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Exemptions of the EU Water Framework Directive Deterioration Ban: Comparing Implementation Approaches in Lower Saxony and the Netherlands

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Abstract: The sustainable use of precious water resources requires effective water management. In the European Union, water management is mainly regulated by the Water Framework Directive (2000/60/EC), introducing an integrated river basin management approach. As EU directive, the legislation needs to be implemented in the Member States, entailing not only legal transposition, but also application and enforcement in Member States. One major instrument introduced by the Water Framework Directive is the environmental goal achievement obligation of art. 4 WFD, containing also a deterioration ban with several exemptions. This study compares transposition, application and enforcement of the exemption of permanent deterioration (art. 4 (7) WFD) in the context of the environmental goal achievement obligation regime in Lower Saxony (Germany) and the Netherlands. The study rests on a legal analysis of literature, policy documents and jurisprudence. Although based on the same EU directive wording and case law of the European Court of Justice, the deterioration ban and the exemption of permanent deterioration are implemented rather differently: While the deterioration ban is predominantly understood as planning obligation in the Netherlands, it became an important permit requirement in Lower Saxony since the Weser-ruling of the European Court of Justice.

Keywords: Water Framework Directive; Implementation; Deterioration Ban; Exemptions; Water Management; European Law; Environmental Law; Netherlands; Lower Saxony

1. Introduction

Water is the base of life on Earth. Our water resources form a complex circular flow system, involving oceans, surface waters, arctic ice, soils, plants, the atmosphere and actually all living creatures on earth [1]. Hence, water is encompassing and of essential importance for life on earth. However, our supply of useful freshwater is threatened: Challenges are unsustainable overuses affecting water quality or quantity due to defective water management as well as external pressures like for instance inundations [2]. Climate change and population growth are likely to enhance pressures on our water system [3]. Being such a valuable resource, our water system needs to be managed in a smart and sustainable way [4]. Water management has the objective to provide water of sufficient quality and quantity, as well as preventing negative effects of water uses and external impacts on the water ecosystem and ecosystems that are dependent on sufficient water of good quality as far as possible [5].

The EU Water Framework Directive 2000/60/EC (WFD) has established a common framework for the integrated management of water resources in the European Union, also by means of regularly reviewed river basin management plans, art. 13 WFD. On the one hand cherished for merging the fractured situation of EU water law, the directive on the other hand suffers from poor implementation in the Member States [6]. Some authors even identify an “implementation crisis” [7, already in the title]. Lacking effective application of EU-wide provisions as well as implementation differences in Member States managing shared water resources, are likely to negatively affect water management

efforts. Reasons for varying implementation might be grounded in differing interpretations of the directive's legal core provisions, but also depend on the national political and legal context.

One fundamental WFD requirement in pursuing a good water quality status is the goal achievement regime established in art. 4 WFD [8]. Next to the obligation of environmental goal achievement, art. 4 WFD also establishes a deterioration ban in order to at least maintain the current state of quality. Contrary to the usual characteristics of the EU directive instrument, setting a target framework for Member States to be filled in, but similar to older water directives regulating pollution from point sources or setting environmental quality standards, the obligations following from art. 4 WFD are rather specific and hence also contain a number of exemptions [9–12].

Regarding the environmental goal achievement provision, Member States can first designate water bodies as artificial or heavily modified, when necessary changes of the water body to achieve good ecological status would negatively affect the wider environment, navigation, water storage, water regulation or other "equally important sustainable human development activities" in a significant way, art. 4 (3) WFD. Moreover, there must not be a technically feasible and reasonably costly alternative to achieve the beneficial aims served by the artificial characteristics of the water body in question. This designation has to be motivated in the river basin management plan and is reviewed in every management cycle. Applying this exemption results in lower environmental target standards [7], namely the good ecological potential (art. 3 (21) WFD) instead of the good ecological status (art. 3 (18, 19) WFD).

Second, time limits for the achievement of quality targets can be extended as long as the current state does not deteriorate further, art. 4 (4) WFD. Applying this exemption requires that Member States are not reasonably able to achieve all necessary improvements in time, since phasing is necessary for reasons of technical feasibility, a timely completion would be disproportionately costly, or timely water quality improvement is hindered by natural conditions of the water body. Furthermore, extension deadlines need to be explicitly stated and motivated in river basin management plans. A maximum extension of two management cycles (thus ultimately until 2027) are possible, except when objectives require even longer time horizons due to natural conditions of the water body. Measures to progressively increase the quality of the water body need to be mentioned and reviewed regularly in the respective river basin management plan.

Third, Member States can define less demanding environmental quality targets for water bodies that are heavily affected by human activity, or their natural condition is such that the achievement of quality objectives would be technically infeasible or disproportionately expensive, art. 4 (5) WFD. Cumulative provisions are that there is no significantly better environment option that is not disproportionately costly and still achieves the needs the human activity is designed to fulfil; that still the highest possible environmental quality is achieved; no further deterioration occurs; and that the exemption is motivated and reviewed regularly in the river basin management plan.

These exemptions of the goal achievement obligation are criticized for constituting a "significant obstacle to the achievement of the WFD's objective as they enable Member States to lower the ambition of the Directive and to delay the achievement of good status, thereby undermining the environmental goal of the WFD" [13]. However, exemptions also make the rather abstract goal achievement obligation manageable and more directly applicable.

Next to the goal achievement obligation, also the deterioration ban itself has two exemptions. First, *temporary deterioration* as a result of exceptional, unforeseeable circumstances of natural cause or force majeure is allowed, art. 4 (6) WFD. Named examples are "extreme floods", "prolonged draughts" or "accidents which could not reasonably have been foreseen". Further cumulative provisions are that all practical efforts are undertaken to protect other water bodies; that conditions for exceptional circumstances, including suitable indicators, are stated in river basin management plans; that suitable measures that do not jeopardize recovery of the water body are planned; that effects of exceptional, unforeseeable circumstances are reviewed annually; that all practical steps for restoration are taken as soon as feasible; and that a summary of effects and counter-measures is included in the river basin management plan of the next management cycle.

Second, Member States are not in breach with the WFD when failure to achieve good environmental status or potential is the result of new modifications to the physical characteristics of water bodies or the result of new activities for sustainable human development (*exemption of permanent deterioration*), art. 4 (7) WFD. It is provisioned that “all practicable steps are taken” to limit further adverse water body status impacts and that the exemption is motivated as well as reviewed every management cycle in the river basin management plan. Reasons for permanent deteriorations must be of “overriding public interest”, the environmental and social benefits of achieving good water quality thus need to be outweighed by the benefits of the planned deterioration. Given examples for such justifications are “human health”, “human safety” or “sustainable development”. Moreover, it must not be possible to achieve the beneficial objectives of the project by other technically feasible and reasonably costly means that are significantly better for the environment.

In particular, the different options and used vague legal concepts (like ‘physical characteristics’, ‘new sustainable human development activities’ or ‘overriding public interest’) of the last exemption (art. 4 (7) WFD) might be subject to diverging interpretations and implementations across Member States, motivating us to zoom in particularly on the application and enforcement of the use of this exemption of permanent deterioration. Laid out rules are particularly relevant since the European Court of Justice (ECJ) ruled in decision C-461/13 of July 1, 2015 on the deepening of the *Weser* river that the deterioration ban has direct effect on permit decisions of projects affecting water resources [14]. It is argued that the *Weser* judgement in first instance seems to provide clarity, but in the end still causes confusion [15]. The importance of the ban’s exemptions was moreover stressed in decision C-346/14 of May 4, 2016 “*Schwarze Sulm*”, where the ECJ accepted the energy transition as overriding public interest justifying deterioration.

An EU directive not only requires the transposition into the different legal systems of all Member States, but also its application and enforcement by national authorities [16]. *Transposition* is the incorporation of EU law provisions into national law within a fixed time frame. After the transposition phase, the new legislation is *applied* by Member State administrations, meaning the use of rules to make decisions with legal effects. New rules are then *enforced* by administrations and courts, what we define as the authoritatively demanded compliance with the new legislation and the use of necessary sanctions in cases of non-compliance.

This multi-scale implementation requirement potentially enables Member State administrations to considerably deviate in the application of the very same provision, resulting in legal uncertainty, contradicting measures and a possible undermining of the directive’s environmental quality objectives [8]. On the other hand, the diversity of approaches might also motivate Member States to adopt best practices from other jurisdictions to improve their water management system and to take local and regional differences into account when implementing a directive. Conformity and clearness in the application of the deterioration ban and its exemptions may enable stakeholders to identify and pinpoint WFD breaches with more legal certainty. Furthermore, a clear understanding of the governance mechanisms of the legislation capacitates the European Commission (COM) to readjust the implementation process in order to achieve the directive’s environmental quality goals effectively and efficiently. Also, a more demarcated interpretation of WFD requirements helps national administrations to apply regulations with higher legal certainty. A clear and uniform interpretation of the legal obligations can thus improve the effectiveness of the directive and its environmental goals and creates a consistent approach in river basins which are often transboundary [17].

The goals of this article are to (1.) identify differences in the legal and organizational implementation of the WFD deterioration ban and its exemptions between selected Member States, and to (2.) formulate lessons learned from this comparison to improve the implementation of specified obligations following from the WFD. For this end, we compare transposition, application and enforcement of the deterioration ban and particularly the exemption of permanent deterioration

in the Netherlands and the German federal state of Lower Saxony. We analyse national policy documents and programs, legislation and jurisprudence as well as relevant literature.

2. Legal Background: The WFD Deterioration Ban and its Exemptions

The long-established European water policy experienced a paradigm shift with the introduction of the WFD in December 2000 [6,18]. One of the main objectives of the WFD was to integrate and streamline the formerly sectorized European water policy [4]. The WFD should establish legally binding rules, obligations and procedures to finally improve water quality in a participatory, reflective and effective way.

One of the directive's main instruments are the environmental objectives and particularly the deterioration ban, regarded as central quality objective of the WFD [19]. The goal of the deterioration ban is at first glance defensive: If a good environmental quality cannot be achieved, then the status should at least not deteriorate further. However, this could not be accomplished by mere omission of any activities, since pressures on the ecological status of water bodies are dynamic and increasing, for example economic growth, population growth and climate change. It is thus likely that Member States are only able to maintain current water quality statuses by active efforts. Consequently, the environmental objectives are not passive, but require action. Besides the deterioration ban, the directive urges the Member States to improve water quality until a good status of all waters has been achieved, but ultimately in 2027.

Questions about what a deterioration actually is, such as 'Any minor disturbance? Or the categorization of quality elements into a lower status class according to annex V WFD? If so, only one quality element or more?', were decided by the ECJ in the *Weser*-case. The ruling has major consequences for the interpretation of the deterioration ban. First of all, the ECJ clarified that the achievement of management goals is mandatory [7]. Therefore, also detailed exemptions are necessary for an effective application of said regulations. However, for project developers, this results in the necessity to evaluate all possible deteriorations beforehand [20], what might not always be possible in a methodologically sound way. Scholars have regarded the ruling as increasing the probability that exemptions will be tested and applied in future permit decisions and thus gain in importance [14,20,21]. The same influence can be expected on river basin management planning and connected programmes of measures. Second, the ECJ defined more clearly what constitutes a deterioration. A degradation of a water body's environmental quality of at least one quality indicator to a lower quality class is to be qualified as deterioration, whereas in the lowest quality class, every degradation constitutes a deterioration. This pragmatic decision increased applicability, but still left important questions open: Could a deterioration be levelled out by improvement of another quality component? What do new modifications of the physical characteristics of a water body entail? And what are projects of overriding public interest justifying deteriorations by using the art. 4 (7) WFD exemption?

The last question was partly answered by the ECJ in the *Schwarze Sulm*-ruling C-346/14, dealing specifically with the margin of discretion of national authorities exploring the exemption of permanent deterioration [22–24]. In 2007, the government of the Austrian Styria (Steiermark) province authorized the construction of a hydropower plant on the river Schwarze Sulm, resulting in a deterioration of the water body's ecological status from 'high' to 'good'. However, this decision was contested by the European Commission only a couple of months later, stating that the overriding public interest for the hydropower plant had to be motivated in the river basin management plan. In the 2009 river basin management plan, the concerned Schwarze Sulm water body was classified as of 'high' quality. After an unlawful withdrawal of the permit by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management in 2010, Styria's Governor confirmed the permit decision in 2013. This decision contained a re-assessment of the quality of the water body in question, with the result that the water body's quality should have been classified as 'good' and not

as 'high' even before the start of the hydropower plant construction. In the Governor's interpretation, an examination of the deterioration ban exemption would thus no longer be necessary. In 2014, the Commission criticized Austria's procedure again and brought the case before the Court.

The Court clarified that the hydropower plant indeed caused a deterioration of the water body in question from 'high' to 'good', based on the 2009 water management plan, what was also not contested by Austria at that time. The Court hereby contradicts the Opinion of Advocate General Kokott who concluded that there is no deterioration in the first place, following Austria's argumentation that the water body quality should have been classified as only 'good' even before the powerplant construction began (ECJ C-346/14, Opinion of Advocate General Kokott, delivered on 3 September 2015, no. 43-56). However, the deterioration could have been justified by making use of the art. 4 (7) WFD exemption. The ECJ ruled that indeed the competent authorities in the Member States have a "certain margin of discretion" in defining overriding public interests justifying water quality deterioration (ECJ C-346/14, no. 70). The national competent authority was consequently right in assuming renewable energy production as overriding public interest. Necessary requirement is a systemic analysis of environmental impacts of projects, though.

The relevance for future cases lies mainly in a sharper definition of what cases of human sustainable development activities are of overriding public interest and thus justify a water quality deterioration. Renewable energy production serves as one of these cases. Furthermore, the role of national authorities applying the art. 4 WFD regime was strengthened, by pointing at the margin of discretion. However, there are also some questions remaining open after this second major ECJ ruling: First, it is still unclear what new modifications of physical water body characteristics are, a vague legal concept in need for further demarcation [22]. Second, the role of granted art. 4 (7) WFD exemptions in river basin management planning remains unclear: the Court omitted to specify whether exemptions need to be integrated in the management plan beforehand or if it is possible for competent planning authorities to deviate from the management plan by granting an exemption and including it in the management plan later on by means of a plan adjustment [22].

3. Implementation in Lower Saxony

Lower Saxony is the second-largest federal state in Germany in terms of superficial area and characterized by large-scale intensive agriculture, important environmental areas like the Harz mountains, the Wadden Sea and the Lüneburger Heide heathland area. It is located at the delta area of three major (international) river basins: Ems, Weser and Elbe, also a small part of the Rhine river basin falls into Lower Saxony legislation. Furthermore, the densely populated urban areas of Hannover, Hamburg and Bremen/Oldenburg are located in Lower Saxony. Major water management challenges in Lower Saxony are morphological changes, including run-off regulation and nutrient depositions from agriculture [7].

3.1. Transposition

Transposition is defined as the timely and complete incorporation of EU directive requirements into (sub-)national law [16]. Due to the division of competences in the Federal Republic of Germany, main actors for water management are the federal states (*Länder*). Water management is part of the so-called deviant legislation competence, allowing the federal states to deviate from federal legislation by means of own legislation. In practice, this means that federal legislation is relevant in the first place, but state legislation could deviate from this. Moreover, later federal legislation could again invalidate state legislation. Only legislation targeting substances and installations is excluded from this regime and remains in federal competence.

Deadline for the timely transposition of WFD requirements into national law was December 22, 2003. The German Water Management Act (WHG) was reformed by the Seventh Reformation Act to the Water Management Act of June 18, 2002 [25]. Although incorporating the main WFD requirements and institutions (table 1), final transposition was finalized not sooner than 2005 due to the untimely transposition in some federal states [26]. The Water Management Act of Lower Saxony

(NWG), also designed to implement WFD requirements, was adopted on February 19, 2010, so more than six years after the deadline.

Table 1. German transposition of main WFD requirements regarding the deterioration ban of surface waters and its exemptions (in 2020).

WFD requirement	Transposition in Germany (federal level)
Goal achievement obligation, art. 4 (1) (a) (ii) WFD	§ 27 WHG
Deterioration ban, art. 4 (1) (a) (i) WFD	§ 27 WHG
Designation of artificial and heavily mod. water bodies, art. 4 (3) WFD	§ 28 WHG
Exemption of deadline extension, art. 4 (4) WFD	§ 29 WHG
Exemption of less stringent objectives, art. 4 (5) WFD	§ 30 WHG
Exemption of temporary deterioration, art. 4 (6) WFD	§ 31 (1) WHG
Exemption of permanent deterioration, art. 4 (7) WFD	§ 31 (2) WHG

WFD requirements regarding river basin management plans and programmes of measures have been transposed directly into German federal law (§§ 82, 83 WHG), also the states have adopted their respective legislations [27].

A practically relevant derived directive is the federal Directive on Surface Water Protection (OGewV), containing for example specifications regarding the demarcation of surface water bodies and reference conditions as well as monitoring regulations. Specifications for determining the water quality status including target pollutant concentrations and the phasing-out of priority hazardous substances were transposed in form of various concretizing directives [26]. The Lower Saxon law contains water management specifications, for example the determination of a competent water management authority. Main competent authority for coordinating water management efforts in Lower Saxony is the state ministry in charge. Tasks are for example the stock-taking and monitoring of surface waters, the determination of quality requirements, and the assessment of quality pressures and impacts. Local water authorities elaborate contributions for programmes of measures for their parts of river basins. Water users need to be given the opportunity to participate in this elaboration and contributions have to be coordinated with other states governing the same river basin. Final programmes of measures regarding Lower Saxony are enacted by the Lower Saxony government. Similar regulations are made for the management plans.

Water management competences are further regulated in the Directive on Water Management Competences (ZustVO-Wasser). Water management responsibilities and competences are mainly distributed between the Lower Saxon State Department for Waterways, Coastal and Nature Conservation (NLWKN), the local water authorities, municipalities, and the competent state ministry.

In some application cases, the division of responsibilities however remains unclear: Crucial is the differentiation between water body extension ("Ausbau") and maintenance ("Unterhaltung"), especially regarding measures for water body development with inherent dynamism [7]. These are measures using the natural water stream to approach a more natural morphology of the water body, resulting in a re-development of characteristic habitats [7]. This is important, because the competent water authority can only order *maintenance* measures. However, Reese et al. (2018) conclude that a major part of structural water body development happens in the overlap of extension and maintenance. In the absence of a clear federal demarcation, it is the responsibility of the states to define a clear division of responsibilities [7].

3.2. Application

Already during a first stock-taking in 2005, it was prognosed that a majority of water bodies in Germany will not reach environmental quality targets [28]. Consequently, only 2% of Lower Saxony's water bodies reached a good ecological state or good ecological potential by the end of the first management period 2009-2015 [7]. Approximately 77% of water bodies in Lower Saxony are regarded as heavily modified [7]. Also for the second management period 2015-2021, the NLWKN is pessimistic about ecological goal achievement [29]. Heavy modification of water bodies as well as massive fertilizer and pesticide entries from agriculture are regarded as main reasons for the shortcomings in target achievement [7].

Important application actor is the NLWKN that is responsible for *inter alia* the coordination of management plans and plans of measures, decisions on deadline extensions and target lowering, public participation, as well as the elaboration of management plans and programmes of measures [7]. Minor water bodies are managed by water and soil associations [7]. In total, there are 107 water and soil associations in Lower Saxony, which are mostly organized in accordance to hydrogeographic characteristics [7]. For coordination purposes, mainly existing organisations, like International Commissions or the inter-state working group on water issues (LAWA) are used [27]. Further actors are the lower water authorities that are not organized according to hydrogeographic characteristics, but instead on county/city level. Their main competence is the issuing of water-related permits [7].

Lower Saxony mostly works with the principle of voluntary planning rather than strict legally binding obligations and enforcement, accompanied by financial facilitation [7]. However, financial means are significantly restricted, since Lower Saxony only provides co-financing to EU funds, resulting in a total of 180 Mio. EUR (including mentioned EU funding) for the whole transition period on to 2027, while the total demand for water body development was calculated conservatively as 750 Mio. EUR [7].

Permit decisions involving the use of permanent deterioration exemption need to be specified in management plans. The NLWKN has published Lower Saxon contributions to the river basin management plans of Elbe, Weser, Ems and Rhine as well as to the corresponding programmes of measures. A precise programme of measures and a planning for the development of a water body are main requisites for land acquisitions for water body extension measures [7].

The first use of the art. 4 (7) WFD exemption concerns the deepening of the outer and lower Weser [30]. According to the competent Ministry, the deterioration is justified by the need for navigation for bigger container ships as part of the trans-European navigation network, contributing to the stimulation of the regional economy [30]. Also environmental arguments are used, since "navigation as environmentally benign transportation mode should be supported" [30, own translation]. However, the exemption was repelled by the Federal Administrative Court (BVerwG) after the Weser-ruling, because the exemption was motivated and approved after the project permit has already been granted.

Second, the permanent deterioration exemption was applied for the development of the outer Ems, although no precise motivations are named in the management plan so far.

Third, forehanded exemptions for water bodies affected by the deepening of the lower and outer Elbe were granted. It was not yet certain at the point of issuing the management plan if these projects will indeed result in a deterioration. Although emphasizing that all measures will be taken to prevent further deterioration, reasons for motivating overriding public interest for the projects were not named. In a later decision of the Federal Administrative Court, derogations were found to be not significant enough to constitute a deterioration (BVerwG 7 A 2.15, no. 577-580).

Fourth, a forehanded exemption was planned for water body T1.4000.01 due to the projected offshore-terminal near Bremerhaven. Motivations for the exemption are the economic development of the Bremerhaven region and renewable energy production, since the terminal is to be used for generating infrastructure for offshore wind energy production. However, the exemption

was found to be unjustified by the local administrative court, since uncertainties regarding goal achievement have not been respected and derogation impacts downplayed (Administrative Court Bremen, 5 K 2621/15, IV).

Measures for preventing further deterioration and contributing to achieving quality objectives for Ems, Weser and Elbe are specified in the Lower Saxony contributions to the programme of measures [31].

All in all, the permanent deterioration exemption is used rather sparingly (only four times in the four river basin management plans) in the current management period 2015-2021 in Lower Saxony. The exemption is used for large-scale infrastructure projects involving the deepening of lower and outer river parts. The granting of exemptions is evaluated already before the intensive examination of project plans, presumably to generate legal certainty for permit-granting authorities and project developers. Exemptions in Lower Saxony are justified by regional economic development, the need for shipping infrastructure and infrastructural development for renewable energy production.

3.3. Enforcement

On the procedural side, it is possible for recognized environmental associations to take legal actions against some water management planning decisions (§ 2 (1) Environmental Remedy Act, *UmwRG*) if claimants are of the opinion that management plans and programmes of measures are not sufficient to achieve management goals. A further means of enforcement are legal supervision instruments of authorities over water and soil associations, mainly by rights to demand information (§ 74 WHG), approval demands (§ 75 WHG), as well as objection rights and the right to execute by substitution if objections are ignored (§ 76 WHG) [7].

A recent ruling of the Federal Administrative Court deals with the question of what constitutes the physical characteristics of a water body regarding the permanent deterioration exemption (BVerwG 7 B 5.19). The case concerns the permit for a mining company to extract groundwater and the discharge of used water in the public outfall. Main substantive question is whether the permit allowing groundwater usage and hereby enabling concerned mining activities in the first place, which subsequently affect the chemical status of the groundwater body, could be based on the exemption of permanent deterioration. Requirement is that the deterioration is the result of new modifications to the physical characteristics of a water body or alterations to the level of groundwater bodies. The BVerwG ruled that both the quantitative and chemical state of a water body are encompassed by the exemption, as long as they are caused by modifications to the physical characteristics of a water body or the groundwater level. This also concerns indirect deteriorations as long as they are in a cause-effect-relationship with the permitted modifications to the physical characteristics. Regarding the examination of the deterioration ban, the BVerwG ruled that a proper examination of the existence of a deterioration entails a duly determination of the current quality state of the water body in question by the competent authority. This comprises the assessment of both physical-chemical as well as biological quality components. Furthermore, an impact assessment on water body level needs to be carried out.

A ruling (BVerwG 9 A 18.15) on the new construction of the federal highway A 20 concerns the question whether WFD requirements only regard those water bodies that are listed in management plans, or also smaller surface waters such as minor brooks or loading canals. The BVerwG ruled that such minor surface waters in the case in question only need to be regarded in determining deterioration if they affect water bodies listed in management plans. However, the Court leaves open whether the German implementation of the WFD also regards minor water bodies in general.

In the major ruling on the deepening of the Elbe river (BVerwG 7 A 2.15), the BVerwG also had to evaluate the question whether cumulative effects of other projects had to be regarded in assessing possible deteriorations. The Court concludes that cumulative impacts of other projects do not play a

role in assessing deterioration effects of a project in question. Since this examination could not be handled effectively on the permit level, usage intensifications and cumulative effects need to be regarded dynamically on the planning level instead, thus being reflected in management plan goals.

A further substantive aspect is the question of how to deal with extending the temporal validity of water use permits: Does the deterioration assessment need to regard the water quality status at the beginning of the original permit or does the point in time of the extension request apply? The BVerwG concludes in BVerwG 7 C 25.15 that discharges based on the original permit are regarded as prior charge for the extension decision. Hence, deterioration ban assessments need to consider the current chemical quality status at the point of time of the permit request in question.

4. Implementation in the Netherlands

We continue by presenting the Dutch implementation approach. Also here, the WFD implementation process is divided analytically into transposition, application and enforcement. The Netherlands is located downstream of the international river basins of Ems, Scheldt, Rhine and Meuse [32].

4.1. Transposition

The implementation act to transpose the WFD into national Dutch law was presented to the Dutch parliament (*Tweede Kamer der Staten-Generaal*) on March 13, 2003 (*Kamerstukken* 28808, no. 1;2). Art. I contains the necessary changes of the former Water management act (*Wet op de waterhuishouding*, Wwh). Necessary adjustments of the Environmental management act (*Wet milieubeheer*, Wm) are regulated in art. II. The proposal was accepted on July 1, 2004, thus slightly after the deadline of December 2003. However, since the incorporation law was already in the parliamentary process, the transposition can still be qualified as timely.

After a structural reform in 2009, national regulations regarding the WFD are now found in the Water act (*Waterwet*, Wtw), the Water decree (*Waterbesluit*, WB) and the Decree on water quality objectives and monitoring (*Besluit kwaliteitseisen en monitoring water 2009*, BKMW 2009) [33].

Next to the general aim of integrated water management, also the river basin management approach is regulated in the Water act. Below the level of formal laws, the Water decree specifies the details of water management, comparable to the German OGewV, but then targeting the whole water system and not only surface waters. Specifics on water management plans like the river basin management plans and the programmes of measures are regulated in chapter 4 WB.

The goal obligation system is incorporated by § 3 art. 2.10 Wtw, referring to chapter 5 of the Environmental management act. In particular, art. 5.2b (3) to (5) Wm regulate goal achievement obligation and deterioration ban, although not exactly in the wording of the WFD. The permanent deterioration exemption is not included in the Wtw, nor in the WB, but only in art. 3 (2) BKMW 2009 [33]. The same holds true for the goal achievement obligation that is regulated in art. 2 BKMW 2009. It is criticized that ecological standards for artificial and heavily modified water bodies (that constitute a vast majority of Dutch water bodies) are not of a binding character: The qualitative descriptions are operationalized only by expert guidelines inserted in management plans, hence not as legally binding standards [33].

Another concern is the large amount of non-designated water bodies: In the Netherlands, competent authorities agreed to voluntarily apply WFD standards for non-designated water bodies as well [33]. However, this also does not constitute a legally binding rule. Regarding the deterioration ban and its exemptions, these regulations – despite being interpreted by the ECJ as binding permit requirements – are only regarded as binding for management plans and thus not applied in permit decisions [33].

Art. 3 (2) lit. (a) BKMW 2009 contains the vague legal concept of 'new modifications of the physical characteristics' stemming from art. 4 (7) WFD in the same wording. In the literature, the art. 4 (7) WFD concept of physical characteristics of the water body is interpreted as hydro-morphological

[32]. There seems to be no further discussion in Dutch literature if this also contains chemical properties.

4.2. Application

The Netherlands adopted seven river basin management plans in the first and second planning period (2009-2015 and 2015-2021). Planning areas are the Dutch parts of the international Scheldt, Meuse and Ems river basins, the Rhine basin was separated into the planning areas of Rhine-North, Rhine-West, Rhine-East and Rhine-Middle [34].

Public participation was possible during the implementation process in the Netherlands. Formal interest representation happened at national and regional levels; public interest during planning stages, however, resulted to be low [35]. Public participation during the elaboration stage of management plans consisted mostly in information and not in decisive elements for citizens or stakeholders [35]. Involved stakeholders include agricultural and business associations, drinking water companies, environmental organisations, and natural heritage associations [34].

The ambition of the Netherlands to achieve environmental goals shows a mixed picture, although the ultimate aim is still to achieve all goals in 2027. Time extensions are applied to limit costs and spread these as much as possible in time [32]. At least formally is was opted for pragmatic, rather low-ambitious goals that could be achieved in most cases at the end of the third management circle in 2027 [32]. The vast majority of 97% of all designated water bodies is categorized as artificial or heavily modified [34], resulting in the lower ambition of reaching only good ecological potential. It was prognosed already during the initial planning circle that many water bodies will not reach quality targets and that envisaged measures will result in insufficient ecological improvements [33,34]. Political unwillingness, fear of legal obligations, lacking knowledge, high implementation costs, mutual dependencies, misfits between EU directives (mainly with the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC)) and public participation problems are identified as reasons for the low ambition of quality objectives designated by provinces [34]. A major challenge for goal achievement is identified in diffuse nutrient entries from agricultural sources, the effectiveness of the rather Dutch governance mode of consensual policy-making to solve this issue is questioned [36].

In the Netherlands, the administrative structure for implementing WFD goals is decentralist in nature, with national authorities having a coordinating role: On national level, competent ministries provide frameworks and handle the international coordination [32]. The Ministry of Infrastructure and Water Management is the competent authority for the large rivers and lakes as well as the sea.

Regional water authorities (*waterschappen*) are organized territory-wise according to hydrogeological characteristics and raise own taxes for their financing [33]. The regional water authorities are characterized as “functionally decentralized public bodies” [4], resulting in specialization in both local characteristics and sector - water management - specifics. Regional water authorities are principal water managers with regulative and administrative power, they can enact bye-laws [4], and collect and use a significant part of the total national water management budget. Furthermore, more informal decision structures have been established, for instance the National Water Administration Meeting (*Landelijke Bestuurlijk Overleg Water*) heading different civil servant expertise clusters [32]. Moreover, the Directorate-General for Public Works and Water Management (*Rijkswaterstaat*) has brought into being the Dutch River Basin Coordination Office with “an important coordinating and content-wise role in applying the Water Framework Directive on regional and national level” [32, own translation].

On regional level, the provinces formulate the ecological water body goals. Regional water authorities provide input for formulating water body quality goals and decide on appropriate measures within their territory [32]. They hereby collaborate with the municipalities, which are responsible for urban water management and the sewage system [34]. For formal plans, a ‘step down, step up’ approach is chosen: Lower-level regional water authorities provide input for the plans

formally adopted on provincial level (step up), whereas regional water authorities adopt their formal plans taking account provincial planning (step down) [32]. Moreover, regional water authorities are the most important actor in applying the WFD on the ground as far as regional waters are concerned [32], but lack important competences to address pollution by nitrates and pesticides. In order to reduce monitoring costs, regional water authorities have defined rather large water bodies [32]. Although the centre of implementation work is on the regional level, governance modes of the various regional water authorities are quite uniform [36].

The assessment of deterioration is based on a Rijkswaterstaat guideline [37,38] and regulations of the union of regional water authorities (*Unie van Waterschappen*) [39]. It is determined that deterioration is based on a time scale of the whole planning period of six years and not for a project-specific timeline. The substantiation is further explained in another guideline on non-natural waters [40]. As a consequence, not the negative impacts of projects are tested on the permit level, but the planning authority tests whether a deterioration over the whole planning period took place and motivates broadly by reasons of artificial modification if a deterioration indeed took place, and not only temporarily. An entry point for project-oriented assessments is the so-called '1% assessment', specifying that activities which have the potential to negatively affect water quality, but happen in less than 1% of the ecologically relevant area of a surface water body, can never have a significant deterioration impact of the ecological quality of the water body as a whole [41]. This assessment is indeed based on permit decisions and thus project-oriented. Although this pragmatic tool might certainly be suitable to increase applicability, it makes the assessment highly dependent on the designated overall area of a water body. Furthermore, it is doubtful whether an assessment that does not discriminate between different activities based on their intensity of effects on ecological water quality is in line with the ecological goals of the WFD.

As a result, the focus is on the designated water body itself that is evaluated every six years to determine a cumulative deterioration of all water uses and projects during the planning period, counterbalanced by measures to increase the same quality category during the same time. There is less focus on individual large-scale projects as in the Lower Saxon interpretation after the *Weser-ruling*.

For major water bodies ("rijkswateren") there is a water quality assessment framework, specified in annex 5 of the management and development plan of major water bodies (*Beheer- & ontwikkelplan voor de rijkswateren*) [42]. Moreover, the assessment framework of the union of regional water authorities contains also an ecology governance guideline (*Beleidsregel ecologie*) [39]. Since both frameworks contain similar regulations, the regional water planner can refer to both.

The permanent deterioration exemption was used only two times for the Netherlands in the current planning period 2015-2021, both times in the Rhine river basin (table 2). In the river basin management plan, the use of the exemption in two cases is not substantiated [45]. Only a global explanation is provided that analysis and sampling methods have changed and that it is therefore methodically dubious to compare chemical and ecological measurement values that resulted in a status deterioration. Also an analysis of the Rhine programme of measures did not quarry a substantial justification [47].

Table 2. Use of deterioration exemptions in Dutch river basin management plans (2015-2021 period).

River basin	Number of justifications for temporary deterioration	Number of justifications for permanent deterioration	River basin management plan (2015-2021)
Ems	1	0	[43]
Meuse	4	0	[44]
Rhine	11	2	[45]
Scheldt	2	0	[46]

4.3. Enforcement

On the procedural side, environmental NGOs have in principle access to Dutch courts if they have a cause of action. Plans and programmes (like the river basin management plan or the programme of measures) cannot directly be tested by Dutch administrative courts. However, plans and programmes that are contrary to legal requirements must not be applied [48].

On the substantial side, Dutch jurisprudence is rather sparse compared to the already quite rich dogmatic body in Germany. In the Netherlands, a specific provision stemming from environmental EU directives is often examined on its own merits to assess if it falls within the requirements of the directive [49]. In order to fulfil directive objectives, there is consequently a call to actually focus the interpretation more on the overall regulatory system that an environmental EU directive establishes [49].

One of the few high-level decisions from the Dutch Council of State (*Raad van State*, highest appellate court in administrative cases) on art. 4 WFD deals with decisions on the deepening of the river Ems (RvS 201409071/1/R6). In the ruling, the Council had to decide whether environmental impacts stemming from deepening works constitute a deterioration. Deepening works involve sand swirling negatively affecting photosynthesis and hereby damaging ecosystems, resulting in lower ecological water status. In particular, uncertainties about cause-effect relationships of swirling on water quality in the hydro-morphological rapport as base of relevant authority decisions were debated. The Council of State underlined that the competent authority can base its decisions on the information at hand; if undisputed, there is no base to question decisions.

Furthermore, in a decision on an infrastructure project in Rotterdam (the reshaping of the *Steigersgracht* into an inner-city water sport area), the Council of State had to treat the question whether authorities have to test WFD requirements in all permit decisions, both in the field of planning as well as in water management. In its ruling (RvS 201605448/1/A1), it is specified that a water permit indeed can be refused if it does not comply with WFD requirements, and that when a water permit is requested, the assessment on WFD criteria should take place in this water permit procedure but not also in a building permit, a planning procedure or an environmental permit.

In another ruling on the same project in Rotterdam (RvS 201703571/1/A1), the Council of State tested more specific substantial WFD requirements related to the water permit that has been granted. In particular, the water quality parameter 'other water flora' was already in the lowest quality class and it was feared that the *Steigersgracht* project would contribute to further deterioration. According to the *Weser*-ruling, every further deterioration of a water quality parameter in the lowest class signifies a breach with the deterioration ban. However, the determination of what constitutes a deterioration in the first place needs to be operationalized by member state authorities. The limit would be the significance, based on scientific measurability [41]. In the Netherlands, the significance is operationalized with the '1% assessment'. Since the cumulation of activities in the water body in

question do not surpass 1% of the overall water body area and there is no counter-expertise offered, the Council of State ruled that the permit authority was right to assume no further measurable deterioration stemming from the realization of the *Steigersgracht* project [41]. Although it makes sense to operationalize the significance of a deterioration based on scientific measurability, a flat operationalization based on the relative surface area is too simplistic. For large water bodies like the IJsselmeer (1,110 km²) or even the Dutch Wadden Sea (14,900 km²), unproportionally area-intensive activities would be admissible [41]. Furthermore, also the quality of the activity is not included in the assessment: highly damaging, but less area-intensive activities are not sufficiently regarded. The 1% assessment is thus an unsuitably flat assessment of deterioration significance.

5. Comparison Results

Key comparison results are summarized in table 3, containing both similarities and differences in the implementation of the WFD deterioration ban rule-exemption-regime in Lower Saxony and the Netherlands.

5.1. Lower Saxony

WFD requirements regarding the deterioration ban have been transposed completely and correctly into German law, although not timely due to delays in the incorporation into state law. Because of water management competency regulations in Germany, both federal and state law play a role for water management in Lower Saxony.

Regarding the application of the goal achievement obligation, Reese et al. (2018) conclude that main structural deficits hinder an effective application of WFD requirements in Lower Saxony, mainly the missing of a clear division of responsibilities and potent actors; a significant lack of funding for investments; and legal difficulties in land acquisition for needed waterside areas [7]. All in all, goal achievement is lacking largely for Lower Saxon surface water bodies. The exemption of permanent deterioration is used rather sparingly (four times in the four river basin management plans situated in Lower Saxon jurisdiction) in the current management period 2015-2021 in Lower Saxony. Art. 4 (7) WFD is mainly applied for large-scale infrastructure projects involving the deepening of large rivers. Reasons for granting exemptions are evaluated already before the intensive examination of project plans. We assume that motivations for this could be to generate legal certainty for both permit-granting authorities as well as project developers. Exemptions in Lower Saxony are justified by regional economic development including job creation, the need for shipping infrastructure and infrastructural development for renewable energy production.

For the enforcement part, many rulings on federal level deal with the deterioration ban and its exemptions. Five general statements can be deducted from current jurisprudence:

1. Also indirect deteriorations are encompassed by the exemption of permanent deterioration, as long as there is a cause-effect-relationship with permitted modifications to the physical characteristics of a water body.
2. The examination of the deterioration ban entails a duly determination of the current state and an impact assessment on water body level.
3. Minor water bodies are only regulated by WFD requirements if they affect water bodies listed in management plans.
4. Cumulative effects need to be regarded on the planning level in form of management goals and thus do not need to be assessed by permit authorities.
5. Deterioration assessments need to consider the current chemical quality status at the point of time of the permit request in question. However, it is still open whether derogations could be counterbalanced by improvements within the same water body, referred to as the so-called programmatic approach or net-loss approach [33,50,51].

5.2. The Netherlands

Major WFD instruments – like the deterioration ban and the corresponding regime of exemptions – have not been transposed on the level of law, but rather as delegated legislation, with the BKMW 2009 playing a key role. There is criticism in academic literature on the resulting questionable legally binding character of WFD-related regulations.

The WFD deterioration ban and its exemptions play a role on the planning level but are not often or directly applied in permit decisions. The ECJ *Weser*-ruling did not bring about the respective paradigmatic change in application (from water management regulation to permit condition) as observable in Lower Saxony. As a result, high-level jurisprudence regarding the art. 4 WFD regime is scarce in the Netherlands. This interpretation and application tradition do not enable actors like environmental associations to use the deterioration ban to stop large-scale infrastructure projects to the same degree as in Lower Saxony. The Netherlands perform fairly well in environmental water quality target achievement, although not all goals will be met in time. The long tradition of water management with resulting well-financed authorities and organizations, highly developed institutions and a good integration of expert and local knowledge might be reasons for this. As a consequence, the deterioration ban and its exemptions play only a minor role in Dutch water law.

5.3. Comparison

In general, although being based on the very same, rather precise wording of the WFD deterioration ban on the EU level and its almost literal incorporation in Member State legislations, there are differences in the application and enforcement of the deterioration ban and use of the exemption of permanent deterioration in Lower Saxony and the Netherlands. In Lower Saxony, we found project-specific justifications for the use of permanent deterioration exemptions in current river basin management plans. In the Netherlands, the deterioration ban seems to be understood more as a general planning obligation. Consequently, justifications in river basin management plans remain global and not project-specific.

Moreover, there are clear differences in the administrative structure to apply WFD requirements 'on the ground': While the Lower Saxon administration mainly represents territorial borders of administrative entities, the Dutch structure is based on hydro-morphological characteristics. In addition to that, Dutch regional water authorities seem to be financed in a healthy way, presumably due to the establishment of own, target-bound taxes. The Netherlands provide an administrative structure with more (specialized) personnel, better equipped to fulfil WFD requirements, although severe threats like pollution with nutrients and pesticides are mainly regulated at the national level. Furthermore, the Lower Saxon differentiation between water body development and maintenance appears to be too unclear to meaningfully distribute tasks between the different involved actors.

Next to these major differences, there are also some similarities. In Lower Saxony, the deterioration ban developed into a strict permit requirement for (large-scale) infrastructure projects. Also in the Netherlands, there are some instances of the relevance of the deterioration ban in permit decisions, for example for the *Steigersgracht* project in Rotterdam. So, infrastructure projects need to be rigorously justified by authorities granting permits and this justification is fully verifiable by courts. We thus observe a major influence of ECJ jurisprudence on Member State dogmatism.

In both cases, a potential breach with EU requirements is identifiable: In the Netherlands, the way the deterioration ban is implemented and applied in permit decisions contrasts with the ECJ interpretation of the role of the deterioration ban since the *Weser*-ruling. Furthermore, the transposition of quality targets without foundation in formal law might constitute a deficient transposition. In Lower Saxony, goal achievement is alarmingly low. Perceived reasons are an unclear division of competences regarding water body maintenance and development and the precarious financial situation of water management authorities. If a competent authority is designated by a

Member State, but not able to fulfil WFD requirements because of lacking financial means, then this likely constitutes a breach with the EU directive. Both Member States need to work to prevent these situations to become actual breaches, already in their own interest of avoiding costly sanctions as well as due to public pressure.

Table 3. Main similarities and differences in the transposition, application and enforcement of the WFD deterioration ban and the art. 4 (7) WFD exemption in Lower Saxony and the Netherlands.

	Transposition	Application	Enforcement
Similarities			
	<ul style="list-style-type: none"> - All relevant requirements are incorporated in both bodies of law. 	<ul style="list-style-type: none"> - There is generally a similar understanding of what constitutes a deterioration (<i>Weser-ruling</i> understanding). 	<ul style="list-style-type: none"> - Strong influence of ECJ jurisprudence on Member State dogmatism is observed.
Differences			
Lower Saxony	<ul style="list-style-type: none"> - The WFD wording has been incorporated precisely in both federal and state law. 	<ul style="list-style-type: none"> - The deterioration ban is a strict permit requirement for large-scale projects since the <i>Weser-ruling</i>. - The financial situation of water management is fraught. - Non-designated water bodies are regarded to the extent that they affect listed water bodies. 	<ul style="list-style-type: none"> - An advanced dogmatic understanding of reasons of overriding public interest justifying deterioration has developed. - Environmental associations play a key role in using the deterioration ban to stop infrastructure projects. - There is unclear, disputed understanding of what constitutes physical characteristics of a water body.
Netherlands	<ul style="list-style-type: none"> - Ecological quality targets for artificial or heavily modified water bodies do not have the status of formal law. 	<ul style="list-style-type: none"> - The deterioration ban mainly constitutes a planning requirement for management authorities. - Regional water authorities are specialized and well equipped. - WFD principles are applied voluntarily on non-designated water bodies. They are sometimes included in management plans, but not in legal requirements. 	<ul style="list-style-type: none"> - There are few cases and developments of the deterioration ban by courts. - Plans and programmes of measures cannot directly be discussed before the administrative courts, contrary to permits. - Diverse interest groups participate in decision-making in regional water authorities. - Physical characteristics of a water body seem to be understood as solely hydro-morphological characteristics.

6. Discussion

Main comparison result is the different role of the exemption of permanent deterioration for justifying water quality deteriorations. While being interpreted mainly as specific justification for large-scale infrastructure projects in Germany, it has more the role of a planning level management objective in the Netherlands. Both approaches have positive and negative aspects regarding achievement of the goal of good water quality: Whereas the Dutch approach fosters a holistic analysis of the overall water system, thus also allowing for cost-efficient solutions, the German approach provides environmental associations with a sharp sword to stop major negative environmental impacts due to economic interests. The deterioration ban, in conjunct with its exemptions might thus function as a suitable tool to balance environmental, social and economic sustainability interests.

It is questionable which interpretation of the role of the permanent deterioration exemption constitutes a more certain interpretation of EU requirements. The Lower Saxon approach reflects the clear wording of the *Weser*-ruling. In addition, also the effectiveness argument can be applied: In order to be effective, EU provisions need to be applied so that the provision's goals are achieved in the best and most efficient way (*effet utile*). The Dutch interpretation of the deterioration ban as a management objective restricts the effectiveness of the regulation against the clear wording of both directive text and jurisprudence. Furthermore, the systematic argument of the design of art. 4 WFD with clear objectives and conditions, as well as detailed exemptions calls for a direct application in permit decisions. This speaks for a higher compliance with EU obligations of the Lower Saxon approach. Moreover, the deterioration ban as applied in Lower Saxony results in the legal protection of interested parties (such as environmental associations) claiming environmental damage due to project realizations.

In general, goal achievement between Member States lacks comparability: Every Member State has different conditions, such as water quality pressures or hydro-geological characteristics. The designation of artificial and heavily modified water bodies as competence of the Member States adds to this lack of comparability. Consequently, quality achievement should be compared on a temporal scale within one Member State, with similar analytical methods and standards. Such an approach also seems to be the basic idea of the Water Framework Directive, introducing management cycles and iterative monitoring instead of fixed quantitative quality targets. However, comparison between member states is useful and needed for transboundary river basin management.

Also after comparing transposition, application and enforcement in Lower Saxony and the Netherlands, there are still some open legal questions. First, the interpretation of *new modifications to the physical characteristics* of a water body remains somewhat unclear: While the Dutch interpretation seems to regard hydro-morphological quality component characteristics only, the German debate is more nuanced. Legal certainty might be brought by future ECJ rulings on this matter.

Second, the requirement of *overriding public interest* might enable authorities and consequently also courts to balance differing interests. There is more legal certainty regarding reasons to justify deteriorations in accordance with the permanent deterioration exemption requirement of overriding public interest due to the ECJ *Schwarze Sulm*-ruling. It is visible in Lower Saxon river basin management plans that reasons are framed in the way that was already successful in the *Schwarze Sulm* case: The production of renewable energy in order to mitigate climate change by lowering CO₂ emissions in energy production seems to have become a permissible justification for water quality deterioration. At the moment, this exemption has been used for waterpower generation facilities as well as installations to make offshore wind energy production possible. However, in our point of view, we should be careful in using the renewable energy production argument without further reflection. Imagining possible other application cases in this regard, the exemption could be used to enable large-scale intensive biomass production in the realm of renewable bio-based energy, possibly generating overshoot nutrient discharges in aquatic systems, causing severe water quality deteriorations. Moreover, also the construction of water energy facilities can have negative

environmental impacts, like the blocking of fish routes if no additional measures to protect fish migration are taken.

Third, it is also not legally certain to what degree and *under what conditions a deterioration can be equivalated* by other quality improvements [51]. The determination of justifiable costs for measures to achieve good water quality is in the end also a political choice that cannot be answered conclusively by the legal system alone.

7. Conclusions

The conducted legal comparison provided a fruitful experience to learn about similarities and differences in implementing the WFD deterioration ban and its exemptions in two different Member State legislations. We present some lessons learned by conducting this comparative legal analysis.

First, legal scholars should further broaden their perspective to interpret vague legal concepts in EU directives by analysing jurisprudence in multiple Member States. For example, the work on what constitutes overriding public interest justifying deterioration or what to understand as physical characteristics of a water body seems to be more nuanced in Germany, to a large part because more deterioration ban cases are actually enforced due to the strict application on the permit level. Still, some legal questions regarding the WFD deterioration ban remain unclear in both cases, for example: 'To what degree does river basin management planning need to take non-designated water bodies into account?' 'Who defines overriding public interest: water management authorities, the public, national courts, ministries, or the ECJ?' or 'What is the role of scientific uncertainty in determining what constitutes a deterioration?' International cooperation in legal science should be fostered, also considering different interpretations of other disciplines and non-academic experts.

Second, the current administrative and financial water management structure in Lower Saxony is on the way to a breach with WFD requirements. Lower Saxony could benefit from adopting, adapting and improving some elements of the Dutch regional water authority structure: In our view, competent authorities should be organized according to hydrogeological characteristics, rather than administrative borders. Moreover, water management authorities should be able to base their financing directly on own taxes and fees. The Dutch situation shows the effect of direct financial flows on the effectiveness of the water management system. Furthermore, the marginally attractive system of formalized public participation should make room for the institutional incorporation of relevant interest groups into water management decision-making boards in Lower Saxony.

Third, some uncertainty and ambiguousness could be diminished by national legislation: In Germany, the differentiation between water body development and maintenance should be demarcated clearly and connected with precise responsibilities. In the Netherlands, environmental targets should receive a legal foundation in form of a formal law or at least laid down in a Decree instead of including the environmental objectives for artificial and heavily modified water bodies in a management plan and referring to expert guidelines. The Dutch 1% assessment remains too simplistic to form a convincing operationalization of what constitutes a measurable deterioration.

Future research could contribute on highlighting the continuous critical monitoring of legal interpretation developments, at least during the next management cycle and potential other management cycles being added to achieve good water quality in the European Union. The effectiveness of a directive to stimulate more sustainable water management is highly dependent on interpretations and application practices in the Member States. Member States not willing or able to comply rigorously with directive requirements might weaken WFD compliance and hereby endanger environmental objective achievement, particularly in international river basins. It is also the task of (legal) scholarly to keep an eye on the implementation process in different Member States. Hereby, we should not only regard legal transposition, but also application and enforcement in the individual Member States. Next to normative, dogmatic studies, also comparative and empirical studies contribute to this aim.

Moreover, future research might monitor changes of the WFD on European level. Changes with importance to the application in Member States should resonate and be reflected in scholarly

debates on both European and Member State level. Also changes in the national systems need to be evaluated, for example the current development towards an integrated environmental and planning act (*Omgevingswet*) in the Netherlands and its relationship towards legislation that regulates the use of pesticides and nutrient pollution.

Furthermore, it should be questioned critically at what point lacking or ineffective Member State financing of the water management system constitutes a breach with WFD requirements. The Dutch system is well financed, while financing for Lower Saxon WFD implementation is lacking. In our point of view, effective transposition, application and enforcement of the directive requires a suitable financing of the designated competent authority. Otherwise, the directive's objective cannot be achieved. The ability to finance water services and water management can be supported by the obligation of art. 9 WFD, dealing with the cost recovery of water services.

Lastly, interdisciplinary approaches in constituting a deterioration are needed: When does a quality component degrade? What constitutes a deterioration? And what is the role of scientific (measurement) uncertainty in this? How can monitoring contribute to a better understanding of the effectiveness of measures? These are questions requiring insights from legal, social and natural sciences working together on a common conceptual understanding.

In the end, water remains the base of life on earth. There is still a long way to go to actually achieve sustainable water management and a good ecological quality of surface waters in the European Union, also after the end of the 'last' WFD planning period in 2027.

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