Wastewater facility operators must monitor the facility's condition, functionality, and the type and quantity of wastewater, maintaining records as required (Article 61).

The **OGewV** specifically addresses surface water quality, setting out detailed monitoring requirements for various pollutants, with a focus on impact-based monitoring of water quality indicators. The methods used for monitoring biological, hydromorphological, and physicochemical water quality must meet EU standards (Article 9). The OGewV specifies how surface waters are to be monitored for ecological and chemical status, with regular updates to monitoring programs (Article 10). Moreover, it requires the monitoring of substances on the EU observation list and specifies methods, frequencies, and reporting procedures to ensure comprehensive and accurate monitoring data, which must be reported to federal authorities (Article 11).

The **Grundwasserverordnung** mandates the establishment of monitoring stations in each groundwater body to oversee quantitative and chemical status. A program for overview monitoring of the chemical status must be developed and updated regularly during the management plan period. If management objectives are not met or groundwater bodies are at risk, operational monitoring is required between overview periods (Article 9). The detailed requirements are described in Annexes 3 and 4 of the law.

While the Düngeverordnung does not address monitoring the Düngegesetz outlines the responsibilities for monitoring and enforcing compliance with fertiliser regulations, including EU-relevant directives. It mandates that authorities at the state and federal levels ensure compliance, manage data collection, and facilitate data sharing for regulatory purposes. The act also grants officials the right to inspect premises, review documents, and collect samples[232].

For the qualitative monitoring under the Habitats Directive of the conservation status of the habitat types in Annex I and the species in Annexes II and IV, a nationwide uniform procedure for the recording and assessment of protected assets has been agreed upon between the federal government and the states[233].

Germany followed the legal requirements set out in Article 9 of the NECD and reported the required information in 2020 for the first time[234].

Netherlands

[230] Umweltbundesamt (UBA/Ed.), 2023.
[231] European Commission, 2017.
[232] German Federal Ministry of Justice and Consumer Protection, 2009a.
[233] Bundesamt für Naturschutz (BfN), 2025.
[234] German Federal Ministry for the Environment, Climate Action. Nature Conservation and Nuclear Safety (BMUKN), 2019.

In the Netherlands, the **National Water Programme** (Dutch Water Act) integrates the requirements of the WFD and other EU water directives, requiring extensive monitoring of water quality across the country[235]. Monitoring data on N and P, and assessments of these nutrients, are provided by regional water boards and Rijkswaterstaat to two portals for freshwater and marine waters respectively[236] and are widely accessible through these portals. Water managers also provide information via factsheets for each WFD water body on the measures taken and to be taken, and the prognosis for achieving goals by 2027. All this information forms the basis for national and regional policy evaluations.

According to the WFD Annex IV, only Natura 2000 areas are designated as protected nature areas under the WFD. Natura 2000 areas are protected by various legal instruments, with the strictest objective applying per Article 4.2 of the WFD. Natura 2000 reporting is not included in the WFD reports.

In recent years, the Netherlands has focused on an integrated approach to nutrient issues within the NPLG. This approach covers Space, Nature, and Agriculture, including the funds from the Government Program (€ 5 billion + € 500 million annually for agricultural nature management). The effectiveness of this program is monitored by scientific institutions. This consortium periodically reports on N reduction and nature improvement within the framework of the Nitrogen Reduction and Nature Improvement Act[237].

5.4.4. Subnational Level

Germany

The monitoring competencies related to WFD, MSFD, ND and GWD of the responsible authorities are defined in Articles 100 and 101 of the WHG. Therefore, the responsibility of monitoring lie on the federal level. The regional laws in Germany, such as the Niedersächsisches Wassergesetz, Schleswig-Holsteins Landeswassergesetz, and Nordrhein-Westfalen Wassergesetz (Landeswassergesetz), provide in some cases additional layers of monitoring, offer additional monitoring levels, some of which differ greatly, but all of them rely mainly on the requirements of the WHG, the OGewV and the Grundwasserverordnung.

Municipalities are responsible for wastewater disposal and must monitor wastewater, including industrial wastewater, for certain parameters in their treatment plants. Companies are generally responsible for monitoring their own wastewater[238].

Article 6 of the Federal Nature Conservation Act[239] establishes the monitoring of nature and landscape as a task of the federal and state governments. This monitoring “serves the targeted and ongoing identification, description and assessment of the state of nature and landscape and their changes, including the causes and consequences of these changes”. Obligations to monitor nature and landscape also arise from EU directives such as the HD and the BD, as well as from international conventions such as the Convention on Biological Diversity and the Bonn Convention. The task of observing nature and landscape, and thus of monitoring, is to provide targeted and up-to-date information for the effective protection of nature and landscape.

Netherlands

The regional water boards and Rijkswaterstaat perform the monitoring in the regional and national water bodies. Data collected for the WFD is also used for the Nitrate directive. Only little data is available for surface water in nature areas, this is partly since the monitoring in those areas is more project based.

A significant portion of the monitoring of Natura 2000 sites in the Netherlands are largely decentralized to the provinces and water authorities.

6. Analysis

This chapter analyses the assessments carried out in chapter 5, along a set of key questions. It combines our findings with evidence from other sources of information such as the EU fitness checks. The analysis is the basis for the recommendations in chapter 7.

[235] Ministerie van Infrastructuur en Waterstaat & Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2025.
[236] Informatiehuis Marien, 2025 and Water Information House, 2025.
[237] National Institute for Public Health and the Environment (RIVM), 2024.
[238] German Federal Ministry of Justice and Consumer Protection, 1997.
[239] German Federal Ministry of Justice and Consumer Protection, 2009b.

6.1. How do the policy instruments serve to reach the objectives of the Zero Pollution Action Plan?

The EU's water policy is primarily driven by the WFD and its related directives, and the MSFD plays a crucial role in achieving the EU's Zero Pollution Action Plan. The strategy, adopted in 2021, aims to create a toxic-free environment for citizens and future generations by 2050. Several policy instruments contribute to this goal:

- **Diffuse pollution measures:** Addressing diffuse pollution from agriculture, a major source of water pollution, is crucial. The ND promotes the implementation of agricultural best practices, nutrient management plans, and buffer zones to reduce the runoff of nutrients into water bodies. The CAP is one mechanism to pay for these measures that go beyond legal obligations.
- **Urban wastewater treatment:** The Urban Wastewater Treatment Directive complements the WFD by setting standards for wastewater treatment, ensuring the removal of pollutants before discharge into the environment.
- **Habitat restoration:** Restoring rivers, lakes, and wetlands to their natural state enhances their capacity to self-clean and support diverse aquatic life. Restoring riparian zones and restoring floodplains also results in nutrient retention in rivers. This results in an indirect regulation of nutrient inputs to the oceans. This contributes to a healthier environment, a central pillar of the Zero Pollution Action Plan.
- **Hydromorphological improvements:** Modifications to water bodies, such as dams and channelization, can negatively impact ecosystems. The WFD promotes measures to mitigate these impacts and restore more natural flow regimes, benefiting both water quality and biodiversity. Altering the flow regime influences nutrient retention in streams, thereby indirectly regulating the input of nutrients into the seas
- **Protecting sensitive areas:** Designating protected areas, such as Natura 2000 sites, helps safeguard particularly valuable aquatic ecosystems and the species they support.
- **Clean Air:** The NECD contributes to the reduction of N inputs via atmospheric deposition.

The Zero Pollution Action Plan calls for an upside-down pyramid of action. This upside-down pyramid claims that, first of all, pollution should be prevented at the source. Where fully preventing pollution is not (yet) possible, pollution should be minimised. Finally, when pollution occurs, it should be remediated – and the related damage compensated.

6.2. Are the identified nutrient reduction objectives and targets consistent and quantified?

Section 5.1 shows that the targets and objectives to reach good ecological/environmental status are constant on the EU level. EU policy cross reference to each other as a result of an extensive interservice consultation during their development. This applies to the marine and the inland waters but also between the two. This finding is confirmed by the WFD Fitness check[240], which states that “devised in sequence and complementary to each other, the WFD, MSFD GWD and Floods Directive[241] form for the most part an internally coherent package. Further it is stated that “there are still issues of incoherence with sectoral policies, for example on agriculture, energy and transport, and these can hinder the achievement of the objectives of the WFD and daughter directives.” The link to the ND is not assessed, but from our findings it could be strengthened

Since the CAP does not have any quantified targets and several objectives (section 5.1) it remains with the MS ambition to which extend a contribution to nutrient reduction is made. The Court of Auditors concluded[242] that the Plans for 2023-2027 are greener than in the previous CAP period, but do not match the EU’s ambitions for the climate and the environment, and key elements for assessing green performance are missing. According to the Plans, only 15.2 % of the EU agricultural area should be under sustainable nutrient management by 2027.

However, due to several political reasons in April 2024, the EU Parliament agreed on a EC proposal to reduce the environmental requirements of the CAP[243]. The latest CAP reduces several environmental requirements to which farmers must abide to receive direct payments. The requirement to devote at least 4 % of arable land, at the farm level, to non-productive areas or features, including land lying fallow, is no longer mandatory for CAP beneficiaries.

[240] European Commission, 2019.
[241] European Commission, 2007.
[242] European Court of Auditors, 2024.
[243] European Parliament, 2025.

However, MS are required to offer a top-up, in the form of eco-schemes, to farmers setting aside land for non-productive features. MS can demand crop diversification instead of the more demanding crop rotation. They are also able to introduce exemptions from certain requirements, and temporary derogations in case of extreme weather but not because of climate change. Further several controls and penalties regarding environmental requirements for small farms, and simplify the procedure to amend the national CSPs for MS are eliminated. All of this is expected to have negative impacts on nutrient input to the water and therewith to weaken the link to the EU environmental targets[244].

The NECD and the Natura 2000 regulations complement the water law and support the achievement of the set objectives and targets. This contribution has been tried to quantified in the NAPSEA report D3.5[245].

On intergovernmental level objectives and targets are in principle consistent within the inland water system and within the marine system but not between inland and marine system as some practical issues remain (see Box 1).

Box 1 Alignment of Freshwater and Marine Water Goals

A revision and harmonization of the assessment of eutrophication in marine waters within the OSPAR framework was completed in 2022. Harmonized and coherent threshold values established in the revised Common Procedure[246] were used. Germany did include the OSPAR thresholds for the 2024 MSFD assessment. In 2022, the Dutch ministries of I&W and LNV agreed to the OSPAR threshold values for eutrophication in the OSPAR sea area. This means that the threshold values will be included in the assessment of GES concerning eutrophication in the sea under the MSFD. In 2027, the Netherlands will evaluate if the new, harmonized threshold values are expected to be met through currently agreed WFD measures, in order to determine if any tasks for the MSFD remain, and necessary measures will be included in the RBMPs[247]. Germany has also undertaken such an evaluation and has included additional measures to reduce nutrient inputs in the MSFD programme of measures. These mainly concern atmospheric nitrogen inputs from shipping and other sources, since these are not addressed by the WFD[248].
As a result of inconsistencies in EU legislation and in spite of efforts to align the assessment methods and threshold values, the eutrophication goals for freshwater and marine waters still do not align perfectly.

On the national level the objectives and targets are fully aligned in both countries in the water and marine sectors. To a lesser degree this alignment can be found in other policy areas. In November 2023, the EC published an assessment of CSP delivery on CAP objectives. The report relies on the information contained in the CSP as well as on qualitative appraisals of the potential effects of the choices made by EU countries[249]. Key conclusions related to the coherence of the legislation are:

- The Plans make a substantial effort concerning soil protection (emphasising soil erosion and organic matter content) and, albeit to a lesser extent, nutrient management and water quality. Compared with the past, overall, conditionality requires longer soil coverage, better tillage practices and crop rotation, and wider buffer strips along water courses. It also incorporates statutory management requirements regarding phosphate pollution. Most MS have increased, often significantly, the area targeted by voluntary measures to improve soil quality (47 % of EU farmland, up from 15 % in 2021).
- Some of these measures directly or indirectly prevent nutrient losses and lead to better water quality. Most CSPs address air quality, focusing on investments and nutrient application approaches which reduce ammonia emissions - but with limited land coverage (6 % EU farmland).
- Enhanced conditionality rules concerning buffer strips along water courses and soil management, coupled with numerous voluntary interventions for nutrient management, will contribute to meeting the Farm to Fork Strategy target to halve nutrient losses by 2030. Restrictions on fertiliser use and support for improving soil health and fertility target 15 % of the EU's farmland.
- The option of compensating measures to counter nutrient pollution as laid down under the Water Framework Directive is rather under-used.

[244] Pesticide Action Network Europe (pane), 2024.
[245] Musoff et al., 2024.
[246] OSPAR, 2022a.
[247] Claessens et al., 2024.
[248] German Federal Ministry for the Environment, Climate Action. Nature Conservation and Nuclear Safety (BMUKN), 2025b.
[249] European Commission, 2023c.

The link between the fresh water and marine sector with the NECD is rather limited and evidence was found that the reduction targets of the NECD will sufficiently contribute to achieving water targets for nutrient reduction[250].

6.3. How consistent are the different quantified nutrient targets and can management objectives be derived?

Establishing threshold values for nutrients (which express an understanding of the relation between biology and increased nutrient concentrations for a particular waterbody class and type) paves the way for designing appropriate measures addressing nutrient concentrations and is thus a key step for the management of water resources under the WFD.

As the findings in the NAPSEA report D4.1[251] indicate, the threshold values decrease from source to sea, which is to be expected considering the dilution of nutrients released from land-based sources. However, our assessment shows that inconsistencies appear, due to the different indicators and assessment methods for N and chlorophyll which are used under OSPAR/MSFD and the WFD, that also consider waterbody-specific ecological conditions.

Poikane et al. (2019)[252] further identified four essential issues why there are some inconsistencies within the thresholds and for nutrients in inland water:

(1) Different nutrients (N and/or P) are used for different water categories in different countries.

(2) The use of different nutrient fractions (total, dissolved inorganic) and different statistical summary metrics (e.g., mean, percentiles, seasonal, annual) currently hampers comparability between countries, particularly for rivers, and transitional and coastal waters.

(3) Wide ranges in nutrient threshold values within shared water body types.

(4) Different approaches are used to set threshold nutrient concentrations to define the boundary between "good" and "moderate" ecological status. Expert judgement-based methods resulted in significantly higher (less stringent) good-moderate threshold values compared with data-driven approaches, highlighting the importance of consistent and rigorous approaches to criteria setting.

Transferring thresholds into nutrient-reduction loads is another challenge. A study commissioned by the Working Group ECOSTAT in 2022[253] concluded that a few MS use loads calculated from measured nutrient concentrations multiplied by flow in the inflows to the water body as their method; others use loads calculated from modelled source-specific emissions, while most use a combination of both approaches. According the study at least 28 models are used by MS; except for two models used in two MS and one used in four, the remaining 25 models are only used in a single MS. In multinational basins such as the Rhine and the Elbe (both flowing into the Wadden Sea), this heterogeneity can lead to different management approaches, although the International River Basin Commissions try to address this issue.

Even if nutrient reduction requirements have been derived, it is highly challenging to plan sufficient and adequate measures to meet these reduction requirements. There is still a knowledge gap on the effectiveness of measures, especially related to diffuse nutrient sources and in particular measures in agriculture. There are only few before-after studies to quantify the effectiveness and different measures preform very different in different areas/ soils/ topographies etc. In addition, with increasing climate change, the effectiveness of measures can change in unpredictable ways. These serious knowledge gaps hamper the planning of measures that are sufficient to meet nutrient reduction requirements.

6.4. How does the governance system in relation to nutrients work towards implementation?

According to chapter 5.2, the policy instruments on the EU level incorporate various coordination mechanisms between institutions and nutrient-reduction-relevant ministries to improve regulatory processes. By facilitating collaboration across different governance levels and involving multiple stakeholders, these policies aim to effectively address nutrient pollution and achieve environmental goals. The integrated approach promoted by these EU level instruments ensures that conservation measures and nutrient reduction efforts are aligned, enhancing the overall effectiveness of regulatory processes and environmental management across Europe.

[250] See table *7.1 and 7.2 in* Nitraatrapportage 2024 *(*National Institute for Public Health and the Environment (RIVM), 2025).
[251] Enserink et al., 2024.
[252] Poikane et al., 2019.
[253] Kelly et al., 2022.

The EU Fitness Check report concluded that[254]: *"The WFD's governance mechanisms provide for monitoring and public participation to guarantee evidence-based policy-making. The increased understanding and knowledge that result from the preparation of the RBMPs and flood risk management plans and the sharing of good practices between Member States have led to increased implementation of concrete measures on the ground."*

However, when checking from an implementation perspective, major shortcomings are recorded when it comes to implementing the targets of achieving WFD objectives in other policy areas. In particular a stronger integration of water and agricultural policies is needed Our assessment is underpinned by a report analysing 13 draft RBMPs of the third cycle (published March 2021) they reveal a general failure of MS to integrate water protection and the WFD's environmental objectives for Europe's waters into other policies, in particular energy, agriculture and infrastructure policies[255].

Another issue related to WFD and MSFD is the fact that the different elements or steps of the management cycle have a different weight in the implementation processes of the Directives. In fact, both Directives focus very heavily on the assessment of the status of the coastal and marine environment. Reporting on the status assessment is highly detailed and there are efforts to compare threshold values and the definition of what constitutes good status across MS, as can be seen from the latest Article 12 assessment for the MSFD. However, when it comes to measures reporting on these is rather vague as set out in the NAPSEA report D4.1[256]. Much more information is required, the information lacks comparability and it is actually not possible to assess, based on the information that MS provide, which measures, if any at all, are undertaken to improve the status. Since the programmes of measures are the most important element in the management cycle giving it such a low weight and comparability seriously weakens the effectiveness of the WFD and MSFD. It leads to an ever increasing improved and detailed understanding about the demise of our coastal and marine ecosystems without in fact ensuring quick improvements in the status through the implementation of measures.

According to the EC evaluation of the MSFD the complexity of the legislation, and its lack of clearly enforceable provisions, hinders the development of adequately effective marine strategies and has resulted in an insufficient level of action in the four marine regions to reduce the key pressures on the marine environment[257].

The latest implementation report of the MSFD states that[258]: "*Member States should put in place governance mechanisms that support the design and implementation of ambitious, coherent, coordinated, fair and effective programs of measures. This involves:*

- *tackling decisively the obstacles to implementing the measures, such as insufficient financing;*
- *improving coordination across authorities to ensure that MSFD measures dependent on other policies are fully implemented by the authorities dealing with implementation of these policies, notably in relation to fisheries, agriculture and energy;*
- *involving the public and stakeholders at the planning stage, taking their contributions into account in the design of measures and ensuring social acceptability of the measures proposed, adopting accompanying measures to limit potential negative impacts if necessary;* "

The EC evaluation of the MSFD state that the RSC also have limited enforcement mechanisms, and the process governing the interaction between EU policies and RSCs is not well defined[259].

A similar picture is drawn in the fitness check of the EU Nature Legislation (BD and HD)[260] which states that the following elements (besides others) are significantly limiting progress: i) insufficient stakeholder involvement (65 %), ii) ineffective local coordination (62 %), iii) gaps in scientific knowledge of species and habitats (61 %), and iv) ineffective EU-level coordination (54 %). The fitness check further states that interactions with other EU laws and policies have caused inefficiencies to some extent (58 %), or to a large extent (27 %).

On the opposite proper enforcement, effective national coordination, international cooperation, public awareness and guidance have some impact on the success of the Directives[261].

The EC report in the evaluation of the MSFD results that inconsistencies can also be the result of weak coordination between the national and regional authorities responsible for the implementation of the different Directives (WFD, MSFD and HD), or because of differences in approach and failure to use the flexibility laid down in the legislation.

[254] European Commission, 2019.
[255] Living Rivers Europe, 2021.
[256] Enserink et al., 2024.
[257] European Commission, 2025k.
[258] European Commission, 2025a.
[259] European Commission, 2025k.
[260] European Commission, 2016.
[261] European Commission, 2016.

For example, methodological choices made by the experts involved in preparing regional assessments under the MSFD may differ from those made by national experts in charge of implementing the WFD and HD[262]. In fact, the MSFD has to some extent weakened the work of the Regional Seas Conventions on taking actions to improve the marine environment, due to a fear that ambitions discussed regionally for taking action could become legally binding under the MSFD. The inconsistencies in implementing the various directives are also based in the legal text and the Common Implementation Strategies at the EU level, which are Directive-specific. Cross-cutting groups addressing multiple directives are very rare, although some groups, such as the MSFD Working Group on Good Environmental Status[263] and the WFD group ECOSTAT[264], try to improve coordination.

We also conclude that the governance and legislation system to reduce nutrient pollution in waters is a very complex one, with (too) many actors on different levels. This makes the implementation of measures often complex and delays processes. In Germany and the Netherlands, therefore, a structure has been built for the national river basins which enables the participation of regional authorities in the making of the RBMP's. However, the focus here is mainly on the freshwater systems. Further, for a smooth coordination of implementing nutrient reduction measures, there is in some areas often a lack of communication across the different governance levels, and also between the Dutch and German authorities in particular on the sub-catchment level. There is a clear lack of a holistic coordination of actions on land, water and air towards safe ecologic boundaries, not only for the Wadden Sea, but for the marine system in general.

While on the intergovernmental level, WFD and MSFD issues are regularly discussed and coordinated, the coordination of the ND or the CSPs is limited and a holistic basin and Source-to-Sea approach is not brought forward. This is also confirmed by the evaluation of the MSFD, where is stated that current CAP measures in place do not sufficiently take into consideration what needs to be done to achieve the objectives of the WFD and MSFD.

With respect to eutrophication and the descriptor 5 of the MSFD there are still unclear provisions how to assess descriptor 5 in WFD coastal waters, where according to the WFD an assessment of the ecological status is already undertaken. So far, the MSFD Article 8 guidance was not able to provide clear provisions for those areas where the Directives overlap. This has resulted in a situation where some MS use the WFD ecological status assessment as an assessment of descriptor 5 of the MSFD while others apply the assessment rules for descriptor 5 also in WFD coastal waters. With respect to managing eutrophication, this has hampered coherent assessments between MS and challenges the common undertaking of measures to reduce eutrophication.

As indicated in chapter 5.3here is also an issue with the fact that measures under different legislation are taken at different governance levels. Due to the more explicit subsidiarity principle in the WFD decision-making on waterbody-specific objectives and measures takes place at the regional or local level, whereas the implementation of the ND primarily takes place at the national level[265]. Many measures under the CAP are voluntary and taken on the farm level (local level), and not all farmers do participate in these voluntary schemes[266].

In a research project on the implementation of the WFD in the Netherlands, the authors also take a look at the general EU landscape. Based on the review of other research, they stress that in practice, the BD and the WFD may set conflicting environmental targets, as waterfowl tend to thrive in more productive habitats, while the WFD often discourages such levels of productivity. This makes it challenging to simultaneously implement and comply with various EU environmental directives. For instance, the CAP is frequently seen as a major source of policy conflict. Additionally, while the WFD and the MSFD requires MS to focus on the basin level, other directives, such as the HD, may emphasize different geographical scales[267].

6.5. Which gaps exist related to the implementation of policy instruments?

With the Program of measures under the WFD and MSFD and the strategic plans under the CAP important planning documents have been created. The plans are created via a multi-stakeholder approach taking into account various interests. Nevertheless, there is a lack of integration of the planning documents towards a holistic planning approach. The RBMPs lack the Source-to-Sea approach, and the CSPs also has to serve other objectives as well leading to the fact that water is only one out of several other priorities. According to our findings even if cross-references are made between the documents, the implementation of measures is not always coordinated. This is in particular true for the local level.

[262] European Commission, 2025k.
[263] See meeting notes.
[264] See workprogram ECOSTAT.
[265] Hüesker & Moss, 2015.; Van Rijswick & Keessen, 2017.
[266] See for example German Federal Ministry of Agriculture, Food and Regional Identity, 2025b.
[267] Van Kats, N. et al., 2022.

It was already pointed out in the NAPSEA report D2.2[268] that there is a lack of implementation and enforcement of nutrient reduction measures. Although the EU level framework is set at the Member State level there is not enough political will to take sufficient action. This is also clear from the MSFD implementation report where it is stated that "stepping up action to reduce nutrient pollution to achieve the objectives of the MSFD, WFD and the Nitrates Directive" is needed[269]. Similar statements can be found in the two WFD implementation reports of Germany and the Netherlands[270]. This led to the conclusion of the EEA and JRC that the reduction of nutrient losses by 50 %, as outlined in Target 4a of the Zero Pollution Action Plan, is unlikely to succeed due to the persistent challenges of agricultural runoff and fertiliser use[271].

Overall, our findings also coincide with those of van Kats et al., 2022[272]. While the pressures on the water system in the Netherlands and Germany are well understood, water authorities often lack a clear course of action to address them due to lack of formal instruments to impose measures. Other hampering factors the authors found are:

- The technical complexity of the WFD was seen as a barrier to public participation and clear communication with regional partners and the general public, making stakeholder engagement more challenging.
- Regional water authorities identified challenges such as the N crisis, housing shortages, and the agricultural and energy transition as factors indirectly affecting the implementation of measures and the achievement of WFD objectives.
- The impacts of climate change on the water system remain uncertain and could potentially outweigh the benefits of WFD measures implemented over the past two decades, complicating long-term planning.
- The WFD's methodology for defining and monitoring ecological potential was considered complex, while the high ongoing costs of monitoring posed financial and logistical challenges.
- Water authorities strongly agreed that the "one out, all out" principle distorts water quality assessments, as progress in individual quality elements is overshadowed by nutrient and pollutant exceedances, which are the responsibility of national ministries.

While the EU's ND sets out a framework for monitoring and managing nutrients, its implementation varies significantly across MS. Enforcement and monitoring are inconsistent, with some countries being more rigorous than others. Germany and the Netherlands do not yet achieve the targets of the ND[273] and both countries have their specific national regulations derived from the ND, but the stringency and effectiveness of enforcement differ. For example, Germany has faced challenges in effectively reducing nitrate pollution in groundwater[274]. This is also confirmed by a recent court case in the Ems Basin in North-Rhine Westfalia in Germany[275].

The funding schemes of the CAP are the key instrument to guide agriculture and to reduce nutrient pollution, but these reductions are strongly depending on three factors:

- Targeting the areas with the most pressing soil problems by MS. Our assessment does not look into the details of the CSPs, but literature has identified some shortcomings. For example, the court of auditors[276] concluded that little of the rural development funds available for CAP voluntary measures were targeted at areas with the most pressing soil problems. Even where targeting occurred, it did not always result in increased spending in those areas.
- Sufficient funding to farmers. In practice, MS did not set the budget for these measures in their rural development programmes based on an assessment of the funding needed to reach the targets.
- Voluntary uptake by farmers. As set out in the NAPSEA report D2.2[277], the main limitation of such voluntary programs is the participation rate.

[268] Gericke & Leujak, 2023.
[269] European Commission, 2025a.
[270] European Commission, 2025j; European Commission, 2025i.
[271] European Environment Agency and Joint Research Centre, 2025.
[272] Van Kats et al., 2022., p.4.
[273] Musolff and Ledesma, 2024.
[274] European Commission, 2021e; IGB, 2023.
[275] The states of Lower Saxony and North Rhine-Westphalia must improve the program of measures for the Ems River basin unit with regard to the nitrate content in the groundwater. This was decided today by the Federal Administrative Court in Leipzig. See: German Federal Administrative Court, 2025.
[276] European Court of Auditors, 2024.
[277] Gericke & Leujak, 2023.

Concluding from the findings in chapter 5.3 there is not enough funding for nutrient reduction measures. The CAP as main source of funding is not sufficient and there is clear evidence that more and better targeted funds and long-term financing, in both countries would need to be mobilised to reach good status and protect the Wadden Sea.

6.6. Which gaps exist related to monitoring and reporting?

On the EU level, the ND reporting primarily focuses on N compounds, particularly nitrates, while P is not as rigorously monitored. Excess P also contributes significantly to eutrophication in water bodies, but the legislative framework for its monitoring and reporting is weaker.

On the EU level, the CAP requires MS to report on certain agricultural practices, but there is a lack of detailed data on nutrient application (fertilizer and manure) at the farm level due to privacy acts. This makes it difficult to assess the impact of agricultural practices on nutrient pollution comprehensively. Germany and the Netherlands both collect data on agricultural practices, but the accuracy of this data can be insufficient for effective nutrient management[278].

Non-point source pollution, which is diffuse and comes from multiple sources like agricultural runoff, is harder to monitor and regulate compared to point source pollution. The current EU legislation, including the Water Framework Directive, struggles with effectively addressing non-point source nutrient pollution. In both Germany and the Netherlands, non-point source pollution remains a significant challenge. The monitoring systems in place are often not sophisticated enough to track diffuse nutrient pollution accurately, making it difficult to implement effective measures. In order to improve this situation in The Netherlands, are looking at other indicators (KPI's, prestation indicators), that help to distinguish proper measures[279].

The NAPSEA report D4.1[280] shows the gap in the coherence of indicators for freshwater (inland) systems and marine waters. More specifically, the indicators used by different countries vary. While a broad range of indicators is available for assessing eutrophication and the status of pelagic or benthic habitats within the legal frameworks of the WFD and OSPAR/MSFD, only a limited subset is comparable across these frameworks and across the German-Dutch border. The only parameter suitable for a comparison is chlorophyll a, although it is not used for the Dutch R-type water bodies. Furthermore, the narratives behind the threshold values differ.

Germany and the Netherlands apply different approaches under the WFD. These methods are not necessarily aligned with the OSPAR '1900' reference plus 50 % and vary depending on water body types. Likewise, the fragmentation of data and indicators across different sectors and MS were found to limit the capacity for a cohesive and accurate assessmenton the EU level[281].

As a result, it is challenging to expect a consistent gradient of threshold values from land to sea. This was also identified in the report D4.1[282] which reviewed the current indicators related to the effects of nutrient reduction measures and previously by Poikane et al. (2019)[283]. Additionally, the EC stock-taking analysis from March 2025 on the progress of the MSFD and the Bathing Water Directive also points to these shortcomings and concludes that" there is scope for enhancing the actual level of both health and environmental protection provided, in line with the EU's zero pollution and biodiversity ambitions"[284].

7. Recommendations

Based on the above stated the following recommendations can be made:

- **Source-to-Sea approach:** The Source-to-Sea approach should be strengthened and a better link between marine and inland waters should be established in the policy framework. This refers to work on the EU level by harmonizing the implementation between the different policy instruments, e.g. ensuring that the WFD measures and CAP measures better support the MSFD goals or harmonizing nutrient thresholds. On the national level, the Program of Measures under WFD needs to better align the needs of freshwater and marine waters. This approach requires stronger coordination among different authorities at the local level and strengthening the coherence across policy instruments on the local level.

[278] Wuijts et al., 2021, p. 7.
[279] BoerenKPI, 2022.
[280] Enserink et al., 2024.
[281] European Environment Agency and Joint Research Centre, 2025
[282] Enserink et al., 2024.
[283] Poikane et al. (2019)
[284] European Environment Agency and Joint Research Centre, 2025

- **Source-to-Sea-Approach: Ensure better coordination and cooperation between regional sea conventions and river basin authorities.** Stronger cooperation could improve the situation for the marine environment as a more holistic approach would be established, tracing nutrient travel routes, effects of measures and travel times from point and diffuse pollution. Such an approach could be achieved by establishing a cross-border nutrient management task force focused on the Wadden Sea, This way the nutrient input can be reduced at the source. To facilitate the exchange, invitations to yearly overview- or working group meetings from the river basin authorities and secretariats of RSCs with members of each of the groups should be ensured. Regarding modelling, such an approach may also require to (better) integrate estuary models to close the gap between monitoring stations in river basins and the required input of marine models.[285]
- **Source-to-Sea-Approach: an overarching view on eutrophication.** An overarching view on eutrophication including both terrestrial, freshwater and marine aspects is needed as in all systems eutrophication problems occur[286]. Although the ratio between the three main nutrients N, P and Si plays a dominant role in all aquatic ecosystems, mostly only goals for either N (mainly in the marine) or P (mainly in freshwater systems) are defined and ratios are not taken into account despite their ecological impact. Si is not monitored in freshwater systems. We suggest that in addition to nutrient loads nutrient ratios, including Si, are also taken into account.
- **Increase the work on load reduction targets.** There is a need to translate the set nutrient concentration thresholds into load reduction targets on the sub-catchment level. These targets should be split into sector shares, and clearly communicated as such, and effective measures should be taken in each sector. This approach also requires a different monitoring setup (combine discharge and concentration monitoring to be able to calculate loads; and more detailed monitoring to support the quantification of sector shares). Recently, a start has been made in the ECOSTAT working group for an assessment of the nutrient load reduction targets to achieve GES.
- **Inform local authorities on the latest scientific knowledge** to ensure better-informed decision-making**.** To make scientific research accessible for local authorities, the information that will be useful to the authorities should be offered to them in an accessible way, such as fact sheets or by discussing the information in "Q & A" sessions and together deciding what can be useful in practice. Further it is recommended to inform regional authorities on upcoming changes in policy, e.g. the harmonized OSPAR n-threshold values. This kind of knowledge transfer needs to be budgeted for in scientific projects and the exchanges shall be added to regular agendas, or in targeted ad-hoc meetings.
- **Review the implementation and authorization processes of nutrient reduction policies on the national, regional and local levels** to adjust to changing climatic and economic circumstances and ensure better coordination and effective implementation. Such reviews are currently systematically only done at the EU level (e.g. Fitness checks) but very limited at the levels further below[287]. Such checks could improve the situation as they will show weaknesses and inefficiencies in the implementation processes. A change in roles and responsibilities can be a result of such checks.
- **Enhance the cross-border coordination and data harmonization:** Establish a cross-border nutrient management task force focused on the Wadden Sea, ensuring that monitoring and reporting standards are harmonized between Germany, the Netherlands, and Denmark (where applicable). This would include unified data collection methods, shared databases, and regular joint reporting on nutrient levels. The EU could facilitate this by mandating regional coordination bodies under the WFD. Germany and the Netherlands should align their nutrient monitoring protocols and jointly report on nutrient management efforts affecting the Wadden Sea.
- **Increase the granularity and frequency of the agricultural practice monitoring and reporting:** Monitoring and evaluation systems are incomplete in the CAP. Weak or missing indicators in the current M&E framework result in poor measure of progress or clear indications on where adjustments are necessary. Mandate more detailed and frequent reporting on nutrient application practices at the field level. This includes collection and publication on fertilizer and manure use, and better tracking of nutrient flows. The Common Agricultural Policy (CAP) should require MS to implement detailed nutrient management reporting systems at the farm level. However, this seems to be difficult due to privacy acts. In parallel, Germany and the Netherlands should enhance and disclose their national databases on agricultural practices.

[285] H. Lenhart pers. comm.
[286] Van Beusekom et al., 2024.
[287] See for example: Freriks et al., 2020.

- **Integrate climate change and nutrient management policies:** Develop integrated policies that link nutrient management with climate action plans, focusing on reducing greenhouse gas emissions from agriculture while simultaneously minimizing nutrient runoff. The EU should encourage the integration of climate and nutrient policies under the Green Deal and CAP, emphasizing synergy in environmental targets. Germany and the Netherlands shall develop national strategies that align their climate action plans with nutrient management objectives as set out by S1.O5 in the NEAES 2030[288].
- **Increase the investments:** The current levels of investment are insufficient to adequately address the water quality situation in Germany and Netherlands[289]. Consequently, investments should increase to adequately financing and thus facilitating the timely and full implementation of the Programmes of Measures to reach the WFD objectives. This recommendation is supported by the latest EC assessment of the WFD[290].
- **Take stricter spatially targeted actions in the agro-food sector where needed and integrate nutrients aspects in food policies.** Since measures to reduce nutrient pollution under the CAP are mostly voluntary and without the influence of water managers the implementation of additional measures to achieve the objectives of the WFD is often needed. So, it is recommended that if voluntary measures do not result in achieving objectives, mandatory measures should be introduced following a regional approach. Further water quality goals should also fully be integrated in the food systems policies.
- **Design the next CAP in a way that farmers select or must apply measures that support the implementation of the NEC, WFD, BD, HD and ND.** Such measures (e.g. precision fertilization techniques to minimize N losses, specific advisory services) if taken up would provide multiple benefits to the environment.
- On the EU level, the proposed **Soil Health Law should be adopted** to increase the health of soils and to focus on reduced nutrient flows into water. Besides others, the proposed Soil Health Directive will provide a legal framework to help achieve healthy soils by 2050. It will do so by putting in place a solid and coherent monitoring framework for all soils across the EU so MS can take measures to regenerate degraded soils and make sustainable soil management the norm in the EU. MS will have to define which practices should be implemented by soil managers and which should be banned because they cause soil degradation. This will also require a change in nutrient management of soils.
- **Consider options to have drinking water quality steer water management overall**: The ND explicitly addresses two goals: the 50 mg/l for nitrate in drinking waters and the prevention and reduction of eutrophication in surface waters. The GD sets the maximum allowable concentration for nitrate at 50 mg/l (as NO3) to define "good groundwater chemical status". However, eutrophication-related thresholds for N are stricter than the 50 mg/l nitrate. The Action Plans for the ND should take this aspect into account.
- **Improve our understanding on the effectiveness of measures** to reduce diffuse nutrient pollution in particular in agriculture. This topic also includes to determine the variable travel times of nutrients within river basins as well as the legacy effects of accumulated nutrients in downstream waters including the sea which may delay the effect of measures.[291]
- **Strengthen the WFD and MSFD management cycles** by paying more attention to the programmes of measures, ensuring comparability between MS and the same level of ambition.
- **Improve the harmonization of relevant Directives with respect to nutrient management,** e.g. align the WFD and MSFD management cycles and try to harmonize WFD and MSFD assessment procedures for the transitional and coastal waters. Better linkage with EU 2030 Biodiversity strategy and Nature Restoration Law should be established.
- In the case of new legislations, a better use of the **Strategic Environmental Assessment Directive** to target nutrients emissions should be considered.

[288] OSPAR Commission, 2025e.
[289] Van Kats, N. et al. 2022, p. 4.
[290] European Commission, 2025j.
[291] Müller-Karulis et al. (2024)

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